

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC1
<https://doi.org/10.5194/nhess-2020-414-AC1>, 2021
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Reply on RC1

Mattia Amadio et al.

Author comment on "Cost–benefit analysis of coastal flood defence measures in the North Adriatic Sea" by Mattia Amadio et al., Nat. Hazards Earth Syst. Sci. Discuss.,
<https://doi.org/10.5194/nhess-2020-414-AC1>, 2021

We want to thank the reviewer for giving us the opportunity to submit an improved draft of the manuscript titled *Cost-benefit analysis of coastal flood defence measures in the North Adriatic Sea*.

We appreciate the time and effort that you have dedicated to providing your valuable feedback on the manuscript. We have been able to incorporate changes to reflect most of the suggestions provided. We have enabled the track changes within the manuscript. The spelling and wording have been extensively revised following criteria of clarity, coherence and brevity.

Following is a point-by-point response to the reviewers' comments and suggestions.

General comment: I would clearly specify that Authors are referring to residential (or mixed) buildings only. It is only sometimes mentioned, while the scope of the manuscript appears to be a general cost-benefit analysis that includes other sectors too (infrastructures, industrial and commercial buildings, population, heritage and natural sites) and maybe also indirect damages. I would at least specify it in the introduction and remember it in the conclusions. Consider also to mention it also in the titles of paragraphs 3.7 and 4.2 and in the graphs' titles.

- Thank you for pointing this out, we clarified that only residential buildings are accounted in both the introduction and the conclusions, and specified that residential buildings represent 93% of total area.

Introduction: I suggest adding a paragraph about the situation in Italy, in order to introduce and justify the study area.

- We agree with your suggestion. We amended ch.2 adding more context and references regarding the situation of the Italian coast and the specific case study location.

Ch. 2 and Sec. 3.1: I would add some references, although the reader can find most of them in the flowing sections, but at a first read, they seem to be missing (e.g., about subsidence in the Padan plain at P2 L78-79 and VLM rates at P3 L102).

- Agreed, the same key references were added in both sections.

P3 L85-86: it is not clear to me how the sea level events' increasing is related to the socio-economic development of the coast. Please clarify.

- Thanks for pointing this out, the section has been amended and extended. The sentence was corrected:

The number of ESL events reported to cause impacts along the Emilia-Romagna coast shows a steady increase since the second half of the past century (Perini et al. 2011), which is in part explained by to the socio-economic development of the coast exposing increasing asset to flood risk.

P3 L93: please provide some examples (years?) of coastal storms resulting in flooding of buildings and activities in the study area.

- Thank you for your valuable comment, we agree that more examples of flood impacts are needed to give better context, accordingly we extended ch.2 adding details about 3 recent dates, and some impact description from the latest (more severe) one.

P8 L245-247: I think the verb is missing, please correct.

- Thank you, we have fixed the sentence by adding the missing verb.

P8 L249: what about infrastructures and natural sites (mentioned on P3 L240)?

- We revised the explanation in ch 2: "The curve covers only residential and mixed-residential buildings, the area of which represents about 93% of total exposed footprints; other types (e.g. harbour infrastructures, industrial, commercial, historical monuments and natural sites) are excluded from risk computation."

P8 L 259-261: the statement about the validation of the depth-damage function on Italian empirical data is a repetition.

- Thanks, the sentence has been corrected.

P9 L279: please provide a reference or a justification to the 6 M€.

- Thank you for this important comment, the section about costs has been extended with all the justifications from official referenced sources in par. 3.8; numbers were also updated in the analysis.

P9 L 292: "costs" instead of "cots".

- Thanks, fixed.

Figures 8-9 (left): I would suggest plotting the defended scenarios too, so that the reader can immediately see the differences and be introduced to the right histograms.

- We agree on your suggestion, the two scenarios are plotted together in figure 8 and 9; however, it might be a bit difficult to read for Cesenatico, due to curves overlapping.

P14 L388: is the velocity as output needed? It is not used in the analysis...

- Thanks, you are correct, velocity is not used in our risk assessment framework. Accordingly, we removed it from the list of model outputs for the analysis.

Appendix A is never cited in the text. Please correct.

- Thank you, it is now mentioned in the section about discount rate.

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2020-414/nhess-2020-414-AC1-supplement.pdf>