

1 **Title:** The global conservation movement is diverse but not divided

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22 **The global conservation movement is diverse but not divided**

23 **Abstract**

24 Biodiversity is being lost at an unprecedented rate, making the conservation movement of
25 critical importance for life on Earth. However, recent debates over the future of conservation
26 have been polarised, acrimonious and dominated by an unrepresentative demographic group.
27 The views of the wider global conservation community on fundamental questions regarding
28 what, why and how to conserve are unknown. Here we characterise the views of 9,264
29 conservationists from 149 countries, identifying specific areas of consensus and
30 disagreement, and three independent dimensions of conservation thinking. The first two
31 dimensions ('people-centred conservation' and 'science-led ecocentrism') have widespread
32 support, whereas 'conservation through capitalism' is more contentious. While
33 conservationists' views on these three dimensions do not fall into distinct clusters, there are
34 clear relationships between dimension scores and respondents' gender, age, educational
35 background, career stage and continent of nationality. Future debates and policy processes
36 should focus on the most contentious issues, and do more to include the perspectives of
37 under-represented groups in conservation who may not share the views of those in more
38 powerful positions.

39

40 **Main**

41 Conservation is at a crossroads. Biodiversity loss is widely recognised as having serious
42 consequences, but despite decades of effort in policy and site specific interventions,
43 extinction rates remain high^{1,2}. The Convention on Biological Diversity 2010 goal to achieve
44 "a significant reduction of the current rate of biodiversity loss" was not achieved, and there is
45 no indication that the CBD Aichi targets for 2020 will be met³. Against this backdrop,

46 negotiations are underway for the post 2020 Biodiversity Framework of the CBD, which will
47 set the global conservation agenda for at least a decade to come. There is widespread
48 agreement that conservation needs to be more bold and ambitious, and to find more effective
49 implementation measures^{4,5}. However, setting the future direction of conservation is
50 hampered by the existence of various competing proposals which diverge on fundamental
51 questions about why, what and how to conserve^{4,6-9}. Two positions in particular have been
52 prominent in recent debates. Proponents of ‘new conservation’ argue for protecting
53 biodiversity because of its importance to people, and emphasise partnerships with
54 corporations, the natural capital approach, and the use of market-based tools such as
55 payments for ecosystem services^{6,10,11}. Meanwhile advocates of ‘traditional conservation’
56 reject these views, arguing instead for the protection of nature for its own sake and
57 emphasising state-based protected areas and regulation^{7,12,13}. This latter position is associated
58 with calls for the radical expansion of protected area coverage targets in the post 2020 CBD
59 framework to at least 50% of the terrestrial and marine realms^{5,8,9}.

60 The ‘new conservation’ debate has dominated conservation thinking for several years,
61 creating the impression of a stark choice to be made about the future of conservation.
62 However, the debate has been critiqued in various ways. First, for recasting as ‘new’ what are
63 in fact long-standing disagreements in conservation^{11,14,15} over underlying rationales (such as
64 ecocentrism and anthropocentrism)^{16,17}, the role of market based approaches and economic
65 valuation^{18,19}, and the relationship between conservation and development^{14,20}. Second, for
66 falsely suggesting there are only two perspectives, leaving out important alternative views on
67 conservation, such as a ‘critical social science’ view which favours conservation for the
68 benefit of people but disagrees with the use of market based approaches^{4,21,22}. Third, for
69 under-representing the diversity of voices in the wider conservation community, because the
70 main protagonists of the ‘new conservation’ debate are from an unrepresentative

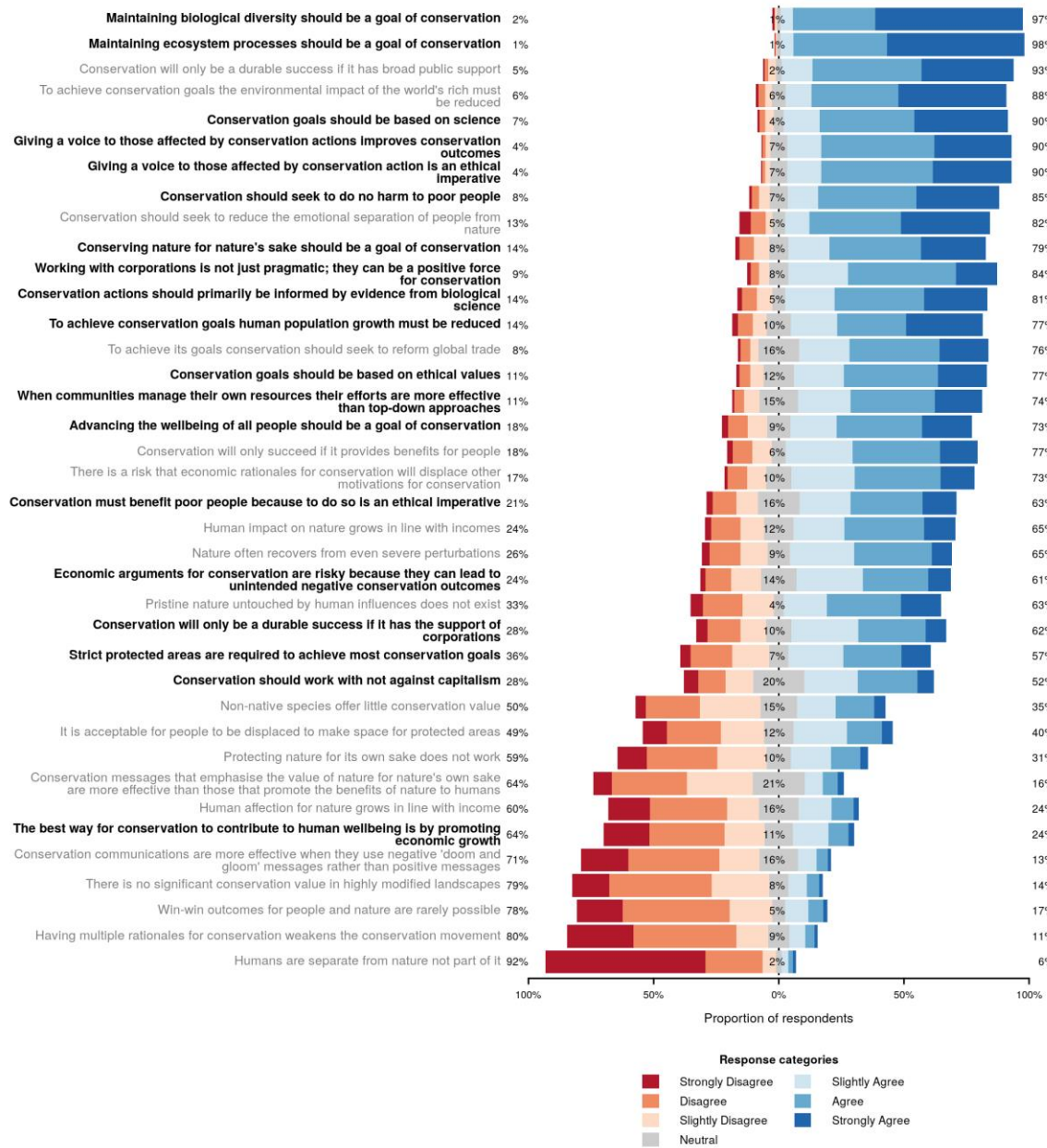
71 demographic group of North Americans who hold senior positions²³. Fourth, for being
72 conducted in an excessively acrimonious and hostile tone^{24,25}.

73 Addressing these critiques and moving the debate forwards requires empirical evidence on
74 the views of the wider conservation community. However, at present these views remain
75 unknown, beyond studies of specific issues such as coexistence with carnivores²⁶. Here, we
76 report the findings of an online survey of 9,264 conservation practitioners and academics
77 from 149 countries (Supplementary Figure 1). This is the largest published survey of the
78 professional conservation community, responding directly to calls for conservationists to
79 carefully identify their views and values, and to express them explicitly^{14,27}. Respondents
80 indicated their level of agreement with 38 Likert items that were designed to assess their
81 views on the issues raised within the new conservation debate, such as the underlying
82 rationales for conservation, how goals should be set and the appropriateness of various tools
83 to achieve those goals (Figure 1; see Methods for details). Respondents also provided
84 information on their gender, age, educational background, career stage and continent of
85 nationality (Supplementary Table 1). The survey was distributed via relevant listservs and
86 through social media channels, targeted to encompass a range of ages and seniority (e.g.
87 postgraduate and early career lists), disciplines (e.g. conservation social science, ecology
88 specialist lists) and geographical locations (continent and country specific lists). The survey
89 was then circulated organically amongst networks of conservation professionals and through
90 social media such as Twitter and Facebook.

91 **Areas of consensus and polarization**

92 We found high levels of consensus among our respondents on multiple survey items, but also
93 important areas with high levels of polarization (Figure 1; Supplementary Figure 2). As might
94 be expected, the strongest consensus was in agreement that the maintenance of biodiversity

95 and ecosystem processes should be goals of conservation. There was also strong consensus in
96 agreement that humans are part of nature, not separate from it. This is perhaps surprising as
97 nature is often spoken of by some conservationists as if it were distinct from people, for
98 example, in the ‘nature needs half’ slogan²⁸. The most polarising issues each have a long
99 history of intensive debate within the conservation community. These included the
100 acceptability of displacing people to establish protected areas²⁹, the need for strict protected
101 areas to achieve conservation goals³⁰ and the question of whether pristine nature untouched
102 by humans exists³¹.



104

105 -----Figure 1 to go approximately here. The legend is at the end of the manuscript -----

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107 **Dimensions of the conservation debate**

108 To examine whether the observed patterns of responses to our Likert items were linked to a

109 smaller number of underlying dimensions of thinking, we carried out an exploratory item

110 factor analysis on our data. Having determined the appropriate number of dimensions to
 111 extract (see Methods) we fitted a multidimensional graded response model³² which correctly
 112 accounts for the ordinal nature of the responses. We then rotated the raw factor loadings to
 113 produce more interpretable results, using an oblimin rotation which allows for the possibility
 114 that the factors might be correlated. As a check on the robustness of our findings, we repeated
 115 this procedure on two randomly selected subsets of the data, each comprising one third of our
 116 total responses (Supplementary Figure 4).

