A methodological guide to using and reporting on interviews in conservation science research

Running title: Interviews in conservation science research

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Author contributions

JCY and DCR (co-lead authors) interpreted the data and wrote the manuscript (equal weighting), HSM tested the robustness of methodology, reviewed c25 papers, and contributed to manuscript preparation, all other authors (except NM) reviewed c25 papers and contributed to manuscript preparation, NM conceptualized the structured review and conducted the literature search in Scopus, screened the relevant papers, and contributed to manuscript preparation.

Abstract

1: Interviews are a widely used methodology in conservation research. They are flexible, allowing in-depth analysis from a relatively small sample size, and place the focus of research on the views of participants. While interviews are a popular method, several critiques have been raised in response to their use, including the lack of transparency in sampling strategy, choice of questions, and mode of analysis.

2: In this paper, we analyse the use of interviews in research aimed at making decisions for conservation. Through a structured review of 228 papers, we explore where, why, and how interviews were used in the context of conservation decision-making.

3: The review suggests that interviews are a widely used method for a broad range of purposes. These include gaining ecological and/or socio-economic information on specific conservation issues, understanding knowledge, values, beliefs or decision-making processes of stakeholders, and strengthening research design and output. The review, however, identifies a number of concerns. Researchers are not reporting fully on their interview methodology. Specifically, results indicate that researchers are: failing to provide a rationale as to why interviews are the most suitable method; not piloting the interviews (thus questions may be poorly designed), not outlining ethical considerations; not providing clear guides to analysis, nor critically reviewing their use of interviews.

4: Based on the results of the review, we provide a detailed checklist aimed at conservation researchers who wish to use interviews in their research (whether experienced in using the methodology or not), and journal editors and reviewers to ensure the robustness of interview methodology use.

Keywords: conservation, decision making, interviews, semi-structured interviews, structured interviews, unstructured interviews, qualitative methods, social science.

78 **1. Introduction**

79 The success or failure of conservation actions often depend on complex decision-making made by
80 individuals, from policy makers to resource managers to consumers. Effective management necessitates
81 a firm understanding of how and why decisions are made. Given calls for greater integration of social
82 science methods in conservation research (Bennett et al. 2016) methodologies commonly used in the
83 social sciences such as interviews can be employed to understand the factors which influence decision-
84 maker behaviour. However, lack of robust requirements from interdisciplinary conservation research
85 journals results in poor and inadequate reporting of key points needed to interpret the quality of social
86 research.

87 Maccoby and Maccoby (1954, 449) define an interview as an 'interchange in which one person...
88 attempts to elicit information or expressions of opinion or belief from another person or persons. While
89 interviewing has been used for millennia (Babbie, 1992), Charles Booth is recognised as the first
90 scientist to have developed a social survey based on interviewing in 1886 (Converse, 1987). In the early
91 20th century, interviews were increasingly used in opinion polling, psychological testing, clinical
92 diagnosis, and counselling. The interview technique is now used in several fields, through face-to-face
93 verbal exchanges, group exchanges and telephone or internet surveys (Mason, 2012). Interviews can
94 range from short exchanges to long detailed exchanges repeated over time. Interviews are now so
95 widespread that researchers have claimed we live in an "interview society" (Silverman, 1993) where
96 "interviewing has become a routine technical practice and a pervasive, taken-for-granted activity in our
97 culture" (Mishler, 1986, p. 23).

98 Interviewing relies on an interactive method in which mutual learning occurs between those involved
99 in the interview process. In this respect, interviewing is an active research process by which an interview
100 or a "contextually bound and mutually created story" is produced by interviewer and interviewee(s)
101 (Fontana & Frey, 2005, 696). They also allow researchers to focus on the interviewees' perspective of
102 what is important or relevant, thereby potentially highlighting issues that the interviewer might not have
103 considered. Interviews may thereby even help to empower interview subjects themselves, allowing for
104 changes in social policy and improved conditions for interviewees (Fontana & Frey, 2005). Minichiello

105 *et al.* (1995) argue that interviews can be preferable to other methods in filling a knowledge gap,
106 particularly if complex behaviours are to be investigated. Previous studies have provided useful advice
107 specifically to conservation scientists about the potential benefits of qualitative social science
108 methodologies (Drury et al., 2011; Newing, 2010; St John et al., 2014).

109 In this paper, we first review recommendations found in the literature on how to conduct interviews.
110 Then we analyse the use of interviews in research on making decisions for conservation. Through a
111 structured review, we explore where and why interviews were used, before examining how authors
112 reported on their use of the interview methodology in the context of conservation decision-making.
113 Based on the results, we provide a detailed checklist aimed at conservation researchers who wish to use
114 interviews in their research (whether experienced in using the methodology or not), and journal editors
115 and reviewers to ensure the robustness of interview methodology use.

116
117 **2. Description of key steps in an interview process**

118 Papers by Drury et al. (2011) and St John et al. (2014 – see Figure 2 in their paper) outline key steps in
119 qualitative methodologies, including question formulation, ethical review, and techniques to perform
120 them. In a book on the value of social science methodologies in conservation, Newing (2010) similarly
121 outlines key stages for research design, including a chapter devoted to interviews. Here, we briefly
122 outline basic steps for using interviews in conservation research (see Figure 1), mainly aimed at
123 researchers not familiar with the interview methodology, before paying closer attention to how these
124 stages are being reported in scientific publications.

