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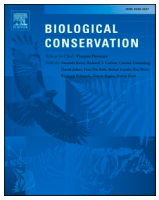

Understanding the diversity of values underpinning forest conservation

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ABSTRACT

Values are the motivational goals that underpin individual and group decisions, attitudes, and behaviours, and often influence the success of conservation. Existing studies have provided insight into the perceptions and attitudes of stakeholders towards forest conservation values. However, there are still contentions among different stakeholders regarding the values underpinning conservation policies and programs. It is still unclear what values matter most to people in forest conservation. Moreover, the specific values that can motivate and empower people to participate in conservation remain poorly understood. We examined these issues using the human value orientation lens, a framework that captures the features of human relationships and interactions with forests and with other forest users. Given the need for conservation policies and programs to align with the priorities of local people, characterising multiple stakeholder perspectives can help us to better understand and untangle the conflicting interests and diverse motivating values influencing conservation policies and programs. Working in Nigeria, a country with one of the highest rates of global deforestation, we use the Q-methodology to capture and describe the viewpoints of multiple stakeholders regarding the values that underpin forest conservation. We identify three factors representing these values, and show heterogeneity in the viewpoints held by different stakeholders. The first factor explained 24 % of the study variance and identified environmental and management values as essential. This viewpoint was largely held by hierarchical stakeholders, forest experts, and forest staff. The second factor explained 12 % of the study variance, and identified cultural values that were predominantly held by forest users. The third factor explained 13 % of the study variance, and identified economic values that were mostly held by forest experts and forest users. Our study shows a diversity of value types held for forest conservation and that there are broad differences between stakeholders regarding their viewpoints. To enhance conservation success, in addition to focussing on consensus values, decision- and policymakers should better differentiate value types that target the specific needs of stakeholders.

1. Introduction

Forest conservation pursues multiple environmental, economic, social, recreational, aesthetic, and cultural objectives. Achieving these objectives is challenging and has been described as a 'wicked problem' due to different stakeholders' conflicting values, interests, and goals regarding the focus of conservation (Mazziotta et al., 2017; Redpath et al., 2018). Resolving conservation conflicts using conventional conservation approaches has proved difficult and ineffective (Mason et al., 2018). Given the multiple goals of forest conservation and the complex nature of conservation conflicts, it becomes crucial to design and implement conservation policies and programs that can deliver needs-specific and relevant projects and attract public support. One way to achieve this is for conservation policies and programs to capture multiple human values and the contrasting interests of different stakeholders. According to Engen et al. (2019), conservation values often differ between stakeholder groups. This is important because the perceptions held by different stakeholders will affect conservation management approaches (Joa and Schraml, 2020). As found by Hoel et al. (2022), one of the social complexities linked to the degradation of natural resources is the clash of perceived conservation values by different stakeholders.

Evidence from most studies that have attempted to evaluate the effectiveness of forest conservation policies and programs, especially in

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the tropics, suggests that despite the proliferation of policies and programs, many have been unsuccessful in achieving their objectives (Börner et al., 2020). For instance, while Magessa et al. (2020) found that low public engagement in forest management is responsible for the failure of participatory forest management policy, Höhl et al. (2020) attributed poor equitable benefit sharing as one of the factors that generate failure in forest conservation. Similarly, the dominance of economic agendas within government institutions can often sideline other concerns (Fatem et al., 2018). Moreover, when narratives in forest conservation policy and program documents are at variance with the values held by stakeholders, conservation efforts can be weakened, resulting in policy failure. According to the latest assessment report on the diverse values and valuation of nature from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES] (2022), only 2 % out of over 1000 reviewed studies consulted stakeholders on nature valuation and only 1 % of the studies involved stakeholders in the step-by-step process of valuing nature. This disconnection between how nature is valued in policy, and the values that stakeholders might hold is likely to result in policies that are not consistent with local realities and viewpoints.

Conservation policies and programs and their intended and unintended behavioural outcomes are intrinsically social phenomena (Mascia et al., 2003). As social phenomena, they are heavily influenced by human values. Human values have been defined as motivational goals or concerns that influence an individual or institutional attitude, behaviour, and actions towards the environment (Ives and Kendal, 2014). Value defines what is important and determines the worth/importance of an object or subject for the well-being of a people. Value concepts used in forest conservation studies can be categorised under three broad orientations: anthropocentric value, biocentric value, and relational value orientations (Ihemezie et al., 2021). While anthropocentric value orientation is a cluster of instrumental or utilitarian human values that seeks to use forest and forest resources to satisfy human needs or achieve a pre-determined end, biocentric value orientation is a cluster of nature-centred and intrinsic values that seeks the existence of forest resources independent of use or function (Fritz-Vietta, 2016; Rickenbach et al., 2017). Relational value orientation is a cluster of social and cultural values that considers the appropriateness of one's relationship with the forest and other forest resources users (Chan et al., 2016; Jones et al., 2016). This is because people do not always make conservation choices solely based on forests' utilitarian or intrinsic values. Understanding the values underpinning most national conservation policies and programs could help explain why many national conservation efforts have not been able to address the problems they intended to solve.

In many developing countries, particularly those lacking a tradition of societal engagement in informing policy, policymakers give little consideration to the values and opinions of stakeholders (Badiora, 2020). In addition, analyses are lacking regarding the values underpinning forest conservation and how national forest conservation policies and programs have integrated human values. Here, we characterise the values presented in Nigeria's forest conservation policy and program documents and examine different stakeholders' viewpoints regarding the values that they think are important in underpinning forest conservation. The overarching aim is to explore the values underpinning forest conservation in order to better understand what should constitute the most important values in forest conservation. Specifically, we ask i) what are the viewpoints of different stakeholders regarding the values underpinning forest conservation? ii) and how do the values of the different stakeholders compare and contrast with each other?

