Assessing the impacts of conservation volunteering on participant wellbeing: a systematic review protocol [version 2; peer review: 2 approved]

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Abstract

Background: Volunteers and citizen scientists have become an essential element of most nature conservation and restoration activities due to lack of resources but also due to the wish to engage and interact with local communities where conservation activities take place. Environmental or conservation volunteering is also considered to be a key resource in achieving much needed, ambitious nature restoration programs. Practical conservation work and various forms of environmental enhancement along with recreational and therapeutic use of natural or green and blue spaces have been studied for some time. The value of volunteers and the work is widely acknowledged but few studies have been carried out on the impacts of participating on the volunteers themselves. Using this protocol, a study will be undertaken to assess how impacts of participation have been assessed and reported in the literature; what these reported impacts are; how these are related to reported barriers and motivations for volunteering and whether they are affected by the region or country of study.

Methods: This paper will identify studies that have described and assessed impacts of conservation and restoration volunteering on participants at an individual level, with a specific focus on physical, mental or societal wellbeing of individuals. Representative studies were sought from major search engines and relevant stakeholder publications, including both peer-reviewed and ‘grey literature’ in predominantly English language publications, published between 2000 and 2020. A priori inclusion criteria consisted of those publications and reports on studies with volunteer and community participants and which described impacts of, motivations for and barriers to participation. After a critical appraisal, a total of 105 articles were selected for further analysis to provide a narrative and mixed methods synthesis of the evidence base.

Keywords

conservation, volunteering, community, wellbeing, citizen science
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Author roles: Nuuttila H: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Writing – Original Draft Preparation, Writing – Review & Editing

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Introduction

Background/rationale

We intuitively know that healthy ecosystems are essential for human wellbeing.\textsuperscript{1,2} This has become widely accepted and reflected both in international policy initiatives as well as in the vision of major international and national conservation organisations.\textsuperscript{3} The effect of environmental enhancement along with recreational and therapeutic use of natural or green and blue spaces have been studied for some time.\textsuperscript{4–6} Nature-based interventions, exposure to natural environments and ‘green exercise’ have shown to be beneficial to health and wellbeing regardless of age, gender, ethnicity or social status.\textsuperscript{7} The natural environment is accepted as a vital provider of health and other environmental services whilst life-style related conditions and illnesses influenced by a lack of physical activity, links to natural places, and links to community and people amount to around £180 billion a year in the UK alone.\textsuperscript{8} The theoretical framework behind this project is based on the Green Mind Theory put forward by Pretty et al., 2017,\textsuperscript{9} which links the human mind with the brain and body and connects the body with natural and social environments with reciprocal processes: environments shape bodies, brains, and minds; minds change behaviours that shape social interactions and natural capital.

Volunteering and volunteers have become an essential element of most nature conservation and restoration activities due to a lack of resources\textsuperscript{10–12} but also due to the requirement to engage and interact with local communities where conservation activities take place. Volunteering is acknowledged by UK national governments as a valuable resource to achieve nature conservation and regeneration targets (www.nationalnatureservice.org). The value of volunteers and the work is widely acknowledged but few studies have been carried out on the impacts of participating on the volunteers themselves.\textsuperscript{13} While many studies report the use of volunteers in conservation projects and describe the value of volunteers to conservation efforts, they rarely describe the impacts of volunteering to volunteers themselves or to the wider community. Qualitative evidence shows that environmental enhancement and conservation activities are valued by participating volunteers, how these impacts of participation have been assessed and reported in up-to-date literature; what these reported impacts are; how these are related to reported barriers and motivations for volunteering and whether they are influenced by the region or country of study. The study will also critically assess the methods used in selected studies to describe and examine the impacts and make recommendations for future studies in the field. As volunteers will continue to be required to support critical nature restoration projects, it is vital to understand how volunteering may impact participants. Furthermore, understanding the positive co-benefits of nature related activities such as conservation volunteering can be used to create pathways for multi-solving interdisciplinary eco-societal issues and fast-tracking these into action.