125 The basic steps in an interview process (see Figure 1) can broadly be defined as the initial project design
126 (Steps 1-3); data gathering (Steps 4-7); and analysis and write-up (Steps 8-9).

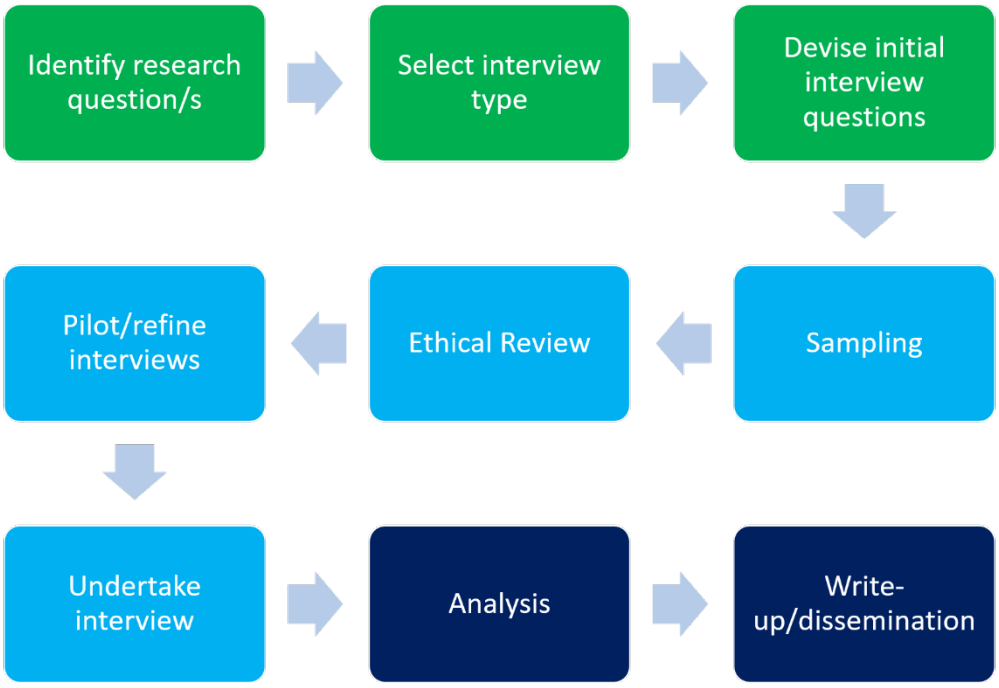

Figure 1: Basic stages in an interview process: initial project design (stages 1-3), data gathering (stages 4-7), analysis and write-up (Stages 8-9)

Initial project design (identify research question/s, type of interview, formulate interview questions)

The interview process starts with the identification of research question(s). This is followed by a critical reflection of whether the interview is the most suitable methodology to use based on the question, and whether the interview should be supplemented with other methods. Key areas to consider at this stage include whether interviews can provide the right kind of data for envisaged outputs, or whether other research techniques might be more suitable. In making this decision, researchers could weigh up the advantages and disadvantages of interviews as a methodology in light of their research question(s), including different styles of interviews (structured, semi-structured, unstructured).

Structured interviews are based on a fixed set of pre-determined questions. The same interview script is used in each separate interview, which allows close comparison between different transcripts, but does not allow interviewees to shape the discussion (Punch, 2005). Conversely, unstructured interviews are not based on an interview script. In this style of interview, the course of the conversation depends on the responses of the interviewee themselves and questions are asked spontaneously based on these

answers (Bryman, 2004). While this does allow an in-depth analysis of particular issues that are considered important by an interviewee, and limits pre-conceived researcher bias in shaping the interview, such interviews offer little assurance that all relevant issues will be covered and present a problem for comparative data analysis (Bryman, 2004). Since there are disadvantages of both structured and unstructured interviews, researchers generally prefer to adopt a middle-ground by using a semi-structured approach (Dunn, 2000). These rely on a pre-conceived interview guide, which means that standard questions are asked in each separate interview, allowing comparison and maintaining data quality. Crucially, however, they allow the interviewer to ask additional questions if an interesting or new line of enquiry develops in the interview. This flexibility is important for investigations of complex issues, such as studies of conservation science-policy interfaces, which analyse messy processes that can rarely be foreseen (Young et al., 2014; Rose et al., 2016).

Once the type of interview has been selected, the researcher can start to formulate interview questions. Depending on the type of interview selected, formulating questions may result in a structured interview schedule, an interview guide, or an aide memoire (Bryman, 2004; Drury et al., 2011). Bias due to poorly constructed questions is a common criticism of qualitative interviews. Therefore before formulating questions, researchers should seek to build their knowledge of robust question design from methods textbooks and training courses. In general, it is best to start the interview with relatively easy questions. Such questions, which may ask the respondent to tell the researcher something about themselves, help the respondent to settle, therefore building a good rapport for the interview. Subsequent questions should be designed in a manner that does not lead or force the respondent to give particular answers desired by the researcher (Bryman, 2004).