117 Based on these analyses, we identified three latent variables which were theoretically
 118 coherent and consistent across the two replicates. Each variable represents a different
 119 dimension of conservation thinking, which together characterise views on important aspects
 120 of the aims and practice of conservation (Table 1). Dimension 1 (‘people-centred
 121 conservation’) relates to the role of people in conservation, as participants and stakeholders.
 122 Dimension 2 (‘science-led ecocentrism’) relates to the role of science in the conservation of
 123 species and ecosystems, consistent with fundamental elements of ecocentric thinking^{33,34}.
 124 Dimension 3 (‘conservation through capitalism’) relates to the role of corporations, economic
 125 metaphors and market based approaches in conservation (Table 1).

Factor	Item	Text	Loading
F1	30	Giving a voice to those affected by conservation action is an ethical imperative	0.736
	4	Conservation must benefit poor people because to do so is an ethical imperative	0.686
	29	Conservation should seek to do no harm to poor people	0.661
	24	Giving a voice to those affected by conservation actions improves conservation outcomes	0.634
	18	Advancing the wellbeing of all people should be a goal of conservation	0.627
	20	Conservation goals should be based on ethical values	0.449
	32	When communities manage their own resources their efforts are more effective than top-down approaches	0.400
F2	6	Conservation actions should primarily be informed by evidence from biological science	0.635

	10	Conservation goals should be based on science	0.633
	37	Maintaining biological diversity should be a goal of conservation	0.600
	3	Conserving nature for nature's sake should be a goal of conservation	0.457
	21	Maintaining ecosystem processes should be a goal of conservation	0.454
	16	To achieve conservation goals human population growth must be reduced	0.423
	9	Strict protected areas are required to achieve most conservation goals	0.405
F3	15	Working with corporations is not just pragmatic; they can be a positive force for conservation	0.734
	14	Conservation should work with not against capitalism	0.733
	28	Conservation will only be a durable success if it has the support of corporations	0.587
	31	The best way for conservation to contribute to human wellbeing is by promoting economic growth	0.504
	22	Economic arguments for conservation are risky because they can lead to unintended negative conservation outcomes	-0.418

126

127 **Table 1: Factor loadings from a confirmatory three dimensional item factor analysis.**

128 Dimension F1 is labelled as “People-centred conservation”, F2 as “Science-led ecocentrism”,
 129 and F3 as “Conservation through capitalism”. Within each dimension, items are presented in
 130 order from most strongly positive loading to most strongly negative loading.

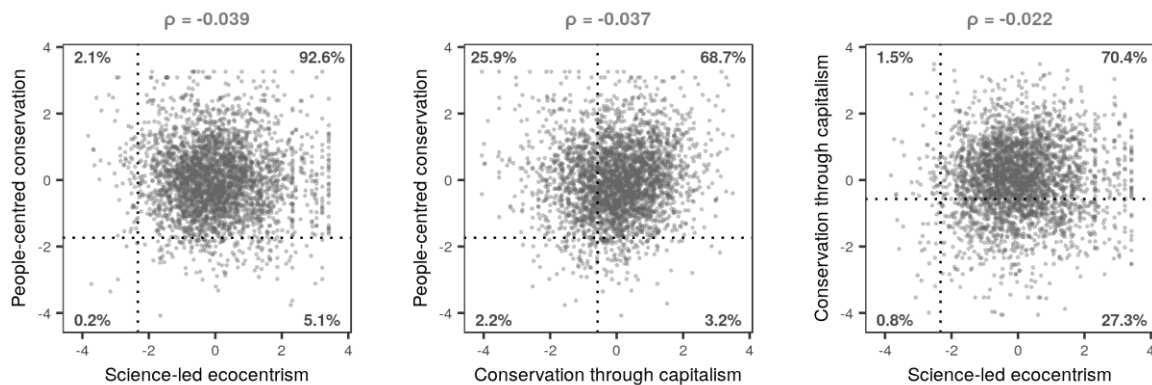
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132 All three dimensions reflect longstanding debates in conservation, although the third has
 133 become particularly contentious in recent years²¹. The three dimensions can be used to
 134 describe a wide range of conservation viewpoints. For example, based on its description in
 135 the literature^{6,7}, the ‘new conservation’ position is people-centred, in favour of conservation
 136 through capitalism but generally critical of ‘science-led ecocentrism’, whereas the ‘traditional
 137 conservation’ position is the converse. If most respondents adhered to the ‘new’ or
 138 ‘traditional’ positions, we would expect them to cluster into two groups corresponding to
 139 these positions, where the positions of respondents on each dimension would be highly
 140 correlated within each cluster. In fact, we found that factor scores calculated from a

141 confirmatory model fitted to a third, independent subset of the responses were not
142 substantially correlated and respondents exhibited a wide range of positions on all three
143 dimensions, with cluster analysis revealing no evidence of distinct sub-clusters (Figure 2;
144 Supplementary Figures 5 and 6).

145

146 To understand better the underlying views of respondents on the Likert items associated with
147 each dimension, we plotted their positions on each dimension relative to the point that would
148 result from a neutral answer to all Likert items (Figure 2). This showed that the great majority
149 of respondents were in favour of both ‘people-centred conservation’ and ‘science-led
150 ecocentrism’, to a greater or lesser extent, despite the fact that these perspectives are often
151 treated as mutually exclusive³⁵⁻³⁷. This might reflect a pragmatic recognition that different
152 approaches are suitable for different contexts, combining to a more heterogeneous overall
153 strategy. Opinions over conservation through capitalism’ were more polarised, with 28.1% of
154 respondents against this approach, contrasting with only 5.4% opposing ‘people-centred
155 conservation’ and 2.3% opposing ‘science-led ecocentrism’ (Figure 2). This relatively high
156 level of concern about ‘conservation through capitalism’ is important given the prominent
157 role of market-based approaches and corporate partnerships in contemporary conservation
158 practice³⁸.