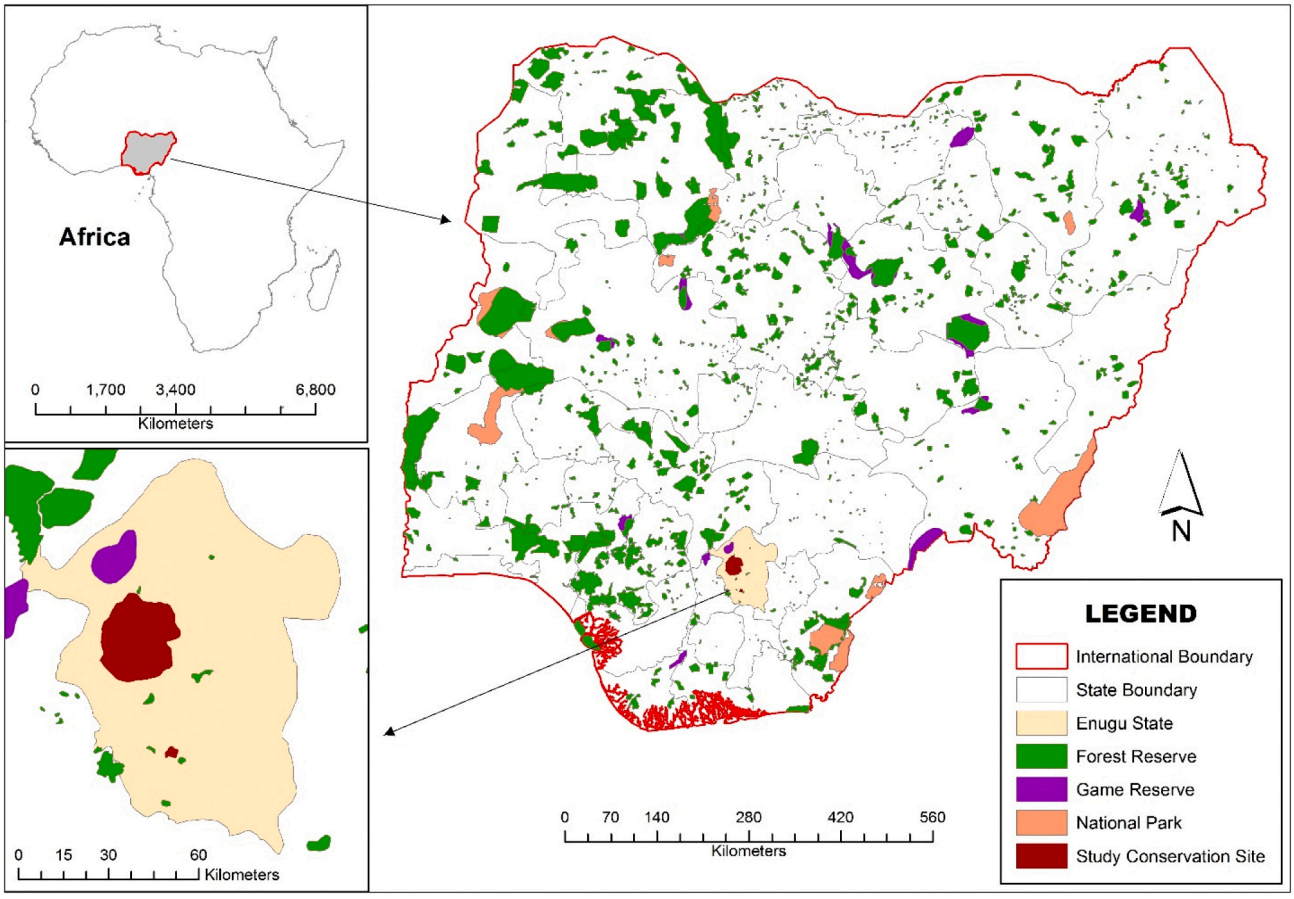

Fig. 1. The location of Nigeria in Africa (upper inset), the distribution of different forest conservation areas across the country and the location of Enugu state and the study conservation sites (lower inset).

2. Methodology

2.1. Study area

Nigeria (Fig. 1) has a population of 206.4 million (Nigerian Bureau of Statistics, 2020) and has a total land area of 923,770 km^2 (Food and Agricultural Organization [FAO], 2015). Nigeria was considered suitable for this study because, apart from being a natural resource-based economy (Inuwa et al., 2022), Nigeria's forest is a unique part of the Guinean Forests of West Africa Biodiversity Hotspot (Luiselli et al., 2019). Forests play a critical role in livelihood sustenance, contributing about 2.5 % to Gross Domestic Product (National Forest Policy, 2020). However, according to the Global Forest Watch report (2018), the country has experienced one of the highest deforestation rates globally. The 2020 Global Forest Resource Assessment Report places Nigeria's forest cover at below 8 % of the country's landmass. Over 5 million ha (6 % of forest area) have been lost in the last 30 years (World Bank, 2020), and the rate of deforestation still stands at between 3.7 % to 4 % per annum (National Forest Policy, 2020). Previous studies have provided proximate causes of deforestation in Nigeria, such as agriculture, logging and timber extraction, charcoal production and fuelwood collection, livestock grazing, and uncontrolled fire (Adetoye, 2019; Hosonuma et al., 2012). However, one underlying reason that is largely unexplored could be the lack of understanding of the role of human values in influencing policy uptake and enforcement.

Within Nigeria, forests play a substantial role in supporting household income and economic prosperity, something that is particularly true of states in the southeast of the country, such as Enugu state (Nzeh et al., 2015). However, Enugu state has forest reserves that have been subject to some of Nigeria's highest levels of deforestation (Mba, 2018). The state has 12 government forest reserves with a land area of about 35,000 ha, but these forest reserves experience an annual deforestation rate of about 5.7 % (Enugu State Forestry Commission, 2020). This rate is relatively high compared to the national average of 4 % (Orji, 2021). Furthermore, deforestation has been cited as one of the major causes of frequent flooding, erosion, and siltation of water bodies (Nzeh et al., 2015). These necessitate improvement in the state's conservation and management strategies of protected forest areas. The two largest forest reserves in Enugu state (Enugu and Akpakume Nze Forest Reserves) were selected because of their high potential for ecotourism revenue generation (Amalu et al., 2018; Eboh and Ujah, 2005). These forest reserves are currently under threat due to pressure from urbanisation and industrial development. Enugu and Akpakume Nze Forest Reserves have areas of 1139 ha and 911 ha respectively (Enugu State Forestry Commission, 2020).

In terms of conservation efforts, Nigeria has 986 government forest protected areas, comprising 925 forest reserves, 32 game reserves, seven national parks, two wildlife sanctuaries, and one strict nature reserve (World Database on Protected Areas [WDPA] 2018). Several policies and programs have been set up to support biodiversity conservation, including the National Biodiversity Strategy and Action Plan (2016–2020), National Forest Policy (2020 and 2006), National Park Service Act (1999, amended 2006), and the National Policy on the Environment (1989, amended 1999). However, the country's forest conservation policies and programs have not reduced forest biodiversity loss or achieved other conservation objectives (Enuoh and Ogogo, 2018).

2.2. Methods

We employed Q-methodology to examine the viewpoints of different stakeholders regarding the values underpinning forest conservation. Q-methodology is exploratory and semi-quantitative, and provides a coherent and structured means of eliciting diverse viewpoints from different stakeholders on various social issues (Zabala et al., 2018). It allows the categorisation of discrete viewpoints into groups/clusters of value stands using a bottom-up approach (McKeown and Thomas, 2013). Q-methodology is an effective way to explore human perspectives (Watts and Stenner, 2012). It is most suitable for this study because, unlike other unidimensional approaches that measure human values using single scales like monetary value or market worth, Q methodology captures multiple values, including intangible values that cannot be easily quantified in monetary terms, such as cultural identity, spiritual existence and social relations (Pike et al., 2015). It does this by combining qualitative techniques to elucidate subjective viewpoints, with the statistical robustness of quantitative analysis (Watts, 2015).

Q methodology follows a systematic approach that starts with collecting the whole spectrum of subjective opinions/statements, representing a comprehensive viewpoint around the subject of study (Zabala et al., 2018). We followed the four-stage process of Q-methodology (Zabala et al., 2018) which involves i) research design (concourse development, Q-set, ranking grid, and p-sample); ii) data collection (sorting a set of 40–60 statements by participants, from the most to the least agreed, and post-sort interview); iii) data analysis (factor extraction, factor rotation, and (flagging of factors); and iv) factor interpretation.

2.3. Statement creation

We constructed 45 statements (concourse) relating to perspectives on the values underpinning forest conservation, using a combination of value narratives identified from 12 forest conservation policy and program documents from the Nigerian government, 11 peer-reviewed papers, and 10 online media (see Supplementary material S1). Through this approach, we identified a wide range of forest value statements and value types covering all sections of the human value orientation framework (i.e., anthropocentric, relational, and biocentric value orientations) (Ihemezie et al., 2021). Duplicate statements were removed, leaving 45 forest value statements (Q-sets) that included 30, ten and five statements for anthropocentric, relational, and biocentric value orientations, respectively. Pilot testing was carried out with four respondents to confirm that statements were easily understood. Following the pilot, some statements were slightly rephrased for clarity and conciseness.

2.4. Stakeholder identification

To identify participants (P set), a systematic inventory of potential stakeholders whose viewpoints matter in forest conservation was put together using four categories: hierarchy, knowledge, function, and user (Nkiaka and Lovett, 2019; Ballejos and Montagna, 2008). These categories represent different levels of interest, goals, influence, and knowledge in forest conservation (Table 1).

Following Watts and Stenner's (2012) recommendation to select fewer participants than the number of items in the Q set, we interviewed 35 people from the four stakeholder categories (Table 1). To identify participants under hierarchical, knowledge and functional categories, we selected relevant institutions responsible for forest conservation at the national level for Nigeria and for Enugu state. These include the Department of Forestry Ministry of Environment, Abuja; National Agency for Great Green Wall, Abuja; National Parks Services, Abuja; Forestry Research Institute of Nigeria, Abuja; Enugu State Forestry Commission, Enugu; and key forest conservation NGOs in Nigeria, such as Nigerian Conservation Foundation and Nigerian Society for Conservation of Biodiversity. Participants under the hierarchical, knowledge and functional categories were identified by visiting their offices in Abuja, the capital territory of Nigeria, and in Enugu, Southeast Nigeria. We then employed non-probability snowball sampling to select participants, whereby selected participants provided referrals to recruit other participants suitable for the study within their category. At each of the institution visited, we first identified the head, who then pointed us towards other relevant staff within different categories. Interviews with participants in hierarchical, knowledge, and functional categories were

Table 1
Classification and selection of participants in different stakeholders categories.

Category	Definition	Number
Hierarchical	These are stakeholders with influence and authority on Nigeria's forest conservation policies and programs. They include government commissioners of the environment, heads of environmental institutions, departments, parastatals, and agencies. Their interest in forest conservation is expected to be high but can also be affected by other factors such as politics. Here, decision makers were interviewed, two each from Enugu State Forestry Commission, Enugu; Department of Forestry Ministry of Environment, Abuja; National Parks Services, Abuja; and National Agency for Great Green Wall, Abuja.	8
Knowledge	These are expert stakeholders with relevant knowledge and skills in forest conservation in Nigeria. They include conservation researchers in universities and research institutes, international organisations, environmental consultants, and NGOs. They have a high level of interest in forest conservation, but their level of influence is limited. Here, three forestry researchers were interviewed from the University of Nigeria, Nsukka, Enugu state and two from the University of Abuja. Also interviewed under this category are Coordinators from Nigerian Conservation Foundation, Abuja; Forestry Research Institute of Nigeria Abuja; and Nigerian Society for Conservation of Biodiversity.	8
Functional	These are stakeholders who are formally responsible for forest conservation issues in Nigeria. They include field staff working in institutions, departments, parastatals, and agencies of forestry who prepare and implement forest policies and programs. They are also expected to have a relatively high level of interest and influence on forest conservation. Here, field staff were interviewed, two from the Department of Forestry Ministry of Environment, Abuja; National Agency for Great Green Wall, Abuja; National Parks Services, Abuja; and three field staff from Enugu State Forestry Commission, Enugu.	9
User	These are local people living around protected forest areas who are directly or indirectly dependent on forest resources and are also affected by forest conservation. Their level of interest in forest conservation varies depending on their conservation goals. But they have the least influence on conservation.	10
Total		35

conducted in English. Following a reconnaissance survey, participants under the user category were identified from households around two threatened forest reserves in Enugu: Enugu and Akpakume Nze Forest Reserves.

2.5. Data collection

Data were collected using the Q-Method software- a web-based platform, which was physically presented to the participants on a tablet in their offices and households. Before starting the sorting process, an information sheet addressing ethical issues was presented, explaining the participant's involvement and activity, free and informed prior consent, voluntary participation and withdrawal from the study, anonymity and confidentiality, and data access and protection. The information sheet also explained the purpose of the study, including the meaning of key terms like values and forest conservation in the context of this study. This was to ensure an understanding of the subject matter and to verify the consistency of definitions. Participants read all 45 statements (or where they were unable to read, the statements were read to them). They then indicated whether they agreed with, disagreed with, or were neutral/uncertain about each statement. Participants then sorted all statements into a quasi-normal distribution grid ranging from +4 (most agreed) to −4 (least agreed). Sorting was immediately followed by the collection of participants' socio-demographic data (gender, age, level of education, income, and household cooking energy source). These demographic data were used to understand other variables that influenced participants' viewpoints during factor interpretation. A post-sorting conversational interview followed this. Post-sorting interviews allowed us to understand the motivations behind sorting patterns, especially statements placed at the extremes of the ranking grid (Guenat et al., 2019). Interviews were recorded with the participants' permission and later transcribed, coded, and analysed. Data collection followed the same process for all stakeholder categories. Ethical approval for the work was granted by the University of Leeds Research Ethics Committee (Reference Number: AREA 21-002). Interviews with the forest users were conducted in English or Igbo according to their preferences. Interviews conducted in Igbo were translated to English during data analysis.

2.6. Q analyses

Q-sorts were analysed using the PQMethod 2.35 software. A 35 × 35 correlation matrix was produced from our Q-sort and subjected to Centroid Factor Analysis (CFA). Our first CFA extracted seven factors, which were rotated using the Varimax method. The following decision criteria were used to determine the eventual number of factors to analyse and interpret: i) Kaiser-Guttman criterion, which states that only factors with an Eigenvalue (EV) of 1.00 or above should be retained; ii) accept factors that have two or more significant factor loading following extraction (Watts and Stenner, 2012); iii) Humphrey's rule which states that a factor is significant if the cross-product of its two highest loadings (ignoring the signs) exceed twice the standard error (SE) (Brown, 1980). Significant factor loading at $p < 0.01$ significant level was calculated using the equation: $2.58 \times (\sqrt{\text{no of items in Q-set}})$. Standard errors were calculated using the formula: $1 \div (\sqrt{\text{no of items in Q-set}})$. We used the calculated significant factor loading to determine i) Q-sorts that load significantly on a single factor, ii) confounded Q-sorts (that load significantly on more than one factor), and iii) non-significant Q-sorts (those that did not load significantly on any factor).

Out of the seven extracted factors, 5, 6, and 7 were dropped because they did not satisfy the three decision criteria above. Thus, four factors were extracted and rotated again. We examined the correlation between factor arrays and found that factors 1 and 3 were significantly positively correlated with a value of 0.49 ($p < 0.01$) while factors 1 and 4 are correlated with a value of 0.46 ($p < 0.01$). These are highly statistically significant correlations in the context of our study. The implication is that the two factors are too similar to be interpreted as different and may be better understood as alternative manifestations of the same factor or viewpoint. We reduced the number of extracted factors to 3 and rotated again to address this problem. A three-factor solution was, therefore, the focus of our final interpretation. Factor arrays were created by flagging the factors in the Q-method software.

The viewpoints were interpreted by examining each factor's statement scores (z scores) (using the factor arrays in Table 2). Factor interpretation focused not only on the absolute ordering of the statement scores but also on the statement position in one factor relative to other factors. For instance, a statement ranked +2 by one factor is seen as relatively less important if other factors ranked the same at +3 to +4. We used the crib sheet system of Watts and Stenner (2012) in factor interpretation to identify important issues about which a particular factor viewpoint is polarised and how that viewpoint is polarised relative to other factors. The factors were named according to the most dominant value types or the most central idea expressed by each factor viewpoint. Narrative analysis was used to evaluate patterns and gain insight from the post-sort interviews. The patterns/insights were then linked to the factor viewpoints of individual Q-sorts to understand why participants who loaded significantly to the factors had sorted the items the way they did and what extreme sorted items meant to them.

3. Results

The three extracted factors explained 49 % of the study variance,

Table 2
Participant loading for each rotated factor matrix, showing significant sorts, non-significant sorts, and confounders.

Participant number	Participant identity	Factors		
		Factor 1	Factor 2	Factor 3
P1	M42TGEK*	0.6327	0.0611	0.3934
P2	M55TGfEK	**0.4525X**	−0.0570	0.1435
P3	M31TGfEU**	−0.0444	0.0182	−0.3636
P4	M59TGEK	0.2703	0.1427	**0.4137X**
P5	F47TFEK	**0.5935X**	−0.1430	0.0822
P6	M40TGDH	**0.4316X**	−0.0624	0.0635
P7	M53TGDH**	0.3482	−0.1622	0.2496
P8	M59TGEU**	−0.0893	0.1791	0.0080
P9	F55TGDH*	0.4780	−0.1092	0.4852
P10	M60TFFF*	0.5694	−0.1978	0.4319
P11	M44TGkDH*	0.4752	−0.0516	0.3937
P12	F22SKfFU**	0.1390	0.2248	0.0658
P13	M63TKfU*	0.0516	0.5360	0.4793
P14	F65PKfFU	0.1901	0.3691	**0.7778X**
P15	F35TGEK**	0.3126	−0.0993	0.2869
P16	M41TGEK	0.3510	**0.4519X**	0.1376
P17	M52TGCH	**0.5031X**	−0.1821	0.0591
P18	F29TGkFU**	0.2854	−0.2382	0.3264
P19	M56TGkEK	0.1289	0.1949	**0.6323X**
P20	F57TGDH*	0.4882	0.1997	0.6151
P21	M64TGDH*	0.5064	0.2432	0.5580
P22	F69NFFU*	0.0053	0.7484	0.4345
P23	F66PKfFU	−0.0552	**0.7980X**	0.3732
P24	F70NKfFU	0.0000	**0.7436X**	−0.0249
P25	M73NKfFU	−0.0269	**0.6923X**	−0.0435
P26	F26SKfFU	0.2001	**0.7951X**	0.1015
P27	M42TGEF*	0.7025	0.2022	0.4449
P28	F30TGkEF	**0.8504X**	−0.0299	0.0016
P29	M36TGkEF	**0.8311X**	0.0227	0.1270
P30	F47TGEF	**0.8505X**	0.0489	0.0838
P31	F60TGEF	**0.7864X**	0.2651	0.3242
P32	M29TGEF*	0.7725	0.1726	0.4649
P33	F43TGEF*	0.7711	0.2587	0.3968
P34	M58TGkEF*	0.6821	0.2998	0.3923
P35	M35TGEK**	0.3270	−0.3190	0.1529
	Eigenvalues	8.4	4.20	4.55
	% study variance	24	12	13