This study will review the most recent research on the topic to better understand the impact of conservation activities on participating volunteers, how these impacts of participation have been assessed and reported in up-to-date literature; what these reported impacts are; how these are related to reported barriers and motivations for volunteering and whether they are influenced by the region or country of study. The study will also critically assess the methods used in selected studies to describe and examine the impacts and make recommendations for future studies in the field. As volunteers will continue to be required to support critical nature restoration projects, it is vital to understand how volunteering may impact participants. Furthermore, understanding the positive co-benefits of nature related activities such as conservation volunteering can be used to create pathways for multi-solving interdisciplinary eco-societal issues and fast-tracking these into action.

Various stakeholders, both academic and non-academic were approached for assistance, including members of the UK health and wellbeing organisation (NHS), volunteer sector, conservation, and community development. Several people were able to assist and contribute to the theoretical framework, question formulation and the literature search strategy, ensuring a thorough understanding of the key concepts relevant to the review.\textsuperscript{14}

One of the most difficult to define concepts was ‘human wellbeing’. As our understanding of wellbeing has evolved in psychology, sociology and economics, so has our way of defining and assessing it in conservation practice and policy. Understanding human wellbeing is now a critical component in sustainably managing the environment. Biedenweg et al. identify six human wellbeing indicators (psychological, physical, social, cultural, economic, governance) affected by the environment and useful in studies policy and management.\textsuperscript{15} It is acknowledged that human wellbeing has both objective and subjective aspects.\textsuperscript{16} The objective components (material and social attributes) are easily measurable such as our jobs and incomes, homes, places we live in, our environment, available services, infrastructure so on. Equally important
is the subjective, perceived wellbeing which can only be described by the individual. These include job or health satisfaction, our feelings of belonging, empowerment, available choices as well as our perceived level of mental wellbeing, our relationships and confidence in society and civic institutions around us. At its most simple form, human wellbeing in conservation has been defined through three conditions: meeting needs, pursuing goals and experiencing a satisfactory quality of life.¹⁷

Crucially, wellbeing is now acknowledged to being not just individually constructed and perceived¹⁶ but also a social and cultural construct, with differing aspects across spatial and temporal scales, even if some components are universally accepted.¹⁸–²¹

Here we used a multidimensional framework for wellbeing, incorporating all aspects of our lives including social and cultural, environmental and physical, economic and material, and psychological including emotional and spiritual wellbeing.

Objectives of the review

The main objective of this review was to understand whether participation in voluntary conservation and restoration programs has specific impacts on the participants and their communities. The primary research question was:

**What are the impacts (O) (positive or negative) of voluntary participation (I) in conservation and restoration activities to the participating volunteers (P)?**

In addition to the primary research question other related questions were identified. These included questions on how the impacts of participation had been defined and assessed; what methods have been used to do so and what variables may affect the extent of these impacts or how they have been evaluated and reported. Conceptual framework for potential impact pathways is depicted in **Figure 1**.

The secondary research questions were:

- How many studies were identified that specifically describe impacts on participants and/or volunteers?
- How many of those impacts specifically describe or refer to the concept of ‘wellbeing’?

**Figure 1.** Conceptual flowchart illustrating potential positive impact pathways from volunteering to the participating individual based on theory of change process.
If ‘wellbeing’ is discussed, described, or assessed, how has it been defined? What aspects of wellbeing have been included?

How have impacts on participants and/or volunteers been collected, measured, or evaluated?

Has volunteering or participating been shown to have an impact on ‘wellbeing’ or any of its aspects?

Has participation in conservation/restoration projects been shown to improve any aspect of individual wellbeing?

Has participation in conservation/restoration projects been shown to achieve improved wellbeing for communities?

What motivates people to volunteer?

What barriers have been described which might prevent people from volunteering?

What challenges may arise within volunteering situation that may prevent people from continuing their volunteering commitment?

Where in the world have studies included in this review been conducted? Where are the institutions situated to which the first authors of included studies have been affiliated with? Does this influence types of impacts, barriers or motivations described?

Definitions of the question components:

The **subject/population (P)**, or the unit of study was any identified habitat or species conservation or restoration project with a definite aspect of community and/or volunteer participation described in the literature.

The **intervention (I)** was the volunteer participation, and the outcome (O) was the effects on participants’ or perceived mental, physical, social and economic wellbeing, both at individual as well as community level.

The review’s focus was specifically the described (subjective) perceptions of individuals who have participated in volunteering activities. As such, it was not possible to find a suitable **comparator**, such as review of volunteering impacts from non-conservation projects, that would have provided adequate, reliable data for comparison.

**Protocol**

The review was conducted following the methodological guidelines set by the Centre for Evidence-based Conservation (CEC) at Bangor, Wales, UK22–24 and the PRISMA-P guidelines.25,26 The study arose from a restricted situation during COVID regulations and is not a standard systematic review in a sense of having resources for a large team of researchers. The study was conducted mostly by one researcher but aiming for the higher standards than that of a typical literature review.

**Searches**

Six bibliographic databases were used for this review: ISI Web of Science, JSTOR, Scopus, ScienceDirect, Google Scholar and Lens. The search was conducted for years between 2000 and 2020 as 20 years’ worth of data was the deemed the maximum period to limit excessive data from earlier years when a pilot search had shown that ‘wellbeing’ was very rarely linked with volunteer research.

The search strings used are listed below:

“conservation” OR “community conservation” OR “community based conservation” OR “community-based conservation” OR “volunteer conservation” OR “participatory conservation” OR “citizen science” AND “volunteer” OR “volunteering” OR “wellbeing” OR “well-being”

In addition, limited searches were conducted for “impacts of conservation”, “impacts of conservation volunteering”, “impacts of community-based conservation”, “co-benefits of conservation”, “co-benefits of conservation volunteering”, “conservation volunteering” AND “happiness”, “conservation volunteering” AND “health” to check how well the general search string were capturing the intended literature.
English language was used in bibliographic database searches as well as organizational website searches and web-based search engines. Organisational websites were searched for additional literature, see Table 1. The number of databases used, and the grey literature searched, hopefully ensures the comprehensiveness of the search strategy. Due to lack of resources, there are currently no plans to update the searches during the conduct of the review.

Inherent meta-bias is present through the use of mostly English language literature. Although attempts are made in the analysis to identify countries where studies are conducted as well as the nationalities of first authors, it is not possible to disentangle the language bias from the dataset. This will be discussed in the final results.

A total of 13,777 documents were identified from web-based database searches, this figure was reduced to 10,804 after duplicates were removed using the ‘duplicate’ search in Excel tables. Finally, the list was organised in an alphabetical order and visually checked for duplicates. An additional 96 articles were sourced from organisational websites, key-litterature references and publication depositories and added to the search data (Figure 2).

### Article screening and study inclusion criteria

A priori methodology for screening the articles was conducted in three stages. The initial screening covered only the title of each document, article or a report. Irrelevant titles, as well as all further duplicates were deleted.

A total of 1242 articles and documents remained after the initial title screening (Figure 2). Articles were kept for further reading if deemed otherwise interesting and relevant to the project.

Title screening consisted of checking the title against the following criteria and whether it alluded that the paper would discuss any of the following: conservation/restoration/rewilding project/natural resource management/volunteer participants/community conservation/community participation/citizen science/impacts or wellbeing linked to conservation, environment and volunteering in any form/challenges, barriers, motivations, attitudes, or incentives to volunteering or community based conservation or participatory experience.

If it wasn’t not clear whether or not the article might discuss the above, it was kept for further screening. In addition, included for further reading, were titles that alluded to the above topics which could be discussed in the text, specifically when these were titled as reviews or analyses.

The articles and studies identified by their title were downloaded where possible and if not found or the weblinks were unavailable the authors were contacted, and copies requested.

The checklist against which each article was compared included the following:

- Does the article discuss a conservation/restoration/rewilding project/natural resource management? (YES/NO)
- Does it also describe, discuss or assess volunteer participants/community conservation/community participation/citizen science? (YES/NO)
- And/or does it also describe, discuss or assess impacts or wellbeing linked to conservation, environment and volunteering in any form? (YES/NO)

| #  | Organisation                              | Website                                |
|----|------------------------------------------|----------------------------------------|
| 1  | National Resources Wales                 | https://naturalresources.wales         |
| 2  | The Wildlife Trust                       | https://www.wildlifetrusts.org/        |
| 3  | British Trust for Conservation Volunteers| https://www.tcv.org.uk/                |
| 4  | Marine Conservation Society              | https://www.mcsuk.org/                 |
| 5  | Department of Conservation, New Zealand  | https://www.doc.govt.nz/               |
| 6  | Scottish Forestry Trust                  | https://www.scottishforestrytrust.org.uk |
Furthermore, does it discuss challenges, barriers, motivations, attitudes, or incentives to such project – anything that would indicate a discussion of the participatory experience, not just merely that volunteers were used to collect data? (YES/NO)

In addition, included for further reading, were titles that alluded to the above topics which could be discussed in the text, specifically when these were titled as reviews or analyses. Abstracts that related exclusively to ecotourism or tourism were not included.

A total of 272 articles went through an additional abstract screening stage. After which 106 articles remained for more detailed assessment (Figure 2).

Consistency checking
A Cohen’s kappa analysis was conducted on a selection of (n=115, 10%) titles between the first reviewer and an additional reviewer to check for consistency of the filtering approach.

Formula used was as follows

\[ K = \frac{(Pr(a) - Pr(e))}{1 - Pr(e)} \]

The resulting Kappa coefficient was 0.7, indicating a moderate to good agreement between the title selection of the reviewer.

Critical appraisal strategy
The critical appraisal strategy consisted of assessing the quality or the ‘internal validity’ of each study based on the extent, repeatability and clarity of methodology description (“well described”, “limited description”, “not described”).
The generalisability of the ‘external validity’ was ascertained based on the sample size of each study, where studies with less than 20 samples, combined with a limited description of methodology were classified as ‘low’ quality (n=2). Studies with 20 or more samples but limited methodological account (n=30) were examined case by case. Initially six of these studies were subjectively given a ‘high’ quality classification but this was downgraded to ‘low’ after further reflection as no objective, repeatable threshold could be described.

Studies with no description of research methodology were excluded from the outset. Studies were further excluded from the analysis if a low sample size was combined with a methodology that was not adequately described resulting in ‘low’ quality data with lack of methodological description (Table 2). Not all ‘low’ quality reports were excluded. Of the final 88 studies, 51 were considered ‘high’ quality and 37 ‘low’ quality.

The sample size will be used as a descriptor for the resulting synthesis and processed further when the validity of the evidence base is weighed up and discussed. Reviews were collated for a separate narrative synthesis.

**Data extraction**

Each article/document was given a meta-data code relating to its database source. All the titles were gathered in Microsoft Excel (Microsoft 365 MSO Version 2207) (RRID:SCR_016137) and assessed according to the critical appraisal strategy. Meta-data extracted included the title, year of publication, country of first author institution, country/countries where study was conducted, and whether these were in ‘Global South’ or ‘Global North’. Data was also gathered to assess whether the article described or assessed: ‘volunteer experience’, ‘volunteer motivation’, ‘positive impacts on or benefits to volunteers’, ‘impacts on the community’ and ‘barriers to or negative impacts on volunteers’. Not all articles would cover all these topics and in the absence of content, the Excel sheet cell was left blank. Raw data were stored in Figshare.27

**Data synthesis and presentation**

The type of synthesis conducted as part of the systematic review will be a combination of narrative and mixed method syntheses. Descriptive statistics, figures and tables will be used to synthesise the evidence base where appropriate.
namely the number, quality, year of publication and geographic spread of articles and other documents collated. This will include assessment of the effect of region and country of the study location as well as the country where the institution or organisation of the first author is based.

Findings will be amalgamated under different themes including:

1) Motivations for volunteering
2) Barriers to participating
3) Perceived impacts from volunteering activities

A narrative, qualitative synthesis form will be used to describe and group different motivations, barriers and impacts identified in the various studies. Not all sources will have covered each of these themes so sample sizes for each will be listed and implications discussed.

The second part of the study will describe the variety of methods used to gather and assess the above data. Literature reviews, systematic or otherwise, identified in the search phase, will be collated and their findings will be presented using a narrative synthesis. The risk of publication bias will be discussed alongside the strategy to identify potential knowledge gaps and the unrepresented subtopics that may warrant further primary research.24

Data availability

Underlying data

Figshare: Underlying data for ‘Assessing the impacts of conservation volunteering on participant well-being: a simplified systematic review protocol’, https://doi.org/10.6084/m9.figshare.19525615.v1.27

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

Reporting guidelines

PRISMA-P checklist for ‘Assessing the impacts of conservation volunteering on participant well-being: a simplified systematic review protocol’, https://doi.org/10.6084/m9.figshare.21030238.26

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Acknowledgements

The author wishes to acknowledge Suzanne Tarrant, a Consultant Psychologist at Hywel Dda UHB, Dr Liz Morris-Webb at Bangor University and Dr Ed Lord and other colleagues at Swansea University researchers in the fields of eco-therapies, blue spaces and well-being, who all provided advice and feedback on conceptual design of the work. The author is also grateful to the team behind the title filtering, Kaisa Käärmemaa and Laura Nuuttila and to the comments of the reviewers who significantly improved the manuscript.