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163 **Conservationists' characteristics predict their views**

164 To find out whether respondents' estimated positions on each dimension were related to
 165 demographic variables, we constructed explanatory models (Figure 3). Demographic results
 166 for 'people-centred conservation' showed that women, those with non-natural science
 167 training and people from Africa, Asia and South and Central America were more in favour of
 168 this approach (Figure 3). The gender result could be linked to the on-average higher levels of
 169 empathy for the wellbeing of other humans among women than men³⁹. The disciplinary result
 170 is likely due to social science and interdisciplinary training emphasising the role and
 171 importance of people¹⁴, although the direction of causality is not clear. The variation between
 172 regions of the world could be linked to geographical variation in the extent to which
 173 conservation actions impact the lives of local residents, or in worldviews on the relationship
 174 between people and their environments⁴⁰. It is striking that within our sample the regions
 175 with stronger support for people-centred conservation contain the great majority of
 176 developing countries.

177 Results for ‘science-led ecocentrism’ showed that women were less in favour of this
178 approach than men, suggesting a gender dimension to these ideas that merits further research.
179 Biological scientists strongly support ‘science-led ecocentrism’ and social scientists strongly
180 oppose it, with other disciplines in the middle. This is not surprising given the strongly
181 contrasting disciplinary perspectives within biology and social science on the statements
182 comprising this dimension. Very senior conservationists were less in favour of this approach
183 than more junior colleagues, perhaps suggesting that those holding these views are less likely
184 to become senior, or that these ideas lose their appeal as one gains professional experience.
185 Finally, support for ‘science-led ecocentrism’ was strongly linked to region of origin, with
186 those from North America and Oceania tending to favour this approach most strongly, in
187 direct contrast to results for people-centred conservation. This could be due to the strong
188 history of ideas relating to wilderness and strict protected area-based conservation in these
189 regions⁴¹.

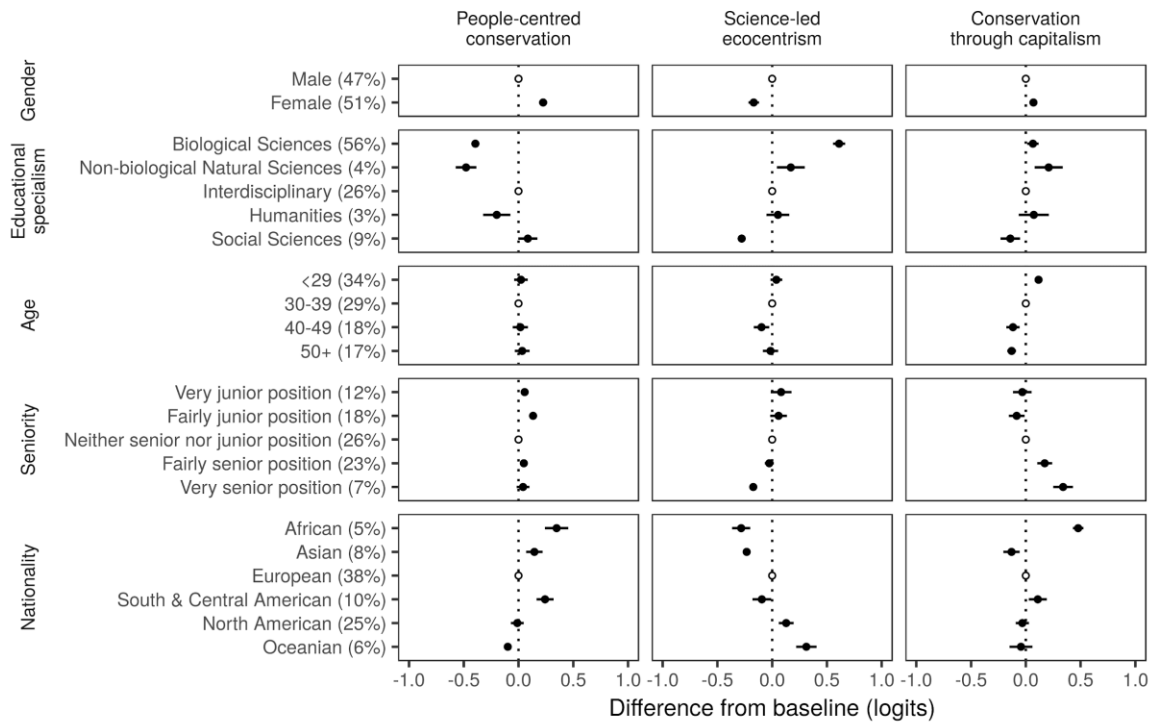
190 Conservation through capitalism was favoured by women, those without social-science
191 training, younger respondents, more senior respondents, and those from Africa. The gender
192 effect merits further investigation. The academic background effect may be caused by the
193 dominance of social science disciplines in research critical of links between conservation and
194 capitalism³⁸, which influences teaching. The age effect perhaps reflects the emergence of a
195 younger generation of conservationists for whom close links to capitalism have existed since
196 before they entered the sector. The seniority effect raises interesting questions about
197 causality, such as whether conservationists become senior because they already hold certain
198 views, or develop them having moved into a senior position, perhaps as a pragmatic response
199 to the funding landscape or prevailing societal views^{42,43}. Finally, the regional result, which is
200 consistent with earlier research¹¹, is likely due to the importance of sport-hunting and

201 photographic tourism as a funding model for conservation in various countries of Eastern and
202 Southern Africa⁴⁴, the regions from which most of our African respondents originated.

