

Interactive comment on “The Value of Citizen Science for Flood Risk Reduction: Cost-benefit Analysis of a Citizen Observatory in the Brenta-Bacchiglione Catchment” by Michele Ferri et al.

Anonymous Referee #1

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General comments

This paper discusses a cost-benefit analysis for citizen observatories based on results in a specific catchment. The content is relevant and will be a valuable addition to citizen science research. Unfortunately, in its current form the paper is difficult to follow and lacks information to fully understand the content. Specifically the citizen observatory need to be explained in much greater detail in the methodology chapter. What exactly does the citizen observatory measure? Are sensors being used and if so for what variables? Are observations only made during floods? How many volunteers were

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used? Do the volunteers get paid or is this part of their job? And in what way do these observatories reduce the cost of floods? These questions are very central to this paper and are currently not communicated. Furthermore, for some values (e.g. the weights) no rational or reference is given. A full assessment of the paper can only be made once this information is provided. I therefore encourage the authors to resubmit the manuscript after including this pertinent information and some other revisions.

Specific comments

- In general, the readability of the paper is poor. One option would be to reduce the number of abbreviations. The authors should also avoid long sentences when possible. Phrases such as “detriment of an increase” (L 422) are confusing – does that mean a decrease? In addition the paper could focus more on the main story (i.e., what is written in the abstract).
- There are many assumptions presented in the methodology. The discussion should include a paragraph that discusses the potential effects of these assumptions and the likely uncertainty due to these assumptions.
- Regarding costs (e.g. in table 12): If you are talking about costs in the millions and billions I would not write the value with a precision of one Euro. That is simply not realistic and gives a false impression of certainty. Ideally you would write ranges, or a value +/- another value.
- The literature review and the introduction could have been more extensive. Are there any other citizen science projects that discuss costs vs. benefits? Or at least that discuss costs and financial benefits? How did they try to assess this and why is your method different, or why has this not been done yet?
- L 9: In what way are citizen observatories a recent form of citizen science? (perhaps this will be resolved through a more thorough introduction to citizen observatories)
- L 10: “over a period of time” is a vague statement and could also just be a day, in

which case there is no difference to Blitzes. Is there a minimum required time?

- L 20-21: Worldwide? In Italy?

- L 29: Dominican Republic – not Dominica

- L 42-48: The first part of this paragraph describes collaborative citizen science and not necessarily a citizen observatory. What exactly is the main difference between a CO and a collaborative citizen science project? Is it the inclusion of a public authority? In that case start with that sentence to describe the difference. Not all long-term collaborative citizen science projects are COs.

- L 48-50: Not all of these references are related to a CO. Also, a more thorough explanation of what these individual papers have found would be nicer, rather than just a list of literature.

- 2.1 Input data: A table would provide a clearer picture of the input data. Also when is the pollutant data used? The conclusion specifies that contamination was not considered (L 477). Why is the data used for the hydraulic model (L 109) not included? Add a paragraph describing which data is used for what.

- L 86-87: Is the risk assessed differently at a different scale than mesoscale? Why does this not hold for other scales? This sentence is confusing.

- Figure 1: Is there an arrow missing from the box “Depth, Velocity, Persistence”? Why do the “Land Use Map” and “People distribution map” have a different design? Also capitalization should be uniform.

- L 93-98 and Table 1: would fit better into 2.2.2

- L 100: “must be addressed” → by whom or for what?

- L 109: Which hydraulic model?

- Table 2: What does the sign “%” mean? Is this meant to be a “-“? (same in table 3)

- L 140-142: “Greater awareness tends to correspond to greater preparation if an event takes place.” Please add a source for this statement.

- Figure 3: Where do the weights come from? Are they assumed by the author or based on literature? What is the reasoning behind the weights? Why is “Insurance density” stated, when the weight is 0? What is the uncertainty for these weights and how do they affect the results?

- Figure 4: What is the normalized index function and how was this value computed? What does it mean?

- Figures 4-6 could also be included in a supplementary material. In general section 2.2 is rather long and according to the abstract not central to this paper. Parts of this section could be included in a supplementary material.

- L 217: You could add that people are also less likely to take warnings serious in future.

- L 242: Why are road inundations lumped together, regardless of whether or not the infrastructure is damaged? Surely the cost differs significantly in those two scenarios?

- L 256: Does this mean that the vulnerability depends on the seasons, i.e., on when the crops are growing?

- L 260-266: I do not understand why “contamination/ pollution, erosion” and “open space” are lumped together here? Also apart from describing what an open space is, the connection to flood susceptibility unclear. Please make the connections clearer to the reader.

- Why is the vulnerability high (i.e., 1) when “Integrated Pollution Prevention and Control (IPPC) installations” are present? Shouldn’t these installations reduce the vulnerability?

- L 273-274: Please rephrase. I suppose “cultural heritage” is not actually considered

an “adverse consequences of future flood events”.

- Figure 9: Why does water height not play a factor in (d)?
- L 284: Repeat what the macro-categories are.
- L 287: I would rephrase “moderate” as “low”, as moderate is actually a synonym of medium. (same in Table 5) You actually use “low” already in Table 9 – please homogenize.
- L 301: This is the first time you mention a reward. What reward do you mean? “Direct and indirect users” -> of what?
- L 308: One variable should not have multiple letters in an equation. This could be considered to be $I \cdot S \cdot R \cdot R$. (Also applies to some other formulas in this paper.)
- Table 6: Where do the weights come from? Are they calculated or taken from another source?
- L 330: superscript for 2
- L 349: Please define what you mean with a “unit of management”.
- L 358-359: “Because rapid floods are difficult to predict, early warning systems and prevention measures are of less use in this region.” I have some doubts regarding this statement. Surely early warning systems (sirens) and prevention measures (reforestation) still reduce the risks associated with rapid floods? Please offer a source or rephrase.
- L 361: superscript for th
- L 365: Was data that was not collected by trained volunteers discarded? How many volunteers were trained and how many were not trained? This section needs to be expanded considerably as described in the general comments.
- L 377: “The situation before the intervention” The word situation is rather vague, but

more importantly you do not describe what exactly that intervention is (see general comments).

- L 279: Specify what you mean with numerical simulations. Do you mean the hydraulic model? Very little information is provided about the modelling that was done. The reference to section 2 could be more specific, do you mean section 2.2.1?

- Table 8: What is P1, P2 and P3?

- L 415: “implementation of the CO” → not fully explained what that is, see general comments.

- Table 11: Please explain the difference to table 9 (not just the different values, but the different meaning).

- L 426-432: This paragraph is rather unclear, but this will likely improve once the general comments are addressed.

- Table 12: caption “different” not “difference”; also I would not just include the residual damage, but also the original and then the difference. Or you could make a plot with both the original and residual costs.

- L 436: How did you calculate the cost for CO? What are the cost components? Is it sensor costs, maintenance costs or personnel costs? Over what time do these costs accumulate?

- I have found at least one reference in the text that is not in the list of references. Please double check.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-627>, 2019.