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Web links to the author's journal account have been redacted from the decision letters as indicated to maintain confidentiality

26th Jul 23

Dear Professor Reyes-Garcia,

Your manuscript titled "Indigenous Peoples and local communities report ongoing and widespread climate change impacts on local social-ecological systems" has now been seen by 3 reviewers, and we include their comments at the end of this message. They find your work of interest, but some important points are raised. We are interested in the possibility of publishing your study in Communications Earth & Environment, but would like to consider your responses to these concerns and assess a revised manuscript before we make a final decision on publication.

In particular, we would most recommend you address the following points made by the reviewers:

- * To provide more detail about the methodology. This includes detail on indicator use (and potentially considering the inclusion of an example as Reviewer 3 suggests) and how the methodology could be operationalized (particularly for the benefit of Indigenous and Local People)
- * To clarify terminology over climate change, climate change impacts, indicators, effects.
- * To reflect on the marginalisation and erosion of rights of Indigenous Peoples as Reviewer 3 suggests, and any implications for the methodology/study.

We therefore invite you to revise and resubmit your manuscript, along with a point-by-point response that takes into account the points raised. Please highlight all changes in the manuscript text file.

We are committed to providing a fair and constructive peer-review process. Please don't hesitate to contact us if you wish to discuss the revision in more detail.

Please use the following link to submit your revised manuscript, point-by-point response to the referees' comments (which should be in a separate document to any cover letter), a tracked-changes version of the manuscript (as a PDF file) and the completed checklist:

[Link redacted]

** This url links to your confidential home page and associated information about manuscripts you may have submitted or be reviewing for us. If you wish to forward this email to co-authors, please delete the link to your homepage first **

We hope to receive your revised paper within six weeks; please let us know if you aren't able to submit it within this time so that we can discuss how best to proceed. If we don't hear from you, and the revision process takes significantly longer, we may close your file. In this event, we will still be happy to reconsider your paper at a later date, as long as nothing similar has been accepted for publication at Communications Earth & Environment or published elsewhere in the meantime.

Please do not hesitate to contact us if you have any questions or would like to discuss these revisions further. We look forward to seeing the revised manuscript and thank you for the opportunity to review your work.

Best regards,

Niheer Dasandi, PhD
Editorial Board Member
Communications Earth & Environment

orcid.org/0000-0002-8708-837X

Clare Davis, PhD
Senior Editor
Communications Earth & Environment

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Furthermore, please align your manuscript with our format requirements, which are summarized on the following checklist:

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and also in our style and formatting guide [Communications Earth & Environment formatting guide](https://www.nature.com/documents/commsj-phys-style-formatting-guide-accept.pdf)

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All Communications Earth & Environment manuscripts must include a section titled "Data Availability" at the end of the Methods section or main text (if no Methods). More information on this policy, is available at <http://www.nature.com/authors/policies/data/data-availability-statements-data-citations.pdf>.

In particular, the Data availability statement should include:

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- If a dataset has a Digital Object Identifier (DOI) as its unique identifier, we strongly encourage including this in the Reference list and citing the dataset in the Data Availability Statement.

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Please refer to our data policies at http://www.nature.com/authors/policies/availability.html.

REVIEWER COMMENTS:

Reviewer #1 (Remarks to the Author):

The article is well written. The major claims in the article will be helpful for other researchers and policy makers. The data collected and analyzed supports the claims and is convincing. The article describes site specific regions responses well. The methodology can be replicated in other studies.

I have no recommendations for this article and enjoyed reading and learning from it.

Reviewer #2 (Remarks to the Author):

This paper aims to address two gaps: 1) to broaden the reporting of Indigenous and Local People's specific experiences of climate change across the globe, 2) to organize and harmonize the large dataset characterized by high biophysical and biocultural diversity so that trends can be understood.

The data analyses and the discussion of limitations of the work are sound. The paper is well-organized and well-written. The collective experience and expertise of the authors is impressive.

The paper's main finding that reports of climate change impacts are dependent on climate zones and livelihood activities is unsurprising, even if undocumented as the authors write.

The authors suggest that the paper's value is "to provide a methodology that could be adapted for assessing economic and non-economic loss and damage related to climate change impacts on local social-ecological systems, thus providing empirical basis for parties to discuss appropriate compensatory measures. This would contribute to a broader recognition of the diverse histories of social, environmental, and ecological harm while opening just pathways into uncertain futures." It is not clear how this paper could actually achieve that. I encourage the authors to think more deeply and write in more detail about how the method and findings could be operationalized on the ground and in policy for the benefit of Indigenous and Local People. The need for the work is great and time is of the essence.