* Confounder; ** non-significant sorts. Bold numbers with X indicate significant factor loadings of 0.38 above at $p < 0.01$ level of significance. Factor 1: (8) 2, 5, 6, 17, 28, 29, 30, 31; factor 2: (5) 16, 23, 24, 25, 26; factor 3: (3) 4, 14, 19; confounders: (12) 1, 9, 10, 11, 13, 20, 21, 22, 27, 32, 33, 34; non-significant sorts: (7) 3, 7, 8, 12, 15, 18, 35. See Supplementary material S3 for participants' demographic information and identity code meaning.

with 16 out of 35 Q-sorts loading significantly on a factor (Table 2). The three extracted factors also satisfied the requirements of the Kaiser-Guttman criterion, Humphrey's rule, and had two or more significant factor loading following extraction. Our significant factor loading at $p < 0.01$ significant level was ±0.38, while the standard error was 0.15. Table 3 provided the basis for our final factor interpretation. It outlines the factor arrays for each of our study factors, the statement wordings numbers, and the value types associated with each statement.

3.1. Factor 1: environmental and management values

Factor 1 had an eigenvalue of 8.40 and explained 24 % of the study variance. Eight participants' sorts loaded significantly on this factor. These participants include forest experts (knowledge n = 2), forest stakeholders with influence and authority (hierarchical n = 2), and stakeholders formally responsible for forest conservation issues (functional n = 4). They are all educated up to the tertiary level and use gas as their major source of household cooking energy. The income class varies but is dominated by lower-class income (n = 6), followed by the lower middle class (n = 1) and upper-middle class (n = 1). These stakeholders agreed more with statements suggesting that environmental and management values are the most important values underpinning forest

Table 3
The 45 statements sorted by the participants. The statements are linked to their corresponding value type. The factor arrays are the statement scores for each factor which provide the basis for factor interpretation.

Factor arrays					
Value type	Statement number	Statement wording	Factor 1	Factor 2	Factor 3
Economic values	1	Forest management or conservation may restrict access to the forest to harvest wild foods for human food security.	2	3	3
Economic values	2	Forest management or conservation may restrict the harvesting of forage to feed domestic animals.	−1	0	2
Economic values	3	Forest management or conservation will enhance wood and timber production.	1	1	3
Economic values	4	Forest management or conservation may restrict the use of non-wood raw materials like bamboo, fibers, and raffia.	−1	0	4
Economic values	5	Forest management or conservation may reduce fuelwood production.	−4	0	3
Economic values	6	Forest management or conservation will enhance the provision of biochemical and genetic materials for production.	−1	−1	0
Economic values	7	Forest management or conservation will enhance forest contributions to government revenue.	1	−4	−2
Economic values	8	Forest management or conservation will support income generation for forest-dependent communities.	1	3	4
Economic values	9	Forest management or conservation will enhance job creation and employment in the forest sector.	3	4	4
Economic values	10	Forest management or conservation	2	4	3

(continued on next page)

Table 3 (*continued*)

Factor arrays					
Value type	Statement number	Statement wording	Factor 1	Factor 2	Factor 3
		preserve medicinal plants.			
Health values	11	Forests should be managed to support mental health and well-being.	−3	−3	−3
Health values	12	Forests should be managed to help relieve stress and anxiety.	−3	−2	0
Health values	13	Forests should be managed to provide natural space for rest and relaxation.	−2	−1	−2
Educational values	14	Forests should be managed to provide a natural environment for conducting research.	0	−3	−3
Educational values	15	Forests should be managed to provide a natural environment for outdoor teaching/ learning and hands-on experience.	1	−3	−3
Creative values	16	Forests should be managed to provide a natural environment for artistic and technological inspiration.	−3	−2	−1
Creative values	17	Forests should be managed to provide a natural environment that stimulates thinking and mental development.	−2	−2	−1
Recreational values	18	Forests should be managed to provide a natural environment to go for a leisure nature walk.	−1	−2	−2
Recreational values	19	Forests should be managed to support ecotourism development.	2	2	1
Recreational values	20	Forests should be managed to provide a natural environment for hunting for enjoyment.	−3	0	−2
Aesthetic values	21	Forests should be managed to enjoy their beautiful scenery.	0	1	2
Aesthetic values	22	Forests should be managed to preserve an attractive natural environment.	−1	1	1
Cultural values	23	Forests should be managed to preserve cultural identity.	−2	3	−1
Cultural values	24	Forests should be managed to preserve heritage values.	0	4	0
Cultural values	25	Forests should be managed to support spiritual experiences.	−4	2	−3
Cultural values	26	Forests should be managed to maintain a natural environment for traditional practices.	−4	3	−4
Social values	27	Forests should be managed to provide natural environments where people can bond and connect (social cohesion).	−2	2	−4
Social values	28	Forests should be managed to provide natural environments for communal interaction.	−2	2	−1
Social values	29	Forests should be managed in order to align, comply, or contribute to international regulations and obligations on conservation.	0	−4	−4
Management values	30	Forest management or conservation will promote equitable sharing of benefits of forest resources.	3	1	0
Management values	31	Forests should be managed to promote private sector involvement in its management.	3	−4	−1
Management values	32	Forests should be managed to promote community participation in its management.	3	1	0
Bequest values	33	Forest management or conservation will ensure that the forests are preserved for future generations.	2	2	−1
	34		4	−2	1

(*continued on next page*)

Table 3 (*continued*)