References

1. Gascon M, Zijlema W, Vert C, et al.: Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. Int. J. Hyg. Environ. Health. 2017; 220(8): 1207–1221. PubMed Abstract | Publisher Full Text
2. Newton A, et al.: Assessing, quantifying and valuing the ecosystem services of coastal lagoons. J. Nat. Conserv. 2018; 44(Febuary): 50–65. Publisher Full Text
3. Bottrill M, et al.: What are the impacts of nature conservation interventions on human well-being: A systematic map protocol. Environ. Evid. 2014; 3(1): 1–11. Publisher Full Text
4. Britton E, Kindermann G, Domergan C, et al.: Blue care: A systematic review of blue space interventions for health and wellbeing. Health Promot. Int. 2020; 35(1): 50–69. PubMed Abstract | Publisher Full Text
5. Lovell R, Husk K, Bethel A, et al.: What are the health and well-being impacts of community gardening for adults and children: A mixed method systematic review protocol. Environ. Evid. 2014; 3(1): 1–13. Publisher Full Text
6. Lovell R, Husk K, Cooper C, et al.: Understanding how environmental enhancement and conservation activities may benefit health and wellbeing: A systematic review. Environmental health. BMC Public Health. 2015; 15(1): 864. PubMed Abstract | Publisher Full Text
7. Barton J, Griffin M, Pretty J: Exercise, nature- and socially interactive-based initiatives improve mood and self-esteem in
the clinical population. Perspect. Public Health. 2012; 132(2): 89–96.
PubMed Abstract | Publisher Full Text

8. Berry HL, Bowen K, Kjellstrom T: Climate change and mental health: A causal pathways framework. Int. J. Public Health. 2010; 55(2): 123–132.
PubMed Abstract | Publisher Full Text

9. Pretty J, Rogerson M, Barton J: Green mind theory: How brain-body-behaviour links into natural and social environments for healthy habits. Int. J. Environ. Res. Public Health. 2017; 14(7).
PubMed Abstract | Publisher Full Text

10. Foster-Smith J, Evans SM: The value of marine ecological data collected by volunteers. Biol. Conserv. 2003; 113(2): 199–213.

11. Cook H, Inman A: The voluntary sector and conservation for England: Achievements, expanding roles and uncertain future. J. Environ. Manag. 2012; 112: 170–177.

12. Dickinson JL, Zuckerberg B, Bonter DN: Citizen science as an ecological research tool: Challenges and benefits. Annu. Rev. Ecol. Evol. Syst. 2010; 41(August): 149–172.

13. McKinley DC, et al.: Citizen science can improve conservation science, natural resource management, and environmental protection. Biol. Conserv. 2017; 208: 15–28.

14. Haddaway NR, Kohl C, da Silva NR, et al.: A framework for stakeholder engagement during systematic reviews and maps in environmental management. Environ. Evol. Evid. 2017; 8(1): 11.
Publisher Full Text

15. Biedenweg K, Stiles K, Wellman K: A holistic framework for identifying human wellbeing indicators for marine policy. Mar. Policy. 2016; 64: 31–37.
Publisher Full Text

16. Summers JK, Smith LM, Case JL, et al.: A review of the elements of human well-being with an emphasis on the contribution of ecosystem services. Ambio. 2012; 41(4): 327–340.
Publisher Full Text

17. Milner-Gulland EJ, et al.: Accounting for the impact of conservation on human well-being. Conserv. Biol. 2014; 28(5): 1160–1166.
Publisher Full Text
Open Peer Review

Current Peer Review Status: ✔ ✔ ✔

Version 2

Reviewer Report 16 March 2023

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Philip A. Martin
Basque Centre for Climate Change, Leioa, Spain

Having looked at the responses to my review I am satisfied that the authors have addressed my concerns. Based on these revisions I am happy for the work to be indexed.