Reviewer #3 (Remarks to the Author):

The paper describes the local impacts of climate change observed by Indigenous Peoples and Local Communities (IPLC) using a standardized protocol applied in 48 sites, which yielded 1661 site-agreed reports that were grouped in 369 indicators. Both the standardized method and the global scale are novel and offer insights of interest for scholars working at the intersection of knowledge systems and climate change. Further, this paper will increase the relevance of cross-cultural comparative analysis. However, it should not lead to an overemphasis on quantitative data and analysis that disregards qualitative studies.

The paper seems to lump together different things under the term of "impacts". The study would gain strength by distinguishing effects from impacts. For instance, increase in mean temperature and decrease in crop productivity are treated both as impacts. However, scholars treat changes in mean temperature either as climate change, as an indicator of climate change, and as an effect of global warming. Whereas researchers understand changes in crop productivity as impacts of climate change.

To include what the authors understand by climate change (presumably changes registered over decades) might also increase the clarity of the manuscript. I assume that this definition explains why the starting question of changes in the youth of the respondent.

Expanding the methodology, probably with an example, would make the paper replicable. In its current state, how the indicators are used is unclear. For instance, if and environmental change is attributed to altered precipitation, would that be in the atmospheric system? But what would happen if other respondent identified changes in animal behavior attributed to altered precipitation; would this go in atmospheric and/or life system?

The paper appears to have an optimistic view of the future of IPLC knowledge, ignoring the cultural erosion and marginalization of IP worldwide, and disregarding the outmigration and declining involvement of youth indigenous in their communities. In light of these trends, other recommendations might be added regarding IPLC knowledge.

Minor comments:

L. 231 a word might be missing

L.260-261. "significantly higher than in tropical and temperate. But the * in Fig. 3 is only on tropical.

L.379. "insights..." might be missing a word.

REVIEWER COMMENTS:

Reviewer #1 (Remarks to the Author):

Point #1.1: The article is well written. The major claims in the article will be helpful for other researchers and policy makers. The data collected and analyzed supports the claims and is convincing. The article describes site specific regions responses well. The methodology can be replicated in other studies.

I have no recommendations for this article and enjoyed reading and learning from it.

Response: We thank the reviewer for this positive and encouraging words.

Reviewer #2 (Remarks to the Author):

Point #2.1: This paper aims to address two gaps: 1) to broaden the reporting of Indigenous and Local People's specific experiences of climate change across the globe, 2) to organize and harmonize the large dataset characterized by high biophysical and biocultural diversity so that trends can be understood.

The data analyses and the discussion of limitations of the work are sound. The paper is well-organized and well-written. The collective experience and expertise of the authors is impressive.

Response: We thank the reviewer for this positive and encouraging words.

Point #2.2: The paper's main finding that reports of climate change impacts are dependent on climate zones and livelihood activities is unsurprising, even if undocumented as the authors write.

Response: We agree that the main finding is unsurprising but not previously documented with a strong empirical basis, as we do in this paper. The evidence collected provides a strong basis for our policy recommendations.

Point #2.3: The authors suggest that the paper's value is "to provide a methodology that could be adapted for assessing economic and non-economic loss and damage related to climate change impacts on local social-ecological systems, thus providing empirical basis for parties to discuss appropriate compensatory measures. This would contribute to a broader recognition of the diverse histories of social, environmental, and ecological harm while opening just pathways into uncertain futures." It is not clear how this paper could actually achieve that. I encourage the authors to think more deeply and write in more detail about how the method and findings could be operationalized on the ground and in policy for the benefit of Indigenous and Local People. The need for the work is great and time is of the essence.

Response: We thank the reviewer for raising this important point. We have reformulated the last paragraph of the discussion to clarify how we think the method proposed could be used to measure loss and damage. Specifically, we wrote:

Second, as discussions on the need to address loss and damage to achieve climate justice are gaining recognition in the academic literature^{41,42} and in climate negotiations (e.g., Decision 2/CP.27, UNFCCC. Conference of Parties), our work provides a methodology that allows both the identification of climate change impacts at the local level and the cross-cultural comparison of reported impacts. This methodology has been applied to various tools, including the OpenTEK platform and Oblo, both of which have served to help assess local climate change impacts, either by researchers, citizen scientists, or communities themselves. In this sense, the methodology has the capacity to be applied to existing or new tools and adapted in a way that would inform about the specific economic and non-economic loss and damage related to climate change impacts on local social-ecological systems⁴³. By combining the methodology with a climate impact valuation process, as defined either by communities or regional stakeholders, the work has the potential for providing empirical basis for parties to discuss appropriate compensatory measures. This would contribute to a broader recognition of the diverse histories of social, environmental, and ecological harm while opening just pathways into uncertain futures.