Data gathering (sampling, ethical review, piloting/refinement of interview, undertaking interview)

Data gathering begins with the identification of interviewees. A robust sampling strategy should be developed to ensure informed coverage of the population of interest. St John et al. (2014) suggest first considering the proportion of the interest population that can realistically be sampled, before considering whether there are any important sub-groups that could be under-represented. Once the

practicalities of sample size are known, a strategy can be devised to ensure that meaningful and robust data are collected to answer the research question/s. Several sampling techniques exist (Newing, 2010), including, (1) snowball sampling – where initial informants are identified and the subsequent sample is built by asking for key recommendations from these informants, (2) theoretical sampling – where you interview a few informants, transcribe, analyse, and look for key patterns, and then identify further participants based on emergent themes, (3) key informant sampling – where you target key people that are knowledgeable about the issue, (4) representative sampling – where a sample is chosen to be representative of the total population (involves stratification), (5) random sampling – where people are spoken to at random. Repeats may need to be undertaken depending on the initial response rate.

The next step is to apply for ethical clearance (Silverman, 2005). St John et al. (2014) argue that many conservation researchers are undertaking research on people without being properly informed on issues such as informed consent (checking that participants understand the aims of the project and how their data will be used), anonymity (protecting the identity of informants), and compensation (providing some form of compensation for time disruption e.g. financial, otherwise the process could be coercive). Other ethical considerations include level of personal intrusion, including the sensitivity of questions, vulnerability of participants groups, and the storage of confidential data. Although most organisations, particularly universities, but also non-governmental organisations (NGOs) and government departments, have ethical review committees, St John et al. (2014) argue that members of biological departments are inadequately trained to scrutinise human research. Some journals also require that authors report that ethical clearance for the study has been gained during the submission process. Ethical guidelines should be followed voluntarily in cases where official ethical standards are non-existent. In this review we made the explicit assumption that ethical clearance had been approved, and focussed on identifying whether any ethical concerns had been raised by authors.

When an initial list of questions has been designed, it is useful to pilot or test the interview on colleagues or a subset of the target population (after ethical clearance) in order to check for length, language suitability, and potential sources of bias (e.g. leading questions). The pilot interview can be transcribed to check that it has produced enough relevant data to answer the research question; if not, changes are

needed. Interviews may be carried out face-to-face in person, over the telephone, or increasingly using video technology.

Analysis and write-up (including dissemination and result feedback to participants)

For semi-structured or unstructured interviews in particular, the analysis of interviews often involves a process known as 'coding' (structured interviews may follow a pre-selected coding pattern). Codes may be described as "tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study" (Miles and Huberman, 1994, 56), and they are usually attached to pieces of data of varying size. For this reason, codes can be assigned to individual words, phrases, sentences or whole paragraphs in each transcript, in order to aid the interpretation of meaning. Central to the use of coding is the notion that words themselves do not matter. Instead their meaning is more important, and this allows the clustering of key issues in the data. Researchers might find the use of computer software, such as NVivo or Atlas.Ti, useful in producing 'code maps' and organising the codes in a logical way. The skills needed to operate these software packages are relatively easy to learn, with training courses in most universities and good online guides available.

After analysis, findings are written up, including a critical evaluation of the advantages and disadvantages of using interviews and how their use could have been improved, and efforts made to provide feedback to participants.

Key data to provide when reporting on interviews

In order to allow reviewers and readers to make an informed judgement about the quality of data collection and suitability of conclusions, key data on the application of interviews should be provided in scientific publications. Figure 2 provides a checklist of key data which need to be included in publications, and the subsequent review described in this paper assess whether these data are currently being reported adequately.