Factor arrays					
Value type	Statement number	Statement wording	Factor 1	Factor 2	Factor 3
Environmental values		Forests should be managed to serve as carbon stocks/carbon sinks for climate change mitigation.			
Environmental values	35	Forest management or conservation will support desertification control.	1	−1	0
Environmental values	36	Forest management or conservation will support erosion control.	1	−1	1
Environmental values	37	Forest management or conservation will improve protection against storms.	0	0	2
Environmental values	38	Forest management or conservation will reduce deforestation occurring from land-use change.	2	−1	2
Environmental values	39	Forest management or conservation will support climate regulation such as cool temperatures.	4	1	1
Environmental values	40	Forest management or conservation will support agriculture through pollination and insect control.	−1	1	0
Environmental values	41	Forest management or conservation will support rain formation.	−1	0	2
Environmental values	42	Forest management or conservation will support ecosystem functions such as species diversity.	4	−1	−1
Environmental values	43	Forest management or conservation will improve air quality.	0	−1	1
Existence values	44	Forest management or conservation will ensure the continued existence of wildlife even though I will never use or see them.	0	−3	−2
Existence values	45	Forest management or conservation will protect the existence of native and endangered species.	1	0	1

conservation. They showed a strong agreement that environmental values such as climate change mitigation (no 34, +4), climate regulation (no 39, +4), species diversity (no 42, +4), and reduction in deforestation (no 38, +2), are the most important motivations why forests should be conserved/managed. One of the experts highlighted that forest conservation should seek to promote a hospitable environment: "*Forest trees are the lungs of the earth. They provide us with oxygen and absorb carbon dioxide from the environment. Therefore, without forests, life will be unbearable. This, for me, is the most important reason for forest conservation.*" Therefore, forest conservation was seen as a way to promote a sustainable environment and address some environmental challenges facing the country: "*Various environmental problems are currently threatening Nigeria. Soil erosion is ravaging the southeastern part of the country. There is a high rate of deforestation in the southwest and South-South, while desertification is gradually turning northern Nigeria into barren land. Forest conservation is the only way through which we can tackle these problems and preserve our biodiversity.*"

Stakeholders sharing this viewpoint also related more to statements linked to management values in forest conservation. Here, management options such as equitable sharing of benefits of forest resources (no 30, +3), private sector involvement in forest management (no 31, +3), and community participation in forest management were highly ranked. Functional stakeholders noted that one of the challenges of effective forest conservation in Nigeria is poor stakeholdership and engagement with the public: "*when we carry out afforestation or reforestation projects without involving the local people, they tend to fight the project. So, what we have done to make them have a sense of stakeholdership is to engage them in planting, maintaining, and watching over the forests. We even go as far as asking them what trees they want us to plant. We also train and pay them to collect these plant seeds for us. This way, they feel that the project is their own.*"

Conversely, the participants that loaded significantly onto this factor do not consider cultural value an important motivation for forest conservation. For instance, they mostly disagreed with managing forests to support spiritual experience (no 25, −4), traditional practices (no 26, −4), or to preserve cultural identity (no 23, −2). One functional stakeholder asked: "*Why should forests be managed for religious reasons while more important issues face our country? Do not get me wrong, religion and culture are important, but other avenues are to achieve that.*" Other forest values considered non-essential for forest conservation by these stakeholders include recreational values such as supporting hunting experience (no 20, −3) and non-material health values like managing forests to reduce stress and anxiety (no 12, −3).

3.2. Factor 2: cultural values

Factor 2 had an eigenvalue of 4.20 and explained 12 % of the study variance. Five participants (four forest users and one expert) loaded significantly onto this factor, agreeing more with statements suggesting that cultural values are essential values underpinning forest conservation. Their level of education varies from tertiary (n = 1), secondary (n = 1), primary (n = 1), to no formal education (n = 2). The major source of household cooking energy is kerosene and fuelwood. The income

level varies but is dominated by the poor income class (n = 4), with one lower class income. Participants sharing this viewpoint showed a preference for forest conservation that will preserve heritage values and cultural identity (no 24, +4; no 23, +3): "*This forest is our ancestral heritage which our community is known for. Many people in this country know about the Udi community because of Akpakume Nze Forest.*" The cultural value discourse also raised the issue of equity and indigenous rights in forest conservation: "*There are some trees and animals in this forest that cannot be touched because we believe they are sacred to this community…No matter what the government people are doing, we expect them to respect our culture.*" Similarly, this category of stakeholders values forest conservation, supporting traditional practices (no 26, +3) and spiritual experiences (no 25, +2): "*We have a deep spiritual connection with this forest. Some of us go there to pray and commune with our ancestors. We also use the forest when preparing for the new yam festival. Our chief priest goes there with the elders to perform some traditional rituals so that we can have a bountiful harvest during the next planting season.*" Participants sharing this viewpoint also recognised the value of the forest is the preservation of medicinal plants (no 10, +4): "*You see this Akpakume Nze Forest, one of the unique things about it is that it harbours many medicinal plants and herbs which herbalists and traditional medicine men use for their practice.*"

The statements that were least agreed upon under this factor showed that despite people's preference for economic values from forest conservation, they might not support any forest conservation effort that does not have direct and individualistic value. For instance, they disagreed with forest management or conservation goals that focus on enhancing forest contributions to government revenue (no 7, −4), aligning or complying with international regulations/obligations on conservation (no 29, −4), ensuring the continued existence of wildlife without use (no 44, −3), conducting research (no 14, −3) or outdoor teaching and learning (no 15, −3). They questioned forest conservation that does not have a direct economic benefit: "*I believe the forest is meant to provide for us,…give us money. What use is protecting the forest if it does not benefit us or improve our welfare?*"

3.3. Factor 3: economic values

Factor 3 had an eigenvalue of 4.55 and explained 13 % of the study variance. Three participants (two forest experts and one user) loaded significantly onto this factor. The two forest experts are educated up to the tertiary level while the forest user stopped at the primary school level. Forest experts are also in the lower-class income group and use gas as their source of household cooking energy, while the forest user is within the poor income class and uses kerosene and fuelwood for household cooking. These stakeholders showed a high preference for forest conservation that provides economic values, agreeing with forest conservation that provides income generation for forest-dependent communities (08, +4): "*This forest is a famous tourist attraction in Enugu state. It has employed some of our youths who earn income by showing people around when they visit the forest.*" Similarly, they support forest conservation that enhances wood and timber production (no 3, +3): "*The forest provides valuable commodities like wood and timber which local residents use for housing.*" They also strongly agreed with forest conservation or management that may restrict the use of non-wood raw materials like bamboo, fibers, and raffia (no 4, +4), limit access to the forest to harvest forage for animals (no 02, +2), and reduce fuelwood production (no 05, +3). This shows that they are willing to make concessions or give up some values to achieve greater economic values: "*I agree that measures should be taken to control how people enter the forest to harvest or collect things. If not, they will destroy the forest, and we will lose all benefits.*" However, the participants sharing this viewpoint disagree that social values like managing forests for social cohesion (no 27, −4) are an important motivation for conserving forests in Nigeria: "*I do not agree that forests should be conserved for social activities in this country*."

