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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Mapping the adaptation solution space – lessons from Jakarta for other coastal cities" *by* Mia Wannewitz and Matthias Garschagen

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We would like to thank Referee 2 for reviewing the paper and offering these thought-provoking perspectives. The comments and suggestions are much appreciated and have been carefully considered. A detailed list of our responses to the individual comments is provided below. Overall, we think that the concerns raised by the reviewer are helpful for improving the manuscript. As explained in more depth in our responses, we revised the manuscript accordingly, in particular with respect to clarifying its objective and overall approach.

1. Suitability of journal

RC: Consider that NHESS is a journal for high-quality studies and original research on natural hazards and their consequences. The design, implementation, and critical evaluation of mitigation and adaptation strategies are included, but the present paper only reports a confuse collections of mitigation and adaptation strategies found in bibliographic items about floods in Jakarta.

Answer: We take note of the reviewer's concern and have revised the manuscript to more clearly explain our approach and its contribution to the generation of knowledge in the field of natural hazards and risk reduction. Overall, and in line with the feedback received from referee #1, we are convinced that the structured review and assessment of the peer-reviewed academic literature can make a significant contribution to analyzing the state of an academic debate, in this case around the solutions discussed for Jakarta's flood problem. In this sense, we consider the paper to be very much in line with the scope and aim of NHESS to "serve a wide and diverse community of research scientists, practitioners, and decision makers concerned with [. . .] the design and implementation of mitigation and adaptation strategies, including economical, societal, and educational aspects". Our approach to review, assess and synthesