

Interactive comment on “Threshold effects of hazard mitigation in coastal human–environmental systems” by E. D. Lazarus

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I am grateful to both referees for their comments on this discussion paper.

Broadly posed, their suggested clarifications will improve two key elements of the manuscript.

First, refining the distinction between the second and third hypothetical explanation for the rising-cost-of-disaster paradox will offer a tighter articulation of the research question. I agree with McNamara's point that for the second hypothesis to stand alone, "the rise in [economic] value must be uncoupled from the natural system. In many cases, particularly along the coastline, the increasing value of property is a direct result of human mitigation." In a revised version, I will amend this section of the Introduction

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to fix its present ambiguity. I will also add content to the final paragraph of Section 2 that addresses McNamara's reminder that hazard mitigation can itself drive new, pricier development – an essential dynamic missing from this draft.

Additionally, McNamara is right to note that the seawall model presented here "does not [explicitly] represent hypothesis three" because the underlying probability distribution of large events does not change as a result of hazard mitigation. The seawall only masks regions of the probability distribution. A revision will incorporate McNamara's specific comments into a more detailed progression through the logic of, and rationale for, the modelling illustration I present.

The second element of the manuscript that the referees will have helped improve is my discussion of coupling strength. (Both referees remark on this section of the paper.) Haff raises the interesting idea that, in the examples I provide, humans are able to live decoupled from natural systems because buffering technologies are, quite oppositely, tightly coupled to the environment (highly responsive to variability in natural systems). Simply discussing coupling strength without defining which aspect of the human-side system I am considering – human activity? or the intervening technology? – buries too many assumptions. I think the necessary clarification is, as Haff writes, "just the distinction between relatively uncoupled humans and strongly coupled infrastructure that makes the author's point" – and I will amend this section of the manuscript to reflect the suggestions from both referees.

Lastly, I will change Fig. 5 according to McNamara's proposed changes: first, that the caption must better explain what is shown in the plotted time series; and second, that the "trajectories" plots are both confusing and unnecessary, and so should be removed.

Again, my thanks to both referees and to the journal editors for their contributions to this work.