Reviewer #3 (Remarks to the Author):

Point #3.1: The paper describes the local impacts of climate change observed by Indigenous Peoples and Local Communities (IPLC) using a standardized protocol applied in 48 sites, which yielded 1661 site-agreed reports that were grouped in 369 indicators. Both the standardized method and the global scale are novel and offer insights of interest for scholars working at the intersection of knowledge systems and climate change. Further, this paper will increase the relevance of cross-cultural comparative analysis. However, it should not lead to an overemphasis on quantitative data and analysis that disregards qualitative studies.

Response: We agree with the point raised by the reviewer: quantitative data should not disregard qualitative studies. The LICCI network has emphasized the importance of working with both quantitative and qualitative data to identify common trends as well as idiosyncrasies and to emphasize that both types of data are important to understand global trends and the myriad of climate change impacts across the world. Moreover, the lead author emphasizes this exact same point in a recent position paper (Reyes-García 2023). To address the comment by the reviewer, we reinforce this point in the new version of the manuscript. Specifically, in the introduction we write

On the other hand, the growing body of research relying on grounded information from Indigenous Peoples and local communities, while successfully emphasizing the idiosyncrasies of climate change impacts, does not provide globally comparable information, thus hampering our ability to discern general trends and patterns and to upscale local research results to global climate research^{19,20}.

We have also modified the following sentence in the introduction to emphasize the complementary nature of quantitative and qualitative works

These works provide rich, multi-sited, qualitative, and place-based information on locally experienced climate impacts, although they have limited capacity to discern general

trends because they do not rely on a common strategy to gather globally comparable information.

Moreover, we are explicit about our approach in the last sentences of the introduction, where we write

In this work, our analysis deliberately adopts a global quantitative perspective, oriented to leverage the inclusion of Indigenous Peoples and local communities and their knowledge into climate change research and policy. This work relies on the wealth of qualitative information collected across case studies and published elsewhere²⁴. We emphasize the importance of working with both quantitative and qualitative data to identify common trends as well as idiosyncrasies – both of which are important to understand global trends and the myriad of climate change impacts across the world.

Point #3.2: The paper seems to lump together different things under the term of “impacts”. The study would gain strength by distinguishing effects from impacts. For instance, increase in mean temperature and decrease in crop productivity are treated both as impacts. However, scholars treat changes in mean temperature either as climate change, as an indicator of climate change, and as an effect of global warming. Whereas researchers understand changes in crop productivity as impacts of climate change.

Response: We thank the reviewer for this very useful remark. In this version of the ms. we differentiate between climate change and its impacts. We have implemented several changes in different parts of the manuscript.

In the methodology, we wrote: “In each site, we created a list of *local indicators of climate change and its impacts* (LICCIIs) that were locally agreed upon. The list includes reports of change in elements of the atmospheric system, considered as ‘indicators of climate change’, and reports of change in elements of the physical and the life systems associated with those, considered as ‘indicators of climate change impacts’.”

In the results section, we wrote: “Site-agreed observations of climate change and its impacts were classified in 369 local indicators of climate change impacts (LICCIIs), corresponding to 94 indicators of climate change (i.e., reports of change in elements of the atmospheric system) and 275 indicators of climate change impacts (i.e., reports of change in elements of the physical and the life systems) ((see Methods).”

Finally, we have carefully checked the full manuscript to adjust the terminology accordingly. These changes can be checked in the PDF with track changes

Point #3.3: To include what the authors understand by climate change (presumably changes registered over decades) might also increase the clarity of the manuscript. I assume that this definition explains why the starting question of changes in the youth of the respondent.

Response: We thank the reviewer for this point. We have clarify our use of “climate change in this manuscript in the methods section, where we wrote:

In each site, we conducted semi-structured interviews with 15-25 key participants to document climate change, understood as changes in elements of the atmospheric systems, and its

impacts on the environment. Our interviews focused on changes registered over decades, and noting the direction (e.g., increase or decrease) and the driver(s) of reported changes.

Point #3.4: Expanding the methodology, probably with an example, would make the paper replicable. In its current state, how the indicators are used is unclear. For instance, if an environmental change is attributed to altered precipitation, would that be in the atmospheric system? But what would happen if other respondent identified changes in animal behavior attributed to altered precipitation; would this go in atmospheric and/or life system?

Response: We thank the reviewer for this comment. We acknowledge that the methodology used has a certain level of complexity as some reports of changes and its drivers provide different information. In the current version of the manuscript, we emphasize that the research teams have made an important effort to make the methodology available and reproducible. In fact, the detailed protocol for data collection is published and open access, as they are training materials to support the use of the protocol. We wrote

Following open science principles, the protocol for the research project is openly available²³ and the team has made available a series of online training materials to facilitate the use of the protocol (<https://www.licci.eu/resources/>) so here we focus on explaining the methodological aspects that directly relate to this work.

