

Response to Anonymous Referee #1

We thank Referee 1 for his/her positive and constructive comments. Our responses for the revision of the manuscript are provided below in bold.

This paper addresses a very relevant question: in a coupled human and natural systems (CHANS), what is the effect of different protection investment strategies in relation to flooding, and in particular when flood-rich and flood-poor periods occur? Two approaches are discussed to address this question: (i) a rational cost-benefit approach and (ii) an agent based modelling approach. The first approach is used to look at the economic performance of proactive vs. reactive investment strategies. A Monte Carlo experiment is designed and interesting results are drawn, i.e., as persistence increases there is a change in optimality from proactive to reactive. However in this approach (which the authors deem as outdated in line 9 at page 8303) feedbacks typical of coupled human-natural systems are not modelled. The second approach, i.e., the agent based modelling one, is presented as a reasonable way to overcome this problem. However the application of such a framework is postponed to future works. The paper is very well written and the literature review is very well done.

The weakness of the paper is that, after the very interesting introduction on CHANS, one would have expected the application of the agent based model to be performed, even in a simplified way. It is a bit disappointing that at the end of the paper there are no results to compare to those obtained with the cost-benefit approach. It is like saying "we could do it more properly but we will do it next time". In my opinion two ways could be used to improve the paper: (1) ideally, with a major revision, to add some quantitative results obtained with the agent based model; or (2), with a minor revision, to focus on the description of merits and drawbacks of the two methods for the problem at hand, without presenting the results in detail (those in section 5).

We agree with the Reviewer's comments. In response to suggestion (2) from the Referee, Section 5 will be made more concise and an additional subsection will be added to Section 6 in which the cost-benefit and agent-based approaches will be contrasted.

Detailed comments:

page 8283, line 24: the June-2013 flood in central Europe can be mentioned too.

The 2013 floods will be mentioned in the revised manuscript.

page 8298-8299: How much do the results depend on the time range (50+100 years) of the exercise in Sec 5? Why have the authors chosen this time range?

The choice of a 50 year 'historical record' and a 100 year design life were based on typical values for the UK (Jones et al., 2004; Defra, 2009). This will be clarified in the revised manuscript. Results will be dependent on the length of the 'historic record' and design life, as well as the assumed discount rate. We will discuss these sensitivities, which we plan to explore in future work.

REFERENCETO BE ADDED

Defra: Appraisal of flood and coastal erosion risk management: A Defra policy statement. June 2009, Defra, London pp52, 2009.

Jones, P.D., Lister, D.H. and Kostopoulou E.: Reconstructed river flow series from 1860s to present. Science Report SC040052/SR, Environment Agency, Bristol, UK, pp74, 2004.