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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Spatialised flood resilience measurement in rapidly urbanized coastal areas with complex semi-arid environment in Northern Morocco" *by* Narjiss Satour et al.

Anonymous Referee #2

Received and published: 17 May 2020

Dear authors,

I carefully read your paper which focuses on the important subject of resilience of urbanized coastal areas. I will first give some general comments and then more specific comments and discussion points

General comments

In general, the subject is within scope of NHESS and the subject is scientifically relevant. The paper aims to provide a new method and results for an area which is not frequently studied: the coastal areas of Morroco. The paper aims to quantify resilience in order to allow monitoring and to identify more and less resilient areas to flooding

and climate change. However, the method for quantifying is not well motivated and not clearly linked to the very brief review and resilience definition provided before. It is not possible to evaluate the outcomes on their plausibility or to know if they are transferable to other areas. Also the link to measures or policy making or the relevance of the outcomes is not touched upon. Furthermore, it is not clear how this Flood Resilience Indicator complies with or differs from existing indicators. Finally, the english needs significant improvements and not all references mentioned are in the list of references. The format of the references does not comply with the NHESS standards.

It is recommended that the authors explain how they define resilience, provide an overview of existing frameworks or indicators and discuss why they use those or not and then provide and motivate their own indicators and explain what is the innovative value compared to existing indicators or frameworks. It should be clear how the indicators and outcomes relate to their resilience-view. Finally, the results and their value for the region should be discussed, their plausibility assessed and lessons or implications for other areas should be described. The paper is already a good starting point. The resilience of coastal communities to floods in the context of sea level rise is an important subject where probably many flood risk managers are interested in and struggling with.

Discussion points

1. How do the authors define resilience? Since the paper is on measuring resilience, the authors should define what is meant by resilience and what they aim to measure: resilience of what to what? This is not clear in the current paper. The authors first seem to have adopted the resilience definition of Adger et al.(2005) and Folke et al, (2002): "Resilience approaches aim to understand and manage the capacity of a system to adapt to, cope with and shape uncertainty", but then they mention that many definitions in various fields exist (which is true, but we need to know how the authors define it here). In line 94 they refer to urban resilience instead of flood resilience and the paragraph ends with a sentence on 'community disaster resilience frameworks'.

Although it is mentioned that indicators and frameworks exist, they are not provided or discussed. It is also not clear if the authors consider urban resilience as similar to disaster risk resilience and flood resilience.

The resilience view is also not clear on line 102 where resilience is called a “multidimensional objective”, while in line 103 resilience is called “an approach”. Do the authors see resilience as an aim/objective or an approach or a means to reach an aim (e.g. a better coastal community, smaller flood impacts or better functioning economies)? Or both? Then again references to various indicators are provided, while the indicators itself are not mentioned. The paper then mentions that there is a gap in knowledge on how to measure resilience, but also concludes that resilience needs to be enhanced, so some knowledge on the current resilience is present: at least enough to conclude that the resilience is currently insufficient.

Then from line 113 onwards it is not clear whether the paper looks at resilience to floods which may be affected by sea level rise or coastal erosion or the resilience to floods, sea level rise and coastal erosion all together. That should be clarified. On line 159 the paper states that resilience assessments can be classified into measuring persistence, recovery and adaptative capacity. This makes the concept more concrete. However, these three terms or this distinction is not referred to anywhere else in the paper. Why did the authors put this sentence there? How does it relate to the proposed Flood Resilience Index?

2. The Flood Resilience Index used in the paper: how does it relate to existing frameworks? In chapter 3 on line 164 the flood resilience index is mentioned. Is that new and is that what the authors have developed? Is it related to the indicators and frameworks to which the authors have referred to ? How, or why not?

3. The indicators and subindicators itself: The choice for the indicators is not motivated well. The authors state for example that areas with a higher building density are less resilient. Why is that? Or is that true in Morocco? Is it because the flood impacts may

be higher than in rural areas or areas with less exposure? But perhaps there are also more funds to recover from that damage? Why are areas with a better connection to sewage or drinking water system more resilient to floods (or to floods, coastal erosion and sea level rise, that is not clear in this paper)? There is a reference to Cutter there, but Cutter describes disaster resilience, and not flood resilience, which may be different. Why is communication capacity an economic indicator and not a social one? Is it fair to count both the percentage of old houses, and the percentage of modern houses or is that double counting the same aspect? Is there a storyline to explain the indicators selected: how does unemployment rate, relate to flood resilience (I assume because less funds will be available for a quick recovery?, or is it based on statistical analysis of this factor and flood recovery? Or flood impacts?)

4. What is the use and what are the limitations of such a composite indicator: What if two areas would have the same low score, but one has a low score because it has many persons below 14 or above 60, while the other area has a low value because of it’s low elevation, how would you use that score? What would be the value of a composite indicator if causes of low resilience could be completely different and therefore also solutions or measures may be very different? What is the value for an area without inhabitants? (flood-prone or not) and what would be the value for a densily populated area which is not flood-prone? And what is the value for an area where floods cause impacts which are overcome within a year, or where sea level rise scenarios for the next 50 years can be coped with without a significant increase of flood risks? These questions are related to flood resilience, aren’t they? How does this indicator relate to those? Why do you value all subindicators equally?

5. The English and the writing style The English needs significant improvements. Sometimes sentences start with ‘While x and y is going going on.. and then they end without a second part of the sentence. Some parts are repeated several times e.g. that resilience is often quantified by composite indicators (around line 101, 137, 145, 149)

6. References: The authors provide many references in the review, however sometimes improvements are needed. Sometimes the relation or the link between the referenced work and the work of the authors is not clear (e.g. if stated that they have a resilience indicator, it is not explained what indicator, whether it is useful or not and why, just that there is an indicator), some references are missing in the reference list (e.g. Lutz & Samir, 2010) and some are perhaps less relevant? (e.g. for the claim that floods will occur more frequently in Morroco there are 3 references, one relates to a paper on climate change impacts on hydropower systems in California and is probably less relevant than the other 2). The reference formats are not in line with the journal's requirements.

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