203 We found strong relationships between all the demographic variables we investigated and at
204 least one of the three dimensions of the conservation debate. Indeed gender, disciplinary
205 training and continent of nationality were strongly linked to all three dimensions. Further
206 research could investigate these links in more detail. These results support claims that the
207 lack of diversity of participants in recent public debates about the future of conservation has
208 led to an under-representation of certain viewpoints held within the wider conservation
209 community²³. Given power imbalances between different demographic groups, this also
210 raises questions about whether ideas unpopular with some conservationists are being imposed
211 on them by more powerful supporters of those ideas, as has occurred in the past⁴⁵. For
212 example, respondents from Africa, Asia and South & Central America (where most
213 biodiversity is located) tended to be more in favour of people-centred conservation and less in
214 favour of science-led ecocentrism than respondents from Europe, North America and
215 Oceania. Conservation in the former group of continents has, in many cases, been strongly
216 influenced by individuals and organisations from the latter group of continents⁴¹.

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223 **Sample and survey limitations**

224 While our sample is the largest and most diverse of any study of the global conservation
 225 community, it is important to note that the sampling strategy was based on opportunistic
 226 sharing of an online survey and is therefore not representative of the full conservation
 227 community (although in the absence of data characterising global conservationists, it is
 228 impossible to design a truly representative sampling strategy). For example, our sample over-
 229 represents highly educated conservationists from English speaking and wealthy countries,
 230 and under-represents those from non-English linguistic or less internationalised conservation
 231 backgrounds (e.g. indigenous perspectives). For this reason we caution against over-
 232 interpreting our results, particularly for less well represented demographic groups. These
 233 imbalances in our sample matter, because (i) those over-represented have tended to dominate

234 conservation debates, (ii) there are differences in the opinions held by conservationists from
235 wealthier and less wealthy regions, and (iii) most biodiversity is located in less wealthy
236 countries⁴⁶.

237

238 A second limitation relates to the design of the survey itself. The Likert items were developed
239 through a rigorous process (see Methods), and were deliberately focused on the issues at
240 stake in the new conservation debate over recent years. While this debate incorporates
241 elements of many long-standing debates in conservation, it does not capture the full range of
242 possible issues pertinent to the future of conservation, including, for instance, those existing
243 in languages other than English, or in indigenous worldviews. The survey results should not,
244 therefore, be interpreted as based on an exhaustive review of all possible conservation
245 futures. In addition, the Likert items were presented free of context, making it difficult for
246 some respondents to judge their level of agreement, particularly where they felt they would
247 agree in some circumstances and disagree in others. This last point may also help to explain
248 why most respondents agreed with both people-centred conservation and science-led
249 ecocentrism: in many contexts, conservation interventions have to consider trade-offs
250 between maximising biodiversity and human development²⁷, but the survey did not force
251 respondents to reveal a position on such trade-offs. The limitations of this study create
252 interesting openings for further research into broader ideas about the future of conservation
253 and how perspectives vary with context.

254

255 **Conclusion**

256 At a time when the conservation movement is facing bitter internal disputes over its future,
257 our results demonstrate empirically that at the aggregate, global scale, it is less divided than

258 some have claimed^{7,47}. The great majority of conservationists agree with each other on many
259 important questions and their views do not fall into discrete clusters based on their positions
260 on three key dimensions of debate. However, when disaggregating our results by
261 demographic variables, important differences between social groups emerge. These are not
262 sufficient to be considered distinct clusters or camps (Supplementary Figures 5 and 6), but
263 they reinforce the importance of recognising dimensions of social difference in conservation,
264 and how these factors influence views.

265 Our results have important implications for conservation. Shared views on key issues provide
266 the bedrock for any social movement, and the identification of the specific areas where
267 consensus exists within the conservation movement should provide the basis for productive
268 and less hostile engagement. The finding that there are no distinct ‘camps’ within the
269 conservation community also lends credibility to calls for a more inclusive and unified
270 conservation movement^{23,25,48}. Nonetheless, even moderate differences in the extent to which
271 people agree with certain ideas may result in fundamentally different priorities for
272 conservation practice, particularly where trade-offs need to be made. In addition, our results
273 identify several contentious issues that polarize the conservation community, including
274 protected area management and the appropriate relationship between conservation,
275 corporations and capitalism. In some cases addressing a diversity of conservation challenges
276 may be well served by the existence of diverse conservation ideas and strategies^{25,49}.
277 However, where differences are irreconcilable this should be made explicit and deliberated
278 rather than suppressed in the name of inclusivity^{22,26}.