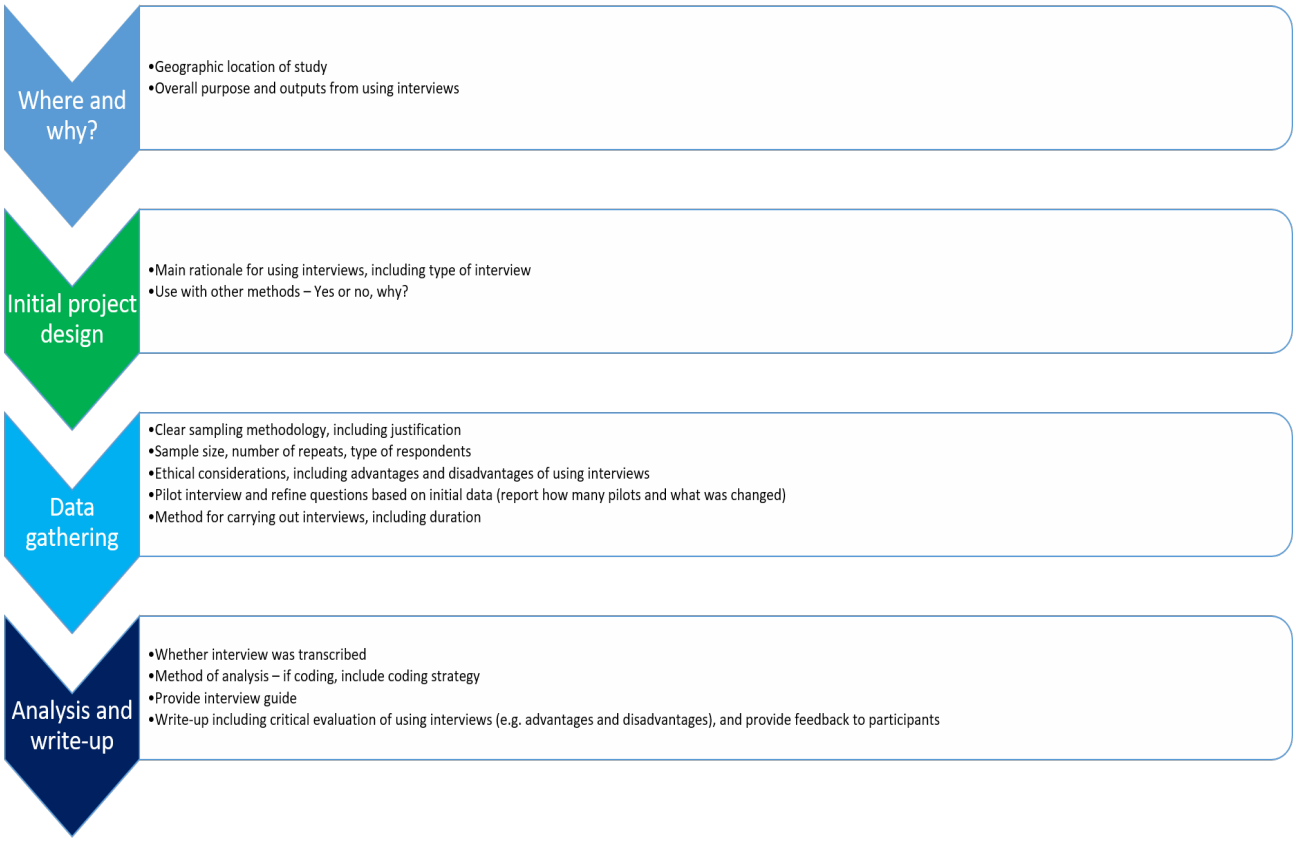

Figure 2. Key data to provide when reporting on interviews

3. Outline of review methodology

The review had two purposes, firstly to review where interviews have been used in conservation decision-making research, and secondly to assess whether key data on the application of interviews are being reported. We conducted a systematic literature review in Scopus for the years 1996- till 08-09-2016. The exact search terms were:

(TITLE-ABS-KEY (interview) AND TITLE-ABS-KEY (biodivers*) OR TITLE-ABS-KEY (conserv*) AND TITLE-ABS-KEY (decision)) AND DOCTYPE (ar OR re) AND PUBYEAR > 1995 AND (EXCLUDE (DOCTYPE , "re"))

Unlike the other papers in this special issue, the search term “decision” was specifically added to the search string to narrow the focus to decision making. This resulted in 676 documents, 40 of which were reviews (none of which were on the interview method itself). We excluded the reviews as these were not primarily focussed on the use of interviews as a method, and shortlisted 636 documents (articles only), which are provided in the supplementary material. The 636 documents were manually screened

based on titles and abstracts, resulting in 382 relevant articles (i.e. they were relevant to conservation and used interviews – see Appendix 2). Over half of these articles had been published in the last 5 years alone. Four papers were inaccessible, or not accessible in English. We therefore focussed on 228 articles that had been published since 2011 (Appendix 3). Articles were screened against a set of pre-determined criteria (see protocol in Appendix 1). This first-round screening produced an initial set of results, which were then cross-checked for consistency by a co-author (HSM). The checking process consisted of selecting 20 random articles, then testing them against the same criteria to see whether HSM's interpretation resulted in the same input as the other co-authors. Based on slight differences in specific categories, namely sampling technique and coding methods, the protocol was clarified to limit any vagueness of interpretation. The articles were then re-screened to ensure consistency (Appendix 3).

4. Results

Where are interviews being conducted?

Based on the review results, use of interviews was reported most often in the US, Brazil, Australia, Western and Northern Europe (see Figure 3). Interviews were reported to be used to a lesser extent in certain African countries, India, China, South America and Eastern and Southern Europe. No papers in the final selection of 228 were found of interviews being used specifically in the Middle East, Russia, and Northern Africa.