3.4. Consensus statements

Consensus statements did not statistically distinguish between factors and showed no significant difference between any of their factor loadings (Supplementary material S2). For our three-factor solution, nine out of 45 statements were consensus statements (1, 9, 11, 13, 16, 17, 18, 19, and 43; Supplementary material S2). One observation from our consensus statements is the general disagreement with certain forest values that do not have economic or environmental relevance. According to one of the hierarchical stakeholders: "*We have so many environmental and economic challenges in this country. We should tap into proper management of forest resources to address them. So, while issues like recreation and relaxation are important, I disagree that they should be a priority for our country at this point unless they also bring economic value.*" This is the reason for disagreement with some value statements like providing a natural space for rest and relaxation (no 13, −2, −1, −2) and providing a natural environment to go for a leisure nature walk (no 18, −1, −2, −2), supporting mental health and well-being (no 11, −3), supporting artistic and technological inspiration (no 16, −3, −2, −1), stimulating mental thinking (no 17, −2, −2, −1). Functional stakeholders also concurred with the above viewpoint: "*Some of these issues like using the forest for recreation or aesthetic purposes are important. But they are more suitable for developed countries that have solved most of their basic economic problems, not a country like Nigeria that is still battling basic economic issues.*" This also explains why recreational values like supporting ecotourism (no 19, +2, +2, +1) which has a direct bearing on economic welfare, as well as managing forests to enhance job creation and employment (no 9, +3, +4, +4), aligned with the views of all the participants. According to one of the forest users: "*People are hungry and looking for what to do to earn a living. Remember, a hungry man may not think of a beautiful environment.*" The expert opinion also sheds more light on this: "*It is not as if conserving forests for recreation or artistic purposes is not important, but when faced with a hierarchical option to choose from, I will rather go for forest conservation that will solve our environmental issues and economic problems first.*"

4. Discussion

Many studies have identified the multifunctionality of forests and the multiple outcomes of forest conservation (Oldekop et al., 2016; Benz et al., 2020). However, underlying the goals a conservation program can achieve are the values of the people who can affect or be affected by conservation programs. This study used Q-methodology to capture the perspectives of multiple stakeholders regarding the values underpinning forest conservation. Consensus statements showed a low preference for forest values that do not have economic or environmental relevance. There are two possible explanations for this. First, on economic values, many households in developing countries are of low-income status, lack alternative means of livelihood, and heavily depend on natural resources such as forests (Nerfa et al., 2020). This escalates the tendency for forests to be used to generate sources of income, food, building materials and fuel to satisfy human needs. Secondly, environmental values have become crucial in many developing countries, especially at this time when the economy is increasingly burdened by environmental hazards such as erosion, floods, desertification and drought (Amusa et al., 2018; Inman et al., 2020). The absence of environmental safety nets together with scarce livelihood programs, explains why environmental values matter most in forest conservation. Overall, environmental, management, cultural, and economic forest values were identified as critical values underpinning forest conservation. Heterogeneity in value viewpoints among diverse stakeholders who hold different levels of interest, influence, and knowledge in forest conservation suggests the need for strategic conservation efforts to address the most important issues to the people. Therefore, national conservation policies and programs should recognise diverse and differentiated value interests in forest conservation. Such understanding can be used to better target conservation efforts to appeal to different stakeholders

and/or focus on consensus values.

Statistically, our three-factor solution captured 49 % of the total study variance, indicating the strength and potential explanatory powers of the extracted factors. According to Watts and Stenner (2012), any variance in the region of 35–40 % or above is considered a sound solution on the basis of common factors. This implies that many stakeholders identified with the claims expressed in the three factors, with each factor highlighting different values underpinning forest conservation. Our result aligned with previous studies that have adopted Q-methodology in environmental research. For example, Vargas et al. (2019) produced a four-factor solution which explained 51 % of the total variance in a study that explored public perception on conservation and development in Colombia. Similarly, the studies of Pike et al. (2015) and Nkiaka and Lovett (2019) yielded three-factor solutions, which accounted for 45 % and 59 % of the study variance, respectively. Environmental value is a type of anthropocentric value orientation that seeks to use forests to address environmental problems like climate change, erosion, flooding and water pollution. Environmental values refer to the individual or shared belief that concerns itself with the well-being of the natural environment (Ihemezie et al., 2021). Our finding corroborates the result of a study from European Union (Lazdinis et al., 2019) which identified environmental issues such as climate change and forest protection as part of the eight main priorities for sustainable forest management. Similarly, a study from Eastern Himalayas (Dorji et al., 2019) showed that forest experts prioritised regulating and supporting forest values, which reflect their broad interest in climate change mitigation and biodiversity conservation. In Nepal, Paudyal et al. (2018) reported stakeholders' preference for the establishment of carbon stocks for climate change mitigation as one of the priority values of forest ecosystem services for regional and global benefits. Here we also confirm that environmental value is a priority value in forest conservation in Nigeria. However, this value seems to resonate more with educated people. Their value for the environment is also reflected in their use of gas as a source of household cooking energy, which has a less direct impact on deforestation than fuelwood. Although environmental values feature prominently in the Nigeria's forest policy, our study further revealed specific geographical environmental challenges on which conservation efforts can focus. These include soil erosion in the southeast, deforestation in the southwest and South-south regions of the country, and desertification in Northern Nigeria. Addressing regional environmental challenges can increase the acceptability of conservation projects.