279 The demographic results identify consistent differences in average viewpoints by gender,
280 educational background, age group, seniority and continent. Given historical links between
281 all of these dimensions of social difference and uneven power relations, these findings raise
282 important questions about whose voices get heard in conservation debates, and who is able to

283 influence conservation action. Conservation is a diverse movement, both in people and ideas,
284 and our results support calls for initiatives to ensure improved representation of social
285 diversity in ongoing debates over the future of conservation⁵⁰.

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288

289 **Methods**

290 **Survey design and sampling**

291 Likert items that form the basis of the Future of Conservation survey were used in a previous
292 Q methodological study, which describes the process by which they were derived²¹. Within Q
293 methodology, statements are selected to represent the greatest possible coverage of views that
294 exist among the respondent community on an established debate/topic⁵¹, in this case,
295 published contributions to the ‘new conservation’ debate. Some of the statements resemble
296 what social psychologists have termed ‘attitudes’, which are specific and contextualised
297 views on particular issues; an example of this is the item ‘It is acceptable for people to be
298 displaced to make space for protected areas’. In contrast, other statements represent more
299 fundamental, cross-situational values⁵²; for instance, ‘Conserving nature for nature’s sake
300 should be a goal of conservation’. Based on the experience of our earlier research²¹, and
301 further piloting of the statements to test their practicality as Likert items with an additional 14
302 participants, we made minor adjustments to four items to improve clarity. One further item
303 was also entirely replaced by a new one. The item “plural rationales for conservation weaken
304 the conservation movement”, was replaced with “having multiple rationales for conservation
305 weakens the conservation movement”. The item “nature often rebounds from even severe
306 perturbations” was replaced with “nature often recovers from even severe perturbations”. The
307 item “conservation communications are more effective when they use doom and gloom rather
308 than positive messages”, was replaced with “conservation communications are more effective
309 when they use negative 'doom and gloom' messages rather than positive messages”. The item
310 “conservation messages promoting the benefits of nature to humans are less effective than
311 those that emphasise the value of nature for nature's sake”, was replaced with “conservation
312 messages that emphasise the value of nature for nature's own sake are more effective than
313 those that promote the benefits of nature to humans”. We added one item “When

314 communities manage their own resources, their efforts are more effective than top-down
315 approaches” as we identified this as an element of the new conservation debate that was not
316 included in the original set of statements. We removed one item: “There is a risk that
317 highlighting human domination of the planet may be used to justify further environmental
318 damage” because this was not interpreted consistently by respondents in our previous work²¹.
319 This gave a total of 38 statements as Likert items in the Future of Conservation survey (see
320 Figure 1). The finalised statements in the web survey format were then piloted with 55
321 respondents known to the authors, with feedback sought on the clarity of statements, the
322 medium and usability. No substantial changes were made to the survey after this.

323 **Online survey design and distribution**

324 We developed a bespoke web-based survey built by the Informatics Team at the UN
325 Environment World Conservation Monitoring Centre and hosted at URL:
326 www.futureconservation.org. This incorporated the 38 Likert items, with a corresponding 7-
327 option Likert framework (strongly agree/disagree; agree/disagree; slightly agree/disagree;
328 neutral). We also collected demographic information about respondents. This included
329 information about: gender; age; level of education and educational specialism; professional
330 experience in research/practice; career seniority; nationality; geographical location of work as
331 a conservationist; professional experience beyond the conservation sector; extent of human
332 modification of landscapes where professional experience took place; experience of market-
333 based schemes in conservation; experiences that were perceived to shape conservation values.
334 These demographic questions were tested using the pilot processes described above.

335 The survey was launched and first publicised in March 2017, using the distribution strategy
336 described in the main text. The survey website remains open, but the last date of a response
337 included in this study is 29th May 2018.

338 **Data preparation**

339 Data preparation and analysis was carried out in R version 3.5.0⁵³. Our initial data set
340 contained 11,272 responses. Prior to analysis, we first removed responses that identified the
341 respondent as having previously taken the survey. This included those that had been
342 submitted from the same IP address and had either given identical responses to the thirty-
343 eight Likert items or gave the same email address. We also removed responses where there
344 were missing data for any of the Likert items or demographic questions, or where the same
345 response was given to all of the Likert items (e.g. all "Strongly agree"). Finally, we excluded
346 responses from those who answered "Not applicable" to the question "In which of the
347 following sectors have you done conservation work in your career?", indicating that they
348 have no direct experience of working or conducting research in conservation, and
349 respondents who reported themselves to be younger than 18. In total, we excluded 2,008
350 responses based on these criteria, leaving 9,264 responses for analysis.

351 Information about the respondents' personal characteristics used in this study was coded as a
352 series of categorical variables: gender (male / female / other or prefer not to say); educational
353 specialism (biological sciences / non-biological natural sciences / interdisciplinary /
354 humanities / social sciences); age (<29 / 30-39 / 40-49 / 50+); seniority (very junior position /
355 fairly junior position / neither senior nor junior position / fairly senior position / very senior
356 position); and continent of nationality (Africa / Asia / Europe / South & Central America;
357 North America; Oceania).