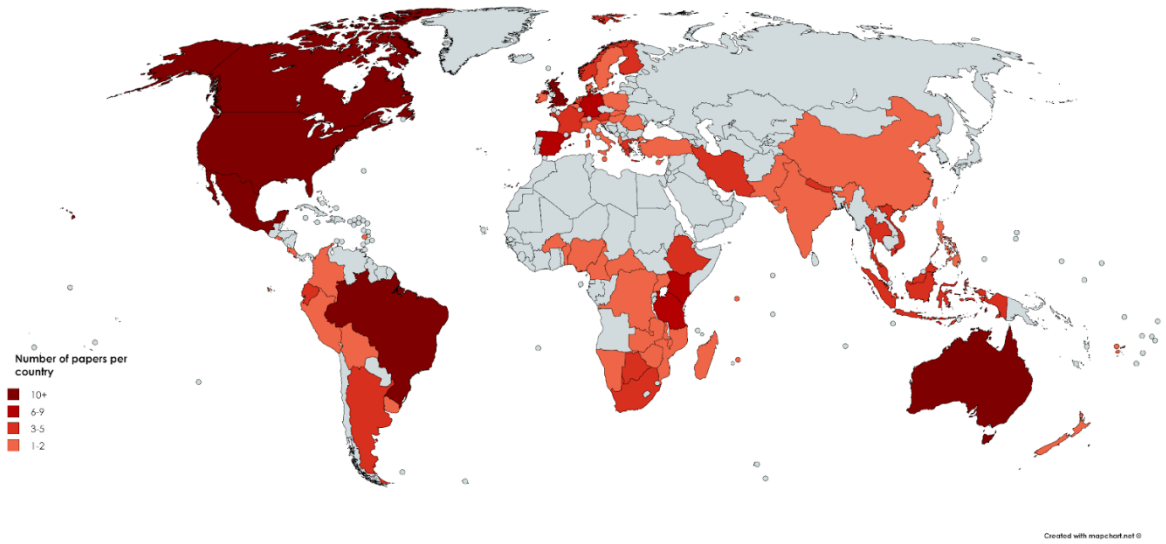

Figure 3. Global heat map for interview use in conservation decision-making research

Why are interviews being used?

Interviews were used for a variety of different purposes. These can be broadly categorised under three main headings:

- Gaining ecological and/or socio-economic information on specific conservation issues (58.6%);
- Understanding knowledge, values, beliefs or decision-making processes of stakeholders (49.9%);
- Strengthening research design and output (6.9%).

There was overlap between some of the categories. For example, understanding knowledge of stakeholders in some cases overlapped with gaining information on a specific issue. However, there is a clear distinction between the first two headings – the focus of the first is extracting specific conservation-related information from stakeholders, rather than understanding the knowledge held by those stakeholders.

Gaining ecological and/or socio-economic information on specific conservation issues

Based on the review, interviews were primarily used to gain specific ecological and/or socio-economic information on conservation issues. Issues under this category included interviews aiming to gather information on specific species or habitats of conservation interest (23%), governance (20%), hunting/farming and other extractive uses of biodiversity (7%), and conservation conflicts (4%).

The most common use of interviews in this category focussed on gathering information on specific species or habitats of conservation interest, including distribution, abundance and threats (e.g. 224 - numbered papers refer to original paper ID throughout). Examples here included gaining information on endangered and data deficient species (e.g. Goliath Grouper – 139), assessing landowner perceptions of fire risk and woody encroachment on grasslands (188), determining the presence/absence of howlers and black-horned capuchins before and after a yellow fever outbreak (71), or eliciting traditional ecological knowledge about climate change from local communities in high biodiversity areas (167).

In addition to ecological data, this category also includes socio-economic data for example understanding household livelihoods of coffee growing cooperative members (290).

Another use of interviews was to gain information on conservation governance aspects (20%). This category included the use of interviews to understand perceptions of conservation governance (for example from the perspective of individuals whose livelihoods depend on a protected species, 107), to understand challenges hampering the effective implementation or enforcement of conservation governance (96, 149), to evaluate the governance outcomes of conservation actions (7). Interviews were also used to better understand governance systems to improve conservation outcomes (e.g. 258), and to better understand the (potential) role of actors within governance structures (e.g. 173, 303).

Finally, interviews were carried out to understand better the impact of or the relationship between human activities and conservation, such as hunting (10, 64), and other extractive resource use (e.g. fisheries, use of specific tree or plant species, 184, forest clearing 269), as well as the conflicts between conservation and other human activities (e.g. 204, 216). This category also included using interviews to understand practices that could impact on species or habitats of conservation interest and vice versa (e.g. 55, 153, 245).

Understanding knowledge, values, beliefs or decision-making of stakeholders

Three different categories could be identified under this heading. Over a quarter (26%) of interview papers focussed on understanding the knowledge, viewpoints, values beliefs or decision-making of specific groups of stakeholders. Whilst all of these papers interviewed stakeholders with an ecological role, or an ecological issue of conservation concern, the focus was not specifically on the conservation issue. Examples under this category included understanding fishermen's profiles, their fishing techniques and knowledge about sharks, focusing on the behaviours exhibited by sharks (141). Other examples included interviews with fire managers to better understand their role in fire and/or smoke management, experiences and strategies for communication, partnerships they are involved in, challenges and ways to address these challenges (197). Another example used interviews to understand local indigenous knowledge about medicinal plants in Kenya (274).

In the second category, authors used interviews to improve understanding of values, beliefs across different groups geared towards conservation actions (14% coverage). These could be current conservation actions, for example, using interviews to elicit stakeholder perceptions of biobanking programs in Malaysia (52), or to explore the interests and actions of actors involved in the management of three biosphere reserves (315). Other uses of interviews in this context included understanding perceptions from stakeholders of protected areas implementation and management, Payments of Ecosystem Services (PES) schemes (e.g. 331), REDD+ program implementation (e.g. 59) and agri-environment schemes (e.g. 97, 145). Interviews were also used to gauge stakeholder views on potential future conservation actions. These include proposed endangered species listing, establishment of Marine Protected Areas (232), no-take zones (148), future research priorities (106), future use of resources (e.g. fisheries targets, 143) etc. Interviews were also used to understand how values could be linked to attitudes towards conservation, for example determining the influence of human aesthetic appreciation of animal species on public attitudes towards their conservation in Kenya (151), or exploring whether and how the degree of cultural attachment can be linked to measures of agro-biodiversity (169). Another example of using interviews for this purpose included documenting farmers' perception of tubers in ecological, social, economic, technological and culinary aspects and how these influence their decisions of conservation priorities (327).