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 10 March 2023

https://doi.org/10.5256/f1000research.143949.r165576

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Margaret Nohilly
Department of Learning, Society and Religious Education, Mary Immaculate College, Limerick, Ireland

Fionnula Tynan
Mary Immaculate College, Limerick, Ireland

Having reviewed the revised document here and in word form, the author has taken time to incorporate many of the recommendations which strengthen this paper overall

Competing Interests: No competing interests were disclosed.
**Reviewer Expertise:** Wellbeing, Child Protection

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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**Version 1**

Reviewer Report 03 January 2023

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**Philip A. Martin**
1 Basque Centre for Climate Change, Leioa, Spain
2 Basque Centre for Climate Change, Leioa, Spain

This study aims to assess the impacts of conservation volunteering on the wellbeing of the participants using systematic review to synthesise the findings of previous studies. This is an interesting question, particularly, as the author states, in light of current attempts to scale up ecosystem restoration.

I am a specialist in ecological synthesis and have approached my review from this perspective, using the Collaboration for Environmental Evidence checklist for editors and reviewers and a guide ([https://environmentalevidence.org/wp-content/uploads/2021/02/CEESAT-Checklist-for-editors.pdf](https://environmentalevidence.org/wp-content/uploads/2021/02/CEESAT-Checklist-for-editors.pdf)). Based on this, I conclude that this synthesis is likely to be significantly better than the vast majority of synthesis papers published in ecology and conservation. For example it was very good to see (i) a well-defined series of questions; (ii) a flowchart conceptualising the potential impacts of volunteering; (iii) use of a PRISMA diagram; (iv) consistency checks for inclusion criteria; (v) critical appraisal of studies. However, I still think that there are a number of issues that need to be resolved.

### Major issues

- I am a bit confused about what this protocol is for. Normally, a protocol is written before a study is carried out and pre-registered in order to avoid questionable research practices. However, in the case of this study it seems like much of the study has already been carried out. Is that the case? If so, what is the purpose of this document.

- It’s fantastic that a good number of platforms were used to search for relevant literature, however it’s not clear to me what the search strings used for platforms other that Web of Science were. In order to make this work as repeatable as possible it would be helpful if detail on this was provided.

- For the screening, how was it decided that titles were irrelevant? I’m also unclear as to
whether the inclusion criteria were applied at the abstract stage or the full text stage of screening or both. It would be great if you could clarify this.

- The critical appraisal strategy is missing detail. It would be helpful for me if all the criteria for critical appraisal were presented in a table so it is clearer what the impact of different scores for each category are for the overall scores for internal and external validity.

Minor issues
- In the question component section some mention of PICO elements would be helpful.
- I can't tell what tool was used for the deduplication of references that were found in searches. Can you please provide some detail on this?
- Why were papers restricted to those published between 2000 and 2020? In addition, although this is mentioned in the abstract, it is not mentioned anywhere in the main text of the article. This information should be included for the sake of clarity.

Typos
- In the section on searches ‘Scobus’ should be ‘Scopus’

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Partly

Are sufficient details of the methods provided to allow replication by others?
Partly

Are the datasets clearly presented in a useable and accessible format?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Ecological evidence synthesis

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 25 Jan 2023
Hanna Nuuttila

Major issues
- I am a bit confused about what this protocol is for. Normally, a protocol is written before a study is carried out and pre-registered in order to avoid questionable research practices. However, in the case of this study it seems like much of the study has already been carried out. Is that the case? If so, what is the purpose of this
You are correct. The study protocol was started just after the COVID pandemic broke out and left me, the main and only researcher, in a difficult position without much academic support from my institution. The protocol was written but not published for various reasons whilst time and funding to conclude the whole work was running out (this was a short fellowship). I was unable to conclude the intended research as face-to-face opportunities shrunk and the only thing I could do was to continue with the systematic review – following the guidelines I had written (but not published). As you say – the protocol’s purpose now is just to support work that has already been started – however the findings have not been analysed or written up and all comments and suggestions for the methods will be useful – even if modifications into search methods etc cannot be made. These can, and will be discussed in the research paper – and I must say I have learned a great deal about systematic reviews, protocols and publication.

It’s fantastic that a good number of platforms were used to search for relevant literature, however it’s not clear to me what the search strings used for platforms other than Web of Science were. In order to make this work as repeatable as possible it would be helpful if detail on this was provided.

