

Interactive
Comment

Interactive comment on “An interactive web-GIS tool for risk analysis: a case study in the Fella River Basin, Italy” by Z. C. Aye et al.

Anonymous Referee #2

Received and published: 5 August 2015

Summary: This is an interesting piece of research, which is an element of the larger CHANGES project. Its contribution to knowledge is demonstrating the development of a web-GIS tool and showing that this is a more flexible and efficient way for decision makers to calculate risk – and related projects work on ways to reduce that risk. With appropriate small to medium level revisions, I believe this paper will be an excellent contribution to NHESS, and be of interest to both the natural hazards and open source spatial software research communities. I also believe this tool has practical applications, and encourage the authors to make the tool available after the prototype is complete. The level of English is generally good.

The majority of my comments relate to making the paper easier to understand and follow. I read the paper four times, and there were still a couple of items I struggled

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Interactive Discussion

Discussion Paper



to follow – I expect that most readers will not do this, so strongly encourage the authors to consider my corrections to ensure the reader truly understands the process (and hopefully can use the tool!). I would particularly like to see more attention paid to clearly defining terminology from the outset of the paper – especially when words such as “risk” and “vulnerability” can be interpreted differently by different communities. The second item I would like the authors to focus on is the figures – although these are generally good, the captions need much more detail so that the figures can be understood “standalone” without having to refer back to the text. I also think there are too many figures – particularly some from figure 13 onward. I would encourage the authors to either combine these or consider making use of supplementary material, so as to keep the readers’ attention. I very much look forward to seeing the revised version of this paper, and other related outputs from the CHANGES project.

Medium level revisions:

Key terminology needs better defining from the outset (e.g., Hazard intensity, vulnerability, exposure, loss, acceptable risk)

Page 4010, line 5 onward, these methods are not explained, and are somewhat jargon-y without further definition.

Section 2.1 on page 4012 is very dense, and hard to follow (points a-g):

(a) Please consider breaking up some of the sentences into shorter, less ambiguous statements (e.g., lines 8-11, the way it is written is a bit ambiguous regarding whether losses of persons are measured in a monetary value; lines 15-20 is a very long and complex sentence).

(b) It is somewhat strange to introduce variables in lines 10-12 but then not use variables in Equation 1.

(c) Why does physical losses have the variable A?

(d) After reading through this section about 5 times, I think that lines 15-21 should be

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Interactive Discussion

Discussion Paper



presented more like a “caption” for the equation, like this:

$$\text{Loss (L)} = \text{Spatial Probability (PS)} \times \text{Vulnerability (V)} \times \text{Amount (A)} \quad (1)$$

Where:

Spatial probability (PS) = The expected spatial probability...

Physical Vulnerability (V) = Level of potential damage...

You do not have to use the variable names I have suggested, but just to give you a feel of how this could be made clearer.

(e) I think the term “intensity” needs better defining. From line 10, I understand this to be the number of hazard events across a region (e.g., a high intensity landslide event would be hundreds of landslides occurring across a municipality in a short space of time). Am I correct about this? If so, I think it would be useful to acknowledge that intensity could be measured in many different ways (e.g., speed, depth, size).

(f) Page 4013, although the concept of a vulnerability curve is well introduced, you have not acknowledged the uncertainties involved in this process, which could have major implications for the estimation of losses. By this, I mean (a) why the selected CDF is an appropriate model and (b) what data informs these vulnerability curves, and its associated uncertainties.

(g) Page 4014, “return periods” are introduced without much description of what these are, and why they are useful. For example, for debris flows, does this represent the return period of a particular speed, size or depth of debris flow? I would like to see a one sentence definition of a return period.

Page 4014, line 19, What are the implications of setting the spatial probability to a uniform value of 1? Surely this results in much higher values of risk? How realistic is this? Related to this, page 4015, line 1, setting the value of vulnerability to 1. If a user sets both spatial probability and vulnerability to 1, how realistic is this risk calculation,

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Interactive Discussion

Discussion Paper



and how is this uncertainty communicated to the user?

Page 4014, line 26, up until this point you have not really discussed the data structure, but now you are mentioning column attributes. This needs some earlier introduction or clarification.

Page 4016, line 26 what is the “mapping index attribute”?

Page 4020, line 17. How realistic is it to have this type of detailed building characteristics information for other locations where this tool might be used? I think one sentence describing the data collection methodology of Ciurean et al., 2014 would be useful here.

Page 4021, line 2-5. A better explanation is needed of how it is possible to calculate the spatial probability of a debris flow using this method. This sentence is not clear.

Page 4025, line 24, please provide a definition of a “qualitative impact-probability matrix”.

Please look through all figure captions and add enough information so that the figures are understandable as “stand-alone” (i.e., without having to find the discussion in the text).

Figure 1. What is the difference between “user” and “group”? Is this discussed in the text? Where does “hazard” appear in this figure? The symbols for the data management module are not that clear – perhaps these could be labelled.

Figure 3. The caption needs work – it is hard to understand what A1 to A4 mean from this caption.

Figure 4. Needs a legend – e.g., what do red and green mean, what do yellow buildings and yellow buildings with a blue outline symbolise? Why are there different vulnerability curves and how are these used – this could be added to the figure caption.

Figure 5. Needs a much more detailed figure caption. You sometimes switch between

Interactive
Comment

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Interactive Discussion

Discussion Paper



Interactive
Comment

full words and notation, which is confusing (e.g., spatial probability versus SP) – please be more consistent. Without going back to the text, some things are not clear – e.g., “amount” (of what?), “column” (of what?).

Figure 7. Again, the caption needs to be more standalone – it is difficult to look at this figure and understand what is going on without having to read the text in detail. It also appears that the text in bold is not actually the text that should be emphasised – I think column one of each table is more relevant? Each table needs column headers – e.g., what do things like «pk nn» mean?

Figure 8. Legend – the word “value” needs replacing with a variable name – i.e., what does 35 Kpa refer to?

Figure 8 (and relevant section of text). It would seem unlikely that all of these debris flows would fail simultaneously. Is this dealt with in the model? It would be useful to include a brief (couple of sentences) discussion about this.

Figures 12, 13, 15, 16, 18, 19 I do not think that all of these figures are necessary. Please consider combining some of them into two-part figures where A and B can be placed next to one another (this may require you to add some larger font labels), or using supplementary material.

Figure 17. Needs a legend.

Minor comments

Section 2.3, I see that Reviewer #1 has provided more substantial comments here. As this section is rather reliant on the reader having some background in geocomputation, for non-experts, I think it would be useful to have one summary sentence stating why this approach is used or why it is different from existing approaches.

Page 4017, lines 21-24, is this description of how the data is managed a contribution to scientific knowledge (i.e., is this novel?). If not, perhaps this could go in the user manual.

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Interactive Discussion

Discussion Paper



Several places where plurals are used when it is not necessary. E.g., page 4009, line 4 “rainfalls”; line 6 “constructions”; page 4011 line 5 “openstreetsmap”. I have not caught all of these, but please go through and check carefully.

Page 4011, line 23, should read “The purpose of the loss component. . .”

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 4007, 2015.

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