A third category explored the differences and similarities in knowledge, views, values and decision-making across different types of stakeholder groups (10%). These papers included using interviews to investigate how different stakeholders perceive conservation challenges, e.g. problems related to marine finfish aquaculture (120) and eutrophication (268). Interviews were also used to understand how different groups understand and/or value certain ecosystem services (e.g. 61, 26), or areas providing a range of services (e.g. marine areas, tourism in specific areas etc; see 255, 46, 345). Other authors used interviews to explore how and why different groups of stakeholders make decisions relating to conservation issues. Examples here included interviews eliciting stakeholders' mental models in a water management system (75) and exploring the role of knowledge exchange of visual products in terms of influencing decisions (132, 321).

331 *Strengthening research design and output*

332 A small proportion of papers used interviews to strengthen research design, either by using interviews
333 to identify stakeholders and/or design research (4%), or using interviews to validate existing ecological
334 or social data (3%). Examples under the first category included using interviews to identify key
335 stakeholders in preparation for a spatially explicit scenario development process to explore policy
336 implementation options (34), or interviews to inform the design of a quantitative survey to explore the
337 values, beliefs and attitudes of farmers (266). In some cases interviews were used at all stages of the
338 research: exploratory expert interviews contributing to the specification of the research focus and to the
339 operationalisation of the research design, problem-centred interviews followed by expert interviews
340 with project managers (161). As mentioned earlier, interviews were often used in conjunction with other
341 methods. However, very few papers (3%) mentioned explicitly the use of interviews to validate existing
342 data, for example, models (349), role-playing games (136), or to explain quantitative results of previous
343 surveys (160; 317).

344
345 ***How interview use was reported in papers reviewed (follows order of checklist in Figure 2)***

346 *Initial project design*

347 The rationale for using interviews was specifically mentioned in only 27% of papers reviewed. These
348 papers mentioned the usefulness of interviews to gather sensitive (10) or hard to obtain information,
349 and understanding processes such as information-processing and decision-making (61). Authors also
350 highlighted the use of interviews to obtain information from a wide range of stakeholders (92), or to
351 build on, validate or complement results gained from other approaches (e.g. questionnaires, focus
352 groups – 135, 322). The flexibility afforded by interviews was also mentioned as a rationale for their
353 use.

354 In 70% of papers reviewed, interviews were not the sole method used. In cases where interviews were
355 used in conjunction with other methods, these included a range of social science methods including
356 questionnaires, stakeholder workshops (including scenario building), document analysis, social
357 network and institutional analysis exercises, SWOT (Strengths, Weaknesses, Opportunities, Threats)

358 analysis, cognitive mapping and agent-based modelling, participatory mapping, rapid rural assessment,
359 participatory photomapping, Delphi technique, ethnographic models, oral histories, historical analysis,
360 fuzzy set and network methods, choice experiments and role-playing.

361 Interviews were also used in conjunction with more standard ecological methods including recall or
362 repeat surveys, conceptual modelling and process-based computer modelling, satellite image analysis,
363 inventories, probability and uncertainty assessments, field-based ecological studies and overarching
364 methods such as literature reviews, analysis of secondary data and documents, online discussions.

365 Of the papers examined, only 11% indicated the use of pilot interviews to refine the interview guide
366 prior to carrying out interviews. While 4% stated explicitly they had not used pilot interviews, 86%
367 either did not use pilots or did not say whether pilots had been used.

368 *Data gathering*

369 Of the papers reviewed, 17% did not specify their chosen sampling strategy. Of those that did, the most
370 popular sampling strategy was through key informants (46%), followed by snowball sampling (23%),
371 representative approach (13%) and theoretical sampling (2%). A total of 20% of papers chose other
372 sampling strategies, including non-proportional quota sampling, calls for volunteers, random sampling
373 of participants, stratified sampling, purposive sampling, maximum variety sampling, and opportunistic
374 sampling.

375 Sample size varied from one to 1400, with an average sample size across all papers (n=228) of 87 and
376 a median of 35. Sample size was not mentioned in 10% of the papers analysed in this study. Types of
377 respondents interviewed included decision-makers (27%), members of the general public (15%) and
378 scientists (9%), as well as other respondents (50%) targeted in the research such as recreationists,
379 fishermen, and farmers (see Appendix 3 for others).

380 For the review, we assumed that ethical approval had been confirmed during manuscript submission,
381 but focused on whether ethical concerns had been raised by researchers through mentioning
382 disadvantages of using interviews. The issue of ethical interviewing was mentioned in 13% of cases,
383 with authors recommending that cultural, linguistic and geographical barriers as well as unconscious

biases and assumptions are taken into account in interviews (122). Other recommendations included using local translators, and for interviewers to learn some of the local languages and customs, and greet respondents in their own language to help them feel relaxed (140). Further recommendations included informing respondents at the beginning of key considerations including the aim of the research, anonymity issues and voluntary participation (140).

Of the papers reviewed, the majority (>60%) were carried out face to face, with a much lesser percentage being carried out over the phone (<10%) and over the internet (<5%). A third of papers did not mention how interviews were carried out.