358 **Investigating polarization in the survey data**

359 To examine the extent to which there was broad consensus of opinion amongst our
360 respondents we calculated polarization scores based on the responses to each statement.
361 Polarization is a statistic that ranges from 0 to 1, where a score of 0 corresponds to all

362 respondents giving the same answer and a score of 1 corresponds to half of the responses
363 falling in one category, and half falling in a second, non-adjacent category. A score of 0.5
364 corresponds to a situation where responses are uniformly distributed across all of the
365 available response categories. 95% confidence intervals around the polarization score were
366 calculated from a non-parametric bootstrap with 200 independent draws for each Likert item.

367 The level of polarization in the responses to each Likert item within our survey ranged from
368 moderate - 0.418 (95%CI: 0.413, 0.427) for “It is acceptable for people to be displaced to
369 make space for protected areas” - to very low polarization - 0.093 (95%CI: 0.090, 0.097) for
370 “Maintaining biological diversity should be a goal of conservation” (Supplementary Figure
371 2).

372 **Modelling strategy**

373 Our analyses were carried out within the framework of multidimensional item response
374 theory⁵⁴ and focused on understanding the number and content of latent dimensions capable
375 of explaining patterns of variation in responses to the survey's Likert items, quantifying the
376 level of these latent traits in individual respondents and understanding whether and how these
377 latent traits might be related to respondents' individual characteristics. Our modelling strategy
378 involved three distinct phases: an exploratory phase in which we examined the structure and
379 dimensionality of the data, a confirmatory phase in which we formally tested the adequacy of
380 the structure we arrived at and an explanatory phase in which we modelled latent trait values
381 as a function of individual demographic characteristics⁵⁵. To allow this, we split the data into
382 three randomly-sampled, equally-sized subsets, each containing 3,088 responses. The first
383 two subsets were used during the exploratory phase, running identical exploratory analyses in
384 parallel and comparing their results to assess the robustness and stability of the solution⁵⁶.
385 The third subset was then used for the confirmatory phase to minimise the problems

386 associated with performing both exploratory and confirmatory analyses on the same data⁵⁴.

387 Having arrived at a satisfactory model structure, the three subsets were recombined in the
388 final, explanatory phase to provide the greatest precision for our estimates of the effects of
389 individual characteristics.

390 **Exploratory modelling**

391 To evaluate the dimensionality of the data, we calculated Velicer's Minimum Average
392 Partial (MAP) criterion⁵⁷ and examined scree plots based on the matrices of polychoric
393 correlations calculated for each of the first two subsets of the data (Supplementary Figure 3).
394 These criteria suggested that up to five distinct factors might be present in the data so we
395 carried out an item factor analysis based on the multidimensional graded response model³²,
396 comparing solutions for three, four and five dimensional models. All models were fitted
397 using the mirt function from the mirt package version 1.28⁵⁸, with parameters estimated via
398 the Metropolis-Hastings Robbins-Monro algorithm⁵⁹. To improve interpretation the initially-
399 extracted factor loading matrix was extracted using oblimin rotation. Since we had no prior
400 theoretical expectation about the correlation of the latent dimensions, an oblique rotation was
401 chosen to allow the factors to be correlated with each other to the extent that was supported
402 by the data. Our choice between the alternative models was guided by the theoretical
403 coherence of the resulting factors, the loading patterns of the items onto each pattern (e.g.
404 three or more items loading $>|0.40|$ and either two or more items loading $>|0.50|$ at least one
405 item loading $>|0.60|$ onto each factor, and few strongly cross-loading items between
406 factors)⁶⁰, and the consistency of the solution arrived at for each of the two subsets of the data
407 (Supplementary Figure 4). Having identified items that did not load sufficiently strongly onto
408 any factor or loaded strongly across multiple factors, we excluded them from the dataset and
409 refitted the model as a further check for consistency.

410 **Confirmatory modelling**

411 Next, we fitted a confirmatory multidimensional graded response models to the third subset
412 of our data, whose dimensionality and structure was informed by the outcomes of our
413 exploratory modelling. Since not all of the initial set of Likert items were well captured by
414 these dimensions, only items which were identified as loading substantially ($>|0.4|$) on one
415 factor and having no strong cross-loading onto other factors (no other loadings $>|0.3|$ and a
416 difference of at least 0.2 between the loading on the main factors and strongest loading on
417 any other factor) were retained in order to obtain simple structure. The model was fitted using
418 the mirt function from the mirt package by supplying a user-specified structure including an
419 unstructured covariance matrix⁵⁸.

420 Assessing the goodness-of-fit of models is challenging for large datasets with complex,
421 polytomous responses, where the full table of possible response combinations may be very
422 sparse⁶¹. We therefore complemented assessments of the fit of the model via a χ^2 statistic
423 calculated based on the expected a posteriori summed-scores⁶² and M_2^* , a limited-
424 information statistic⁶³, the Confirmatory Fit Index and the Tucker-Lewis index⁶⁴, with
425 assessments of the adequacy of the approximation provided by the model based on the root
426 mean squared error of approximation (RMSEA) and standardized root mean squared
427 residuals (SRMSR)⁶⁴. We also assessed possible violations of the assumption of local
428 independence using the local dependence matrix calculated from the χ^2 statistic and
429 standardized residuals calculated from M_2^* for every pair of items⁶⁵.

430 Once a satisfactory fit was obtained, the model was used to estimate the maximum likelihood
431 values for the set of latent trait scores for each respondent represented in the data⁶⁶. In order
432 to provide an intuitive point of comparison, we also calculated the latent trait score that
433 would be expected if a hypothetical respondent had answered "Neutral" to all of the value

434 statement items within the survey. This allowed us to judge the extent to which respondents
435 within our sample were broadly supportive or opposed to the ideas represented by each of the
436 modelled dimensions.

