

Authors' responses to review comments are in *red, bold, italics*.

Anonymous Referee #1

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****General comments:**

The paper presents a novel methodology for the analysis of interactions between the socio-economic and environmental aspects of a region. It is tested in two different regions with similar problems linked to deforestation. The paper addresses relevant scientific questions within the scope of NHESS, presenting novel concepts and tools, which are usable in other contexts in the world. The methods used are clearly explained and the results support the interpretation and conclusions of the paper. The description of the data, the methods used, the calculations made and the results obtained are sufficiently complete and accurate to allow their reproduction. The title clearly and unambiguously reflects the contents of the paper, while the abstract provides a concise, complete and unambiguous summary of the work done and the results obtained. The overall presentation is well structured, clear and easy to understand by a wide and general audience. The paper is, as a whole, of a high quality, although some aspects could still be improved.

Thank you very much for the review and positive feedback.

****Specific comments:**

Regarding the structure of the paper, section 2.1 Description of the study area should be part of the introduction, not of the methodology section.

Thank you for this comment. We agree that the description of the study area is not really part of the methodology. We have added a new point '2 Description of the study area' that goes after '1 Introduction' and before '3 Methodology'. Authors think that it is better not to merge Sections '1 Introduction' and '2 Description of the study area' because they present self-contained information that goes from the general to the specific.

The paper is very well written, with detailed explanations of the method and the results. However, it would improve readability if some parts were shortened. The introduction and the study area description, for example, are too long and contains irrelevant information that could be deleted, such as mean annual temperatures or precipitation, which are not needed and it is sufficient to know the type of climate for the purpose of the article.

Good suggestion. We have deleted irrelevant information and shortened the introduction (from 58 to 50 lines) and the description of the study area (from 64 to 33 lines) to improve readability. See sections 1 and 2 of the revised manuscript.

Some additional information on the scenario selection should be included. In section 2.4, it should be explained why are those scenarios selected and how are they translated into the models? In particular, the 'climate change' scenario is too simplistic and it should not be presented as a scenario itself but only as an important element to analyse together with the development scenarios (as it is mentioned in page 9, lines 4-5).

Thank you for the observations. We have now described the selection process used for the scenarios (Pg 7: lines 16-22). Following your suggestion we have now provided a more extended explanation of the translation of these scenarios into the model (Pg 7: lines 23-28). Further, we have also removed the climate change scenario as being an independent scenario and just defined it as an additional element for the scenarios.

Page 6, line 23: the authors mention two focus groups per study area without justifying why. Please briefly clarify why 2 focus groups were organised instead of one, which could have avoided the merging phase. It is also not clarified if the 2 focus groups were similarly composed, in terms of stakeholder groups.

Agreed. We have clarified the organization (Pg 5: lines 17-19) and composition of the focus groups (Pg 5: lines 19-22).

Page 7, lines 11-15: it is not clear what the 'centrality' concept is; please add a short clarification.

Agreed. Done (Pg 6: lines 11-13).

Page 8, line 1: it would be easier to understand the equation elements with a very small figure containing the components (ci, cj) with the edges and the weights in a visual way.

Although we agree that inclusion of this information (ci, cj) may provide greater support to the work, however an adequate explanation of such information would require an extension section and we believe would probably be more confusing than aiding. The values for the edges and weights of the components are included in Figures 4 and 5.

for Page 8, line 26: how are values between 0-1 determined?

We have now better explained how these values were determined: "Following Reckien (2014), we translated each scenario into the analysis through the manipulation of individual component state vector values (A of Eq. 1: Sect. 2.3.2). (Table 3). For each scenario, we identified components which we assumed would be directly affected by the scenario implementation. For these selected components, their values were fixed between 0-1, depending upon the scale of the scenario's impact. If we assumed a strong increase in the selected component, its state vector value was set to 1, whilst a strong decrease was set to 0. Intermediate values represent less intense increases or decreases. All other components had their values set to 0."

Page 10, lines 15-24: The paragraph is presented as facts, but this is the perceived view of stakeholders and it does not mean it is a demonstrated truth. Please rephrase so that it is clear that authors are presenting the reality perceived by stakeholders.

Agreed. Done (Pg 9: lines 12-21).

Table 1: the list of stakeholder groups is long and not easy to understand by outsiders. It would be easier for the reader if the table added a column (or some other feature) classifying them by wider types of stakeholder groups, such as ‘farmers, environmentalists, local government: : :’.

Very useful comment. Done. In Table 1, a column has been added with the stakeholder group (policy/administration, private sector, non-governmental organization, research)

Table 3: I would remove the climate change scenario, as explained in previous comments

Agreed. Done.

****Technical corrections:**

Page 5, line 32, add “concept” after “FCM”.

Thank you. Done. Pg 4: line 26

Page 6, line 2, add “called” before “nodes”.

Thank you. Done. Pg 4: line 29

Page 6, line 3, add “The weight of” before “these relationships”.

Thank you. Done. Pg 4: line 31

Page 6, line 13, replace “scare” by “scarce”.

Thank you. Done. Pg 5: line 8

Page 9, line 32: remove ‘and problems’, it is redundant.

Thank you. Done. Pg 8: line 30

Page 11, line 7: remove ‘them’ after ‘studies’.

Thank you. Done. Pg 10: line 4

Page 13, line 9: introduce ‘situation of’ (or something similar) between ‘worsen’ and ‘region’.

Thank you. Done. Pg 12: line 3

Page 13, line 25: move ‘absent or ineffective’ before ‘social and governance’.

Changed by ‘weak social and governance support structures’. Pg 12: lines 18-19

Page 13, line 27: replace ‘are’ by ‘is after ‘deforestation’.

Thank you. Done. Pg 12: line 21

Table 2: font size is too small for reading

Agreed. Font sized has been increased

Figures 4, 5: font size of the maps’ elements is too small

Agreed. Font sized has been increased