Interview length was reported in 90% of papers reviewed. Interviews ranged from three minutes to five hours in duration, with a mean of 64 minutes per interview.

Analysis and write-up

A total of 25% of papers stated they transcribed interviews verbatim, while 66% of papers did not mention their method of transcription.

In terms of coding, whilst it was not always clear from the papers, it appeared that 39% of papers did not specify how coding was carried out, 19% used pre-selected codes, 39% coded using grounded theory [the themes emerged out of the raw data itself] and 3% did not code. Interview or topic guides were provided in only 18% of the papers reviewed.

Only 14% of the papers reviewed highlighted a critical evaluation of advantages of using interviews. Of these, authors mentioned the benefits in terms of providing high quality data on complex problems and issues. These include processes such as decision-making, preferences and perceptions. Other advantages included validating or explaining existing (mainly qualitative) data and improving the design of research processes. In papers in which advantages were outlined, authors referred to the practical nature of interviews, being a method that was flexible (283), less time consuming (for researcher and researched) than participatory methods (318), relatively inexpensive and rapid in comparison to other methods (e.g. methods for detecting rare species, 19), and an effective and accurate

409 way to obtain detailed information (265). Finally, some authors mentioned that interviews had allowed
410 for relationship and trust building.

411 Only 14% of papers reviewed mentioned the disadvantages of using interviews. The main disadvantage,
412 highlighted in 50% of the papers in which disadvantages were mentioned, was bias in terms of sampling
413 (e.g. 340, 341) and interviewer and interviewee bias (e.g. 125, 265). In 30% of the papers that mentioned
414 disadvantages, authors described the inability of interviews to produce the data required. Some authors
415 (13%) highlighted that interviews had not allowed for generalizations, either statistical (197), contextual
416 (307), or because interviewees were not necessarily representative (38). Other disadvantages included
417 too much data, making analysis difficult (75), challenges in recruiting interviewees when discussing
418 contentious or sensitive topics (142) and the time, energy, sensitivity and caution in establishing an
419 ethical relationship between researcher and participant (148, 122).

420 Based on the advantages and disadvantages, only 12% of papers suggested specific recommendations
421 in terms of the future use of interviews. Of these 19% recommended improvements in terms of the
422 interviews themselves, such as using pilot interviews, using an interview schedule that provides prompts
423 and opportunities for reflection (255), using a conversational style in order to elicit more information
424 about a particular issue under discussion (345), and reducing the natural tendency of interviewees to
425 provide socially desirable responses by using a neutral facilitator and asking open-ended interview
426 questions so as not to direct responses (298).

427 A limited number of authors (14%) recommended follow-up of interviews. Suggestions included the
428 addition of a protocol to assess respondents' learning as a result of the interviews. Another suggestion
429 was the use of the "member checking" technique that involves the lead researcher meeting with a
430 number of interviewees multiple times following the primary interviews to share interview transcripts
431 and clarify uncertainties in recording and transcription. The authors argue that these interactions serve
432 to both increase the researcher's understanding of participant's perspectives and to increase rapport
433 between researchers and study communities (87).

434
435 **5. Recommendations on the future use of interviews in conservation research and conclusions**

436 ***The use and reporting of interviews in conservation***

437 This review confirms that interviews are widely used in conservation research, although it suggests a
438 disparity in where interviews are used. Based on the review, we found no evidence of interview use in
439 many parts of the world. We further note that providing data at a country level may mask regional
440 variation within countries. The geographical bias found in our review may be influenced by our search
441 being carried out in English (see Amano et al., 2016), and focussing on academic rather than grey
442 literature. It may (partially) also reflect the geographical distribution of conservation research more
443 generally.

444 Interviews were characterised as a flexible method, useful in generating high quality data on complex
445 problems and issues, including processes of information-processing and decision-making. A significant
446 proportion (c70%) of the papers used interviews alongside other methodologies, which is useful since
447 a multi-method approach enables data triangulation and can limit the bias associated with any one single
448 method. Overall, however, there were relatively few cases where the main rationale for using interviews
449 was stated (27%). It was not clear why the researchers had chosen to use interviews, which makes it
450 difficult for the reader to judge whether or not it was the most suitable method. Furthermore, if the main
451 rationale for using interviews is not widely outlined, then it makes it more difficult for other researchers
452 to ascertain whether it is a suitable method to answer their own research question(s).

453 Perhaps the most important finding of this review is the limited information provided in papers on how
454 interviews were used and analysed. Good examples providing clear methodologies were the exception
455 (e.g. 204 – see Zappes et al., 2014), and it was often impossible to ascertain exactly how the researcher/s
456 had applied interviews in their study. This is an important issue in the future application of this
457 methodology in conservation decision-making if the robustness and credibility of process and outputs
458 of interviews cannot be ascertained.

459 In part, the lack of care taken to outline methodologies in full when using interviews may be the result
460 of the review process. Based on the lack of reporting of interview data in the review papers, reviewers
461 would rarely seem to insist on a robust adherence to a checklist of how interviews were carried out and
462 analysed (see Figure 2). Rather, they may actually suggest that detailed information in a methods section

is superfluous. Thus, reviewers may allow a methods section to pass without, for example, a clear explanation of sampling decisions, or without providing a sample interview guide to know what questions were asked, or in spite of a sparse outline of coding strategies. This perception is supported by the literature. For example, St John et al. (2014) argued that reviewers for applied ecology journals generally have natural science backgrounds, and thus their expertise in social science methods can be limited. Thus, the authors argue that more papers with poor social science methods sections are published as compared to those containing low-quality ecological methods. The results from the articles reviewed here suggest that the peer review community, including editors and reviewers, should critique interview methodologies more robustly.