I have modified and amended this and hopefully this is now clearer:

The search strings used are listed below:

“conservation” OR “community conservation” OR “community based conservation” OR
“community-based conservation” OR “volunteer conservation” OR “participatory conservation” OR
“citizen science” AND “volunteer” OR “volunteering” OR “wellbeing” OR “well-being”

In addition, limited searches were conducted for “impacts of conservation”, “impacts of conservation volunteering”, “impacts of community-based conservation”, “co-benefits of conservation”, “co-benefits of conservation volunteering”, “conservation volunteering AND happiness”, “conservation volunteering AND health” to check how well the general search string were capturing the intended literature.

For the screening, how was it decided that titles were irrelevant? I’m also unclear as to whether the inclusion criteria were applied at the abstract stage or the full text stage of screening or both. It would be great if you could clarify this.

Title screening consisted of checking the title against the following criteria and whether it alluded that the paper would discuss any of the following:
conservation/restoration/rewilding project/natural resource management / volunteer participants/community conservation/ community participation/citizen science / impacts or wellbeing linked to conservation, environment and volunteering in any form / challenges, barriers, motivations, attitudes, or incentives to volunteering or community based conservation or participatory experience.
If it wasn’t not clear whether or not the article might discuss the above, it was kept for further screening.

In addition, I included for further reading, titles that alluded to the above topics which could
be discussed in the text, specifically when these were titled as reviews or analyses. I will add the above to the methodology for clarification

- The critical appraisal strategy is missing detail. It would be helpful for me if all the criteria for critical appraisal were presented in a table so it is clearer what the impact of different scores for each category are for the overall scores for internal and external validity.

Research quality matrix. Table not visible in this format and will be added to main text.

**EXTERNAL VALIDITY**
(sample size)

**INTERNAL VALIDITY**
(extent, repeatability and clarity of methodology)

|                | LOW | HIGH |
|----------------|-----|------|
| < 20 (low)     |     |      |
| > 20 (high)    |     |      |
| Not described (no) | NO |      |
| Limited description (lim) | LIM | LIM |
| Adequate description (ade) | ADE | ADE |

Matrix results for data used in the analysis.

EXCLUDE

REVIEW

INCLUDE
Minor issues

○ In the question component section some mention of PICO elements would be helpful. Below you can see the text from the methods which does identify the PICO elements, I have added codes in brackets for clarity – and rephrased the Main research question with coded elements as follows:

**What are the impacts (O) (positive or negative) of voluntary participation (I) in conservation and restoration activities to the participating volunteers (P)?**

The **subject/population (P)**, or the unit of study was any identified habitat or species conservation or restoration project with a definite aspect of community and/or volunteer participation described in the literature.

The **intervention (I)** was the volunteer participation, and the **outcome (O)** was the effects on participants’ or perceived mental, physical, social and economic wellbeing, both at individual as well as community level.

The review’s focus was specifically the described (subjective) perceptions of individuals who have participated in volunteering activities. As such, it was not possible to find a suitable **comparator**, such as review of volunteering impacts from non-conservation projects, that would have provided adequate, reliable data for comparison.

I can’t tell what tool was used for the duplication of references that were found in searches. Can you please provide some detail on this? The ‘duplicate’ search in Excel was used, as was organising in alphabetical order and visually checking for duplicates. Will add this text to the methods for clarification

○ Why were papers restricted to those published between 2000 and 2020? In addition, although this is mentioned in the abstract, it is not mentioned anywhere in the main text of the article. This information should be included for the sake of clarity. Thanks, will add this information. 20 years’ of datasets was deemed something I could tackle by myself, also In pilot searches the mention of wellbeing was simply not coming up in earlier papers, and knowing

Typos

○ In the section on searches ‘Scobus’ should be ‘Scopus’

This will be corrected

**Competing Interests:** No competing interests were disclosed.
This is a very interesting article with a focus on volunteers, which as the article outlines is not often the focus of a research project. The article focuses in particular on the impact of conservation activities on participating volunteers. A clear rational is provided for the study and the objectives of the research are clearly outlined.

