

## ANSWER TO REVIEWRS

Journal: NHESS

Author (s): Contreras-Jara et al.

Manuscript ID: egusphere-2025-4016

Title: "Indirect Costs of Floods: A Case Study of Highways Road Users"

Iteration: Correction

Executive Editor: Prof. Margreth Keiler (NHESS)

| #    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Answer                                                                                                                                                                             |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EE-1 | <p>Thank you for submitting the revised version of your manuscript EGUSPHERE-2025-4016, "Indirect costs of floods: a case study of highways road users."</p> <p>Both reviewers appreciated the revised version and identified only a few remaining technical corrections. I would therefore like to invite you to submit a further revised version addressing these points.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              | We thank the Editor for the positive assessment of the revised manuscript.                                                                                                         |
| EE-2 | In addition to the reviewers' comments, please update all table and figure captions in accordance with the NHESS guidelines. At present, several captions are not sufficiently self-contained. Figures and tables should be understandable without referring to the main text, and all symbols, abbreviations, colours, lines, and other elements shown in the figures should be clearly explained in the figure itself or in the legend/caption. This follows the NHESS editorial guidance that figures and tables should be self-standing.                                                                                                                                                                                                                                                                                 | We have updated the captions of all figures and tables to make them self-contained, following NHESS/Copernicus editorial guidance.                                                 |
| EE-3 | Please also carefully consider and address the technical information provided in the file validation report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | This is addressed in our response to the following comment (EE-4).                                                                                                                 |
| EE-4 | <p>Figures 3, 4, 5: the maps originate from Esri, please add the required attribution text "Powered by Esri" (e.g. Sources: Esri, TomTom, FAO, USGS   Powered by Esri). Please see:</p> <p><a href="https://publications.copernicus.org/for_authors/manuscript_preparation.html#mapsaerials">https://publications.copernicus.org/for_authors/manuscript_preparation.html#mapsaerials</a> -&gt; "Maps and aerials" -&gt; "3. Reuse of material from a map provider without requirement for a copyright statement: no copyright statement needed but a credit (e.g. Sources: Esri, TomTom, FAO, USGS   Powered by Esri) and <a href="https://developers.arcgis.com/documentation/esri-and-data-attribution/#esri-attribution">https://developers.arcgis.com/documentation/esri-and-data-attribution/#esri-attribution</a>.</p> | We updated the captions of Figures 3, 4, and 5 to include the required attribution: "Sources: Esri   Powered by Esri", replacing the previous "Base map: Esri World Imagery" text. |

Reviewer #1

| #    | Comment                                                                                                                            | Answer                                                                                                                                                  |
|------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| R1-1 | The manuscript has substantially improved, and most of my previous comments have been satisfactorily addressed.                    | We thank the reviewer for the positive assessment of the manuscript and for confirming that the previous comments have been satisfactorily addressed.   |
| R1-2 | Only a few minor clarifications remain, particularly regarding the vulnerability model and the uncertainty associated with the 15% | As mentioned in the text, the 15% threshold adopted for "Pint-light" and "Pint-heavy" corresponds to the upper calibration limit of the speed-reduction |

| # | Comment                                                              | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | interruption threshold. I therefore recommend technical corrections. | <p>model by Pregolato et al. (2017a, b) for light vehicles at <math>h = 0.3</math> m. The equivalent threshold for heavy vehicles (<math>h = 1.0</math> m) is obtained using Equation (6).</p> <p>We acknowledge that this fixed threshold introduces uncertainty into the estimated indirect costs. To assess this, we evaluated the flood depth corresponding to threshold probabilities of 10%, 15%, and 20% using Eqs. (5) and (6). The resulting depth varies only from <math>h = 0.28</math> to <math>0.32</math> m for light vehicles and from <math>h = 0.98</math> to <math>1.04</math> m for heavy vehicles across this range, indicating that the interruption threshold is relatively insensitive to the exact probability value adopted. This is, however, only one of several sources of uncertainty in the EUC estimation procedure; a comprehensive analysis of how the different sources propagate through the modeling chain is beyond the scope of this study and is proposed as a direction for future research in Discussion section.</p> |

Reviewer #2

| #    | Comment                                                                                                                                                                                                                                                                                     | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R2-1 | <p>The authors have fully addressed my comments. A couple of minor issues need to be resolved.</p> <p>1) Line 23: The quantitative result "<math>5.7 \times 10^6</math> US US\$ yr<sup>-1</sup>" is useful, but its significance could be explained more clearly in a specific context.</p> | <p>We thank the reviewer for this comment.</p> <p>We agree that the original wording could be misinterpreted as if the EUC value were specifically attributed to the 100-year return period scenario, when in fact it is an annualized value obtained by integrating the costs to road users over all return periods considered (<math>T = 100, 50, 25, 10,</math> and <math>5</math> years), in accordance with equation (17). We have revised and clarified the sentence in the abstract.</p> |
| R2-2 | 2) Line 434: Change " $5.700.000$ " to $5,700,000$ or $5.7 \times 10^6$ .                                                                                                                                                                                                                   | The number format in line 434 has been corrected to " $5.7 \times 10^6$ ", consistent with the notation used elsewhere in the manuscript.                                                                                                                                                                                                                                                                                                                                                       |