The review also highlighted limited reflexivity in papers that have used interviews. Only 14% of papers included a critical analysis of interviews as a method, including for example recognising the presence of sampling and interviewer bias, the difficulties caused by a large amount of data, or the high subjectivity of the coding process. The lack of critical reflection perhaps suggests overconfidence or lack of awareness of reporting requirements in the use of interviews as a research methodology, perhaps in part caused by a desire to present a positive account for peer review. Identifying flaws in the use of interviews should not however be perceived/viewed as a problem; rather, being transparent about sources of bias in a study (e.g. interviewer bias, coding subjectivity) allows researchers to design strategies to mitigate against them. Whilst flaws will never be removed completely, such reflexivity would give the reviewers and readers confidence that the researcher has thought carefully about the methods, thereby increase the robustness of their approach.

The review also highlighted some ethical concerns. Although we assumed that these studies had passed institutional ethical review before commencement, the lack of clarity on ethical considerations is concerning, particularly since St John et al. (2014) found that many biological-oriented review committees had inadequate knowledge of human research techniques. Although some papers did mention ethical concerns, it was rarely discussed as a flaw of using interviews (e.g. the disadvantage of needing to have resources to compensate participants), suggesting that ethics might not be readily considered as a problem in need of solutions.

In summary, data suggest that while researchers are reporting on where and to a certain extent for what purpose(s) interviews are used, they are not fully reporting on all stages of the interview methodology. Results indicate that researchers are failing to provide a rationale as to why interviews are the most suitable methodology for answering their research question/s, and then failing to outline a clear decision process as to the type of interview style that is selected. Furthermore, the lack of piloting [or lack of reporting of piloting] in the vast majority of the reviewed papers (c90%) suggests that questions are not being carefully designed, tested, and refined, and that researchers are not honing their interview skills before the main study. The lack of clear guides to analysis further suggests that reporting on interviewing is not comprehensive. The latter factor is of particular concern since the conclusions generated from each study are being based on interview data; if the researcher is not clear about the analysis process used, then it is difficult to ascertain whether the conclusions are evidence-based.

Suggestions to strengthen the interview methodology for future applications in conservation

Researchers should consider whether they have the skills and resources to design, conduct, and analyse interviews carefully, so that key stages are carefully considered in the interview process. We suggest the checklist illustrated in Figure 2 could be a useful guide for researchers, reviewers, and journal editors, about what data to include in scientific publications. Researchers could use this checklist to guide decision-making and subsequent reporting for each key stage.

For data gathering, to ensure robustness and credibility, the sampling of interviewees must be justified. When selecting a sample, therefore, researchers must be able to show that they have consulted the full range of views needed to answer the questions adequately. Greater transparency is needed with the inclusion of information such as the reason for inclusion and response rate. It is insufficient, for example, to describe a snowballing method without including the reason why each additional participant was recommended and targeted. Researchers also need to discuss ethical considerations, the method of carrying out interviews, and the process of analysis and write-up, including providing feedback to participants. Supplementary material may be used to keep within word count restrictions.

A simple way of encouraging researchers to provide a clear step-by-step guide in the Methods section, or supplementary material, is for editors and peer reviewers to ensure that providing the data listed in

517 the checklist (Figure 2) is a prerequisite for publication. This is information that researchers are
518 expected to collect during interviews. Such information would allow peers and decision-makers to
519 ascertain the credibility and robustness of the interview methodology and its conclusions.

520 Journals will need to provide clear guidance to submitting authors about these requirements, including
521 best practice guides on specific considerations. One such area in need of clear guidance from journals
522 is on ethical matters, which may not be familiar to conservation researchers. Here, we suggest that
523 journals follow the recommendations provided by St John et al. (2016). They argue that all conservation
524 and ecology journals should provide clear ethical guidelines, require an ethics statement, and ensure
525 submitted papers on human research are scrutinised with the same rigour as ecological science.

526 ***Conclusions***

527 This review provides an overview of some of places and ways in which interviews have been used in
528 research on conservation decision-making. While the review highlights a number of concerns, it also
529 provides a basis for recommendations to strengthen the interview methodology for future applications
530 in conservation. These recommendations are not only aimed at researchers using the interview
531 methodology, but also at researchers working in conservation research, journal editors, reviewers and
532 decision-makers using information from peer-reviewed papers. Interviews can be a very useful method
533 in conservation research, allowing for in-depth understanding of processes and issues, often based on a
534 small sample size. The usefulness and credibility of this methodology, however, would benefit from a
535 more strategic approach, as described in this paper, including better justification for its use over and/or
536 alongside other methodologies, and more detail in terms of how interviews are undertaken and
537 interpreted.

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545 ***Data accessibility***

546 Archived on Figshare - https://doi.org/10.6084/m9.figshare.5047675.v1

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Appendix 1 – Protocol for screening

Appendix 2 – Round 1 screening (n=636)

Appendix 3 – Final paper screening (n=228)