437 **Explanatory modelling**

438 In the final phase of our modelling, we tested for (a) the presence of clustering within the
439 views of our respondents and (b) evidence of consistent differences in views linked to
440 respondents' personal characteristics.

441 To test for clustering within the views of our respondents we fitted a series of Gaussian finite
442 mixture models⁶⁷ to the estimated latent trait scores for each person represented within our
443 data using the mclustICL function from the R package, mclust⁶⁸. We had no a priori
444 expectation about the number or shape of clusters that might be present in the data so we
445 fitted a candidate set of 126 models in total, representing all possible combinations of the
446 number of mixture components (up to nine) and the geometric characteristics of the clusters
447 (14 cluster types: spherical, equal volume; spherical, unequal volume; diagonal, equal volume
448 and shape; diagonal, varying volume, equal shape; diagonal, equal volume, varying shape;
449 diagonal, varying volume and shape; ellipsoidal, equal volume, shape, and orientation;
450 ellipsoidal, equal volume and orientation; ellipsoidal, equal shape and orientation; ellipsoidal,
451 equal orientation; ellipsoidal, equal volume and equal shape; ellipsoidal, equal shape;
452 ellipsoidal, equal volume; ellipsoidal, varying volume, shape, and orientation). The fit of
453 these models was compared using the integrated-complete data likelihood criterion (ICL), an
454 information criterion that has been demonstrated to perform well in identifying the correct
455 number of clusters, with the best-fitting model taken to be the one highest ICL value⁶⁹.

456 To test for differences in views linked to respondent characteristics we constructed a person-
457 explanatory version of the graded-response model⁵⁵ by incorporating five variables

458 representing characteristics of our respondents - gender, age, professional seniority, continent
459 of nationality and educational specialism - as fixed effects in a latent regression. The
460 coefficients for these fixed effects, and their associated standard errors, were inspected to
461 explore whether predictable, systematic differences exist in the positions of respondents
462 along each latent dimension, linked to their personal characteristics.

463 **Data availability**

464 The datasets generated and/or analysed during the current study are not publicly available, to
465 maintain respondent anonymity which was a condition of the ethical approval of the study
466 (University of Leeds Research Ethics Committee reference LTSEE-054). All data gathered
467 are stored securely and anonymously by UN Environment World Conservation Monitoring
468 Centre. Please see <http://futureconservation.org/about-the-project> for full details of the Future
469 of Conservation project's ethics and data security protocols.

470 **Project Ethics**

471 The project has a 'project ethics' entry on the following page
472 (<http://futureconservation.org/about-the-project?locale=en>), which is duplicated below:

473 "This project has been approved by the Research Ethics committee at the University of
474 Leeds.

475 All data gathered will be stored securely and anonymously by UN Environment World
476 Conservation Monitoring Centre, and used solely for the purposes of this research project. It
477 will not be seen by anyone outside the research project.

478 Your individual responses will not be identifiable either in this website or in subsequent
479 publications. If you provide us with your email address, we will not share it with other

480 parties, and will only use this to send you summarised results and to invite you to participate
481 in the survey again in future.”

482

483 **Supplementary Information** is linked to the online version of the paper at
484 www.nature.com/nature

485

486 **Materials and correspondence**

487 Correspondence and requests for materials should be addressed to C.S. (cgs21@cam.ac.uk)

488

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494

495 **Author contributions**

496 C.S., J.F and G.H. conceived the project and designed the survey. C.S., J.F., G.H. and R.L.
497 wrote text for the survey website and promoted its uptake. A.K. analysed the data. All authors
498 wrote the manuscript.

499 **Competing interests**

500 The authors declare no competing interests.

501

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- 641

642 **Figure 1: The views of conservationists on key issues relating to the future of**
643 **conservation.** The distribution of responses is shown for each survey item. The items are
644 presented from top to bottom according to the arithmetic mean of the responses, assuming
645 that categories are equally spaced. Items indicated by bold text loaded strongly onto one of
646 the three dimensions and were therefore retained for subsequent confirmatory analyses
647 carried out on an independent subset of the data. Items which were excluded from further
648 consideration are indicated by grey text.

649

650 **Figure 2: Conservationists' views form one cluster, not many.** Relationships between each
651 pair of dimensions identified in a multidimensional graded response model. Axes display
652 dimension scores. Dotted lines represent the score for each dimension that would be
653 generated if 'neutral' were selected for every survey item (further details in Methods).
654 Percentage figures in the corner of each panel show the proportion of respondents who fall
655 into the relevant quadrant created by the dotted 'neutral' lines. The correlation between
656 respondents' scores (ρ) on each pair of axes is shown above the panels.

657

658 **Figure 3: Links between personal characteristics and views.** Unfilled circles represent the
659 baseline level in each panel against which the effects of other levels are compared. Filled
660 circles show the mean difference from baseline (logits) with error bars representing 95%
661 confidence intervals. Figures in parentheses are the proportion of respondents belonging to
662 each category under the relevant variable. Non-specific responses (e.g. "Not reported" and
663 "Other") are not displayed.

664

665