Review of *"Are we talking just a bit of water out of bank? Or is it Armageddon?" Front line perspectives on transitioning to probabilistic fluvial flood forecasts in England* by Louise Arnal et al.

Jan Verkade, Delft, October/November 2019

Overall impression

The manuscript describes the 'transition' of the Environment Agency towards using probabilistic fluvial flood forecasts. The topic is very relevant and worthy of analysis indeed.

Having said that, I think the manuscript would benefit from (i) a better description of what it aims to achieve (ii) additional analysis that would justify the recommendations that are made.

Re (i). The research, through the interviews, provides data that documents the view of various individuals at a single point in time, regarding a change in an organization's processes and procedures. I like to make the analogy with "observations" in the quantitative sciences. Observations can be used to provide evidence of the plausibility of some hypothesis - or of the absence thereof. Such a 'hypothesis' element would greatly improve the quality of the manuscript - and provide a response to the "So What?" question that, post reading the manuscript, continues to linger in my mind.

Re (ii). Based on the interview data, recommendations are phrased. While some of these may be very worthwhile indeed, I think recommendations can only be made based on an analysis where objectives are offset with achievements or projected achievements. Ergo, I think recommendations can only be made if the agency's objectives (with respect to the production and use of probabilistic forecasts) are described. Have these objectives been described in the 2016 National Flood Resilience Review that is cited, maybe? Or are documented elsewhere?

Maybe the above issues could be resolved through the following:

- There is a document that says that the EA should be moving towards probabilistic forecasting. (NFRR but also the 2008 Pitt review?)
- This overall objective has been adopted by the agency and existing projects/policies (evidence, please!) are in place to try and achieve that objective. As an aside, I wonder if this is indeed the case.
- Specifically, this means that EA will have to do this-and-this ('specific objectives'). If these specific objectives have been described in a policy document, great - use these in your manuscript. If not described, make them up - what could be plausible objectives?
- To meet those specific objectives, the agency will have to do this-and-this. This would be the description of your organizational transition.
- We've gathered some data to try and identify where in that process the EA currently is, what pitfalls they see and where they think the challenges are.
- Offsetting specific objectives versus these 'observations', we note that . . . agency is well on its way / straying from its path . . . either way, recommendations are. . .
- It's useful to publish this is in the scientific literature so that (i) scientists may comment on implementation of science in a public organizations; (ii) other organizations may benefit from this; (iii) in assessing the progress of their transition, the EA can benefit from this analysis.

So overall - I think this manuscript is a rough diamond that needs polishing. I am very much interested in seeing the end result - and would be happy to help out through additional reviews if these would be considered helpful.

Other points

I think the above would require fairly significant restructuring of the manuscript and I don't think it's worthwhile to, at this stage in the review process, point out any minor issues.

Some scattered observations though:

- The citation in the title does not pertain to the theme of the manuscript. I also find that the manuscript tends to use language that, at times, can be a little more 'dramatic' than required. This is exemplified by the title's "front line perspectives" (a change in processes and procedures is not a war!) and the reference to "Armageddon" (which, by the way, is a settlement on top of a hill - the 'Ar' originates from the Hebrew 'har' which means mountain - and not prone to flooding and hence reference thereto is somewhat unfortunate - but I am digressing now). Additional examples: "the chaotic and far from certain world we live in", "urgently required", "high priority recommendations".
- A glossary is, I think, unnecessary, and I find the asterisks a little distracting.
- The manuscript's theme is the 'transition to probabilistic forecasting'. The amount of text that is dedicated to that theme, however, is relatively small. For example, the Results sections spans lines 190 through 464 - yet only as of line 425 are the probabilistic forecasts discussed. Similar observations can be made to the manuscript as a whole. In my view, the reader is distracted a lot from the main points.
- The language used to describe the somewhat technical aspects of predictive uncertainty could be a little more precise. Some examples:
  - It's **not** forecasts themselves that are uncertain. What's uncertain is the future water levels, streamflows, etc. - also even if an estimate of those future values is made through a forecast. When that residual uncertainty is quantified or expressed, we have available 'estimates of uncertainty', rather than 'uncertainty'.
  - Uncertainty estimates and probabilistic forecasts are not the same thing. Hopefully the level of uncertainty can be expressed as a probability, but very often it cannot. I wouldn't want to use the terms interchangeably in a manuscript.
  - In a manuscript that discussed 'uncertainty', you have to be a little careful with using the word 'certain' ('certain decisions', l609). In most of those cases, the word 'certain' can be either safely omitted, or replaced by 'various'.
- Minor, minor issue: In author contributions, why not simply reference first names? "Hannah, Louise and Susan posed the original question" is a lot easier to read than "H.L.C., L.An. and S.M. posed the original question".