I recommend that a stronger focus is placed on the concept of wellbeing in this work, particularly in line with secondary research question: If 'Wellbeing' is discussed, described, or assessed, how has it been defined? What aspects of wellbeing have been included? The concept of wellbeing needs to be explored in detail and made accessible to the reader. The conceptual framework outlines a conceptual framework for mental wellbeing. Does this not indicate that mental wellbeing is wellbeing? Mental wellbeing is a component of one of many subsets of wellbeing no more than physical wellbeing, spiritual wellbeing, emotional wellbeing are subsets of wellbeing. I recommend that a more holistic view of wellbeing is explored and presented as a conceptual framework for wellbeing in this article.

The protocol for undertaking the work must be commended as it is well detailed and robust.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Yes

Are the datasets clearly presented in a useable and accessible format?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Wellbeing, Child Protection
We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Hanna Nuuttila

I completely agree that I had not defined the concept adequately. I have conducted much more exploration of the concept. The study proposes to understand the ways in which 'wellbeing' has been conceptualised and measured in the field of conservation and following is something I wrote for another paper. I will utilise this to form a more complex, multifaceted definition of the concept for the methods paper.

‘Human wellbeing’ can be defined in a variety of ways.

As our understanding of wellbeing has evolved in psychology, sociology and economics so has our way of defining and assessing it in conservation practice and policy. Understanding human wellbeing is now a critical component in sustainably managing the environment. Biedenweg et al. identify six human wellbeing indicators (psychological, physical, social, cultural, economic, governance) which are affected by the environment and as such are useful in guiding policy and management (Biedenweg, Stiles, and Wellman 2016).

It is generally accepted that human wellbeing is composed of both objective and subjective dimensions (Summers et al. 2012). The objective components are related to material and social attributes and are easily measurable such as our jobs and incomes, homes, places we live in, our environment, available services, infrastructure so on. Equally essential part is the subjective, perceived wellbeing that can only be described by the individual. This relates to job or health satisfaction, our feelings of belonging, empowerment, available choices as well as our subjective measure of mental wellbeing, our relationships and trust in society and civic institutions around us.

Understanding of wellbeing has evolved from ‘basic human needs’ to encompass ecosystem services, environmental needs and subjective happiness (Summers et al. 2012). We now define ‘wellbeing’ through how people are feeling and functioning in their everyday lives. Crucially we now acknowledge that wellbeing is a social and cultural construct and aspects of wellbeing can differ drastically geographically, even if some components are universally accepted (Beauchamp et al. 2018; de Lange, Woodhouse, and Milner-Gulland 2016; McKinnon et al. 2016).

The Office of National Statistics (ONS) in the UK compiles data on ten domains of national wellbeing[1]; personal well-being; our relationships; health; what we do; where we live; personal finance; economy; education and skills; governance and environment. Within these 10 domains there are 44 indicators of national well-being. The indicators include both objective measures (for example, unemployment rate) and subjective measures (such as job satisfaction) to provide a comprehensive picture of the nation's well-being and 'societal progress'. In contrast, a wellbeing definition used in a conservation project in a rural
Tanzania measures wealth in tropical livestock units, assesses relational and social wellbeing through ability to attend community meetings and places a far more weight and importance in the continuity of traditional ways of life, spiritual practice or female autonomy (Beauchamp et al. 2018). At its most simplistic, human wellbeing in conservation has been defined through three conditions: meeting needs, pursuing goals and experiencing a satisfactory quality of life (Milner-Gulland et al. 2014).

Here, we define wellbeing as a multidimensional concept, incorporating all aspects of our lives including social and cultural, environmental and physical, economic and material, and psychological including emotional and spiritual wellbeing. Wellbeing has both objective and subjective aspects. Objective wellbeing is something we theoretically assume can be measured, whereas subjective wellbeing is an externally experienced concept that only the individual can report on. Happiness and wellbeing are sometimes used interchangeably, but constant happiness is not necessarily a prerequisite to one's general wellbeing. Here the feeling of happiness is considered as one of the elements of wellbeing – but as a momentary and changeable emotion. It is possible to feel sad and have wellbeing simultaneously, just as it is possible to be of ill health or in inadequate economic situation whilst feel happy or content. This complexity makes measuring wellbeing in its entirety difficult, and is probably the reason why many wellbeing studies aimed at assessing wellbeing focus on limited aspects of wellbeing.

[1] Office for National Statistics (ONS), released 11 Nov 2022, ONS website, Statistical bulletin: Quality of life in the UK: November 2022

**Competing Interests:** No competing interests were disclosed.