Management value is a type of relational value orientation concerned with how forests are managed in terms of strategies, governance, levels of involvement and participation, and forest resource benefit sharing (Ihemezie et al., 2021). Our findings identified the importance of community participation in forest conservation and the need to partner with the private sector. Chinangwa et al. (2017) noted that to reduce deforestation, the private sector can help provide the funds needed for forest conservation, while local participation has long been essential in determining forest conservation effectiveness and outcomes (Ezebilo, 2011). These results point towards the need to bring together community and private sector involvement in forest conservation to help reduce policy failure issues attributed to low public engagement and participation (Magessa et al., 2020). Participation in this sense means being involved both in the decision-making and the implementation of forest conservation plans (Soe and Yeo-Chang, 2019). While previous studies (De Royer et al., 2018; Lo, 2021) have emphasised the importance of integrating local participation as one way of addressing issues of social justice in forest conservation, the data from our interviews revealed opportunities to involve local people in conservation projects. These include opportunities to decide which trees to plant, seed collection, actual planting of forest trees, and maintenance and protection of forest plantation. Involving people in all these conservation activities can help build local stewardship and ensure continuity even when conservation workers themselves may have left the community (Handberg, 2018).

Cultural value is a type of relational value orientation that seeks to protect nature because of what it means and represents to the people (Kenter, 2016). It upholds communal identity, preserves heritage values, and recognises nature's spiritual, religious, traditional, and ethical dimensions (Ihemezie et al., 2021). Forests are part of cultural heritage (Eriksson, 2018). Our findings suggest that incorporating cultural values in conservation planning and design can make forest conservation a tool to preserve both nature and indigenous cultural identity and heritage. This is also important because when forest values are used to inform conservation decision-making, there is the danger of overlooking intangible and non-material values like culture. Cultural values could also help address the issue of equity in conservation, ensuring that the rights of the local people are respected while implementing conservation programs, supporting the findings of Wells et al. (2021) that integrating equity concerns in ecosystem restoration planning and implementation can enhance conservation outcomes. Our study also showed that local people prefer forest conservation that incorporates and respects cultural values. This aligns with one of the key lessons learned from the two decades of implementing the cultural value approach to conservation by the Fauna and Flora International (Infield et al., 2018). The report showed that cultural values helped align conservation programs with the priorities of the local people, thereby spawning motivation and justification for forest conservation.

Some developed countries have started incorporating cultural values in their national conservation policies and programs. For example, in the United States, Vucetich et al. (2018) showed how nature conservation conflicts were addressed by incorporating stakeholders' cultural values in conservation policies and programs. Torralba et al. (2020) reported the high preference and relevance for cultural ecosystem services among forest owners and conservation managers in European forests. Similarly, Soliku and Schraml (2018) found that, unlike in developing countries where economic and livelihood issues are the leading cause of contentions in forest conservation, the cultural value people attach to protected areas is one of the major drivers of conservation conflicts in developed countries. Although our findings provide evidence that cultural values matter to forest users, it was clearly absent in the review of forest conservation policies in Nigeria. This finding aligns with the IPBES Values Assessment (2022), which shows that conservation policies have predominantly prioritised short-term economic and market-based values such as those associated with forest production, while ignoring non-market values associated with people's relationship with nature such as cultural identity. Mainstreaming cultural values into national forest conservation policies, planning and management will not only ensure that conservation efforts do not undermine cultural heritage, but it will also improve local support for conservation, enhance ownership of conservation projects, and reduce the chances of conservation policies being rejected by local populations.

Economic forest value is the last value type that features prominently in our study. It is an instrumental value under anthropocentric value orientation that seeks to maximise the benefits of forest provisioning ecosystem services (e.g., extraction of timber, food, fruits, fuelwood, meat, medicinal plants) and benefits of forest conservation projects (e.g., income, employment, rural infrastructures like road construction). It is utilitarian and aims to appropriate forest and forest resources to support subsistence livelihoods, improve human welfare, increase household income, and upscale forest contribution to national economic development (Batavia and Nelson, 2017). A key reason why forests are degraded, especially in developing countries, is the plethora of economic incentives that make the conversion of forest lands to other land uses appear more beneficial than forest conservation (Pearce, 2001). Previous studies have established that conservation projects with apparent economic benefits are usually more successful and attract public support and cooperation than those that focus strictly on environmental protection (Nilsson et al., 2016). Our study provided new insight into the scale of economic values for local livelihood benefits and national revenue. In the context of many developing countries, where

there is generally poor public trust in the government to efficiently manage public resources (Msenge and Nzewi, 2021; Pillay, 2017; Shaaba, 2012), forest users seem to prefer the economic values of forests and forest conservation that have a direct impact on their welfare rather than ones that contributes to government revenue. This economic distinction is important when planning for the economic value of forest conservation. Therefore, it means that conservation decision-makers should separate the economic values of the forest at the national level from those at the local level. This is not surprising considering that most of the local forest users are low-income earners who directly rely on the forest for their livelihood.

The importance of economic values in our study agrees with the 'new conservation science' proposal, which seeks to refocus conservation from one that benefits only nature to one that also benefits humans (Doak et al., 2015). Beyond this, our study also showed that the local people are willing to make some concessions or give up smaller economic values like harvesting forage and fuelwood in favour of greater economic benefits like job creation and income generation from forest conservation.

5. Conclusion

Here, we advance knowledge regarding which types of value are most important in forest conservation. Most developing countries have drafted and implemented many forest conservation policies and programs, which have not successfully reduced forest degradation. Understanding how multiple stakeholders perceive the values underpinning forest conservation in Nigeria, one of the countries with the highest rate of global forest degradation, offers insights relevant to other countries struggling to improve the effectiveness of conservation policies and programs.

The results of this study provide empirical evidence of the importance of identifying strategic motivating values in forest conservation. These value perspectives identified by different stakeholders are not necessarily in opposition to each other but instead reveal different ways of valuing forest conservation. Therefore, to enhance the success of conservation projects, conservationists should focus on how contextual motivating values can empower local people to participate in conservation. They can do this by focusing on consensus values or differentiating value interests that target the specific needs of various stakeholders in forest conservation. This is important considering that it is not always realistic to pursue and achieve all of the multiple objectives associated with forest conservation.

CRediT authorship contribution statement

EJI: conceptualisation, methodology, data collection, formal analysis, writing – original draft preparation. LCS: conceptualisation, methodology, writing – reviewing and editing. MD: conceptualisation, methodology, writing – reviewing and editing.

All authors contributed critically to the drafts and gave final approval for publication.

Article impact statement

Recognizing diverse human values in forest conservation can improve the effectiveness of conservation policies and programs.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data for this study is coded to exclude any reference to personal data. It will be made available on the University of Leeds Institutional Repository (http://archive.researchdata.leeds.ac.uk).

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Appendix A. Supplementary data

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