To clarify the specific doubts raised by the reviewer in this comment, we wrote:

[In the results] For each site, only observations for which there was agreement across focus group discussions were considered (see Methods)

Then, in the methods, we wrote:

As observations of changes and its drivers came in contextualized narratives, they often included multiple drivers. For example, the observation that “Plants “cook” on the ground. The ground is hot, it rains, and then it is hot again, and this “cooks” the plants” made by Tsimane’ informants (Bolivia, Site_ID 24) was classified as a report of “changes in precipitation”, “changes in soil temperature”, and “changes in crop mortality rates”.

Point #3.5: The paper appears to have an optimistic view of the future of IPLC knowledge, ignoring the cultural erosion and marginalization of IP worldwide, and disregarding the outmigration and declining involvement of youth indigenous in their communities. In light of these trends, other recommendations might be added regarding IPLC knowledge.

Response: In our perspective, our research does not reflect an optimistic outlook of the future of IP and LC knowledge. Instead, our focus is on highlighting the practical applications of this knowledge in addressing climate change and advocating for various stakeholders to consider ILK during climate negotiations. Moreover, our policy recommendations stem from the field data. It is important to note that research methods deliberately selected interview participants who had been residents in the local community for over 20-30 years. This choice implies that we have limited data

regarding the erosion of knowledge, particularly in relation to age and the younger members who have migrated out of the community. While it is essential to acknowledge that multifaceted challenges that IPLC knowledge faces, it is important to recognize that making definitive statements about these aspects falls beyond the scope of our study.

LICCI's work provides tools to access, on the ground, knowledges that are often undocumented/inaccessible and deeply threatened by various factors - discrimination, diminishing knowledge holders, socio-ecological changes, etc. There is much talk about Indigenous Peoples' and local communities' knowledge being helpful in addressing climate change, however, very little understanding and little effort on how to access such knowledge and engage it effectively in climate action. In that sense, to address the reviewer's comments, we have added a recommendation highlighting the importance of generating concrete and permanent mechanisms and strategies to support, make visible, and revitalise these knowledges, from the local level, taking into consideration and addressing the multiple factors that restrict their transmission. Specifically, we wrote:

Finally, considering that the foundations of Indigenous and local knowledge systems are being compromised and disrupted in many places⁴⁴, there is a greater need than ever before to support Indigenous Peoples and local communities in mobilizing their knowledge basis to adapt to ongoing impacts and contribute to global mitigation efforts. Our compilation of ethnographic data documenting diverse Indigenous and local expertise about present and future climate change impacts and adaptation plans could inform elite-driven debates about loss and damage, CO2 emissions mitigation, and the turn to renewables. Developing locally specific data ultimately serves the goal of reducing harm to IP and LC that comes from both acute climate impacts and top-down climate adaptations.

Minor comments:

Point #3.6: L. 231 a word might be missing

Response: The sentence now reads:

Csángó farmers (Gyimes, Romania, Site_ID 16) report declining potatoes yields due to pests' infestations, which they relate to warmer winters that allow pests to breed over winter

Point #3.7: L.260-261. "significantly higher than in tropical and temperate. But the * in Fig. 3 is only on tropical.

Response: Thanks for pointing at this error. We have corrected the text now to align with the data.

Point #3.8: L.379. "insights..." might be missing a word.

Response: This was a typo. In fact, this part of the sentence should have been deleted. We have removed it from the current version.

References

Reyes-García, V. 2023. Beyond artificial academic debates: For a diverse, inclusive, and impactful ethnobiology and ethnomedicine. Journal of Ethnobiology and Ethnomedicine.
<https://doi.org/10.1186/s13002-023-00611-6>

13th Nov 23

Dear Professor Reyes-Garcia,

Your manuscript titled "Indigenous Peoples and local communities report ongoing and widespread climate change impacts on local social-ecological systems" has now been seen by our reviewers, whose comments appear below. In light of their advice we are delighted to say that we are happy, in principle, to publish a suitably revised version in Communications Earth & Environment under the open access CC BY license (Creative Commons Attribution v4.0 International License).

We therefore invite you to revise your paper one last time to comply with our format requirements and to maximise the accessibility and therefore the impact of your work.

Please note that it may still be possible for your paper to be published before the end of 2023, but in order to do this we will need you to address these points as quickly as possible so that we can move forward with your paper.

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We hope to hear from you within two weeks; please let us know if you need more time.

Best regards,

Niheer Dasandi, PhD
Editorial Board Member
Communications Earth & Environment

Clare Davis, PhD
Senior Editor
Communications Earth & Environment

www.nature.com/commsenv/
@CommsEarth

REVIEWERS' COMMENTS:

Reviewer #3 (Remarks to the Author):

The authors have satisfactorily addressed my initial reviews. I really appreciate that the authors productively engaged with the comments and generated an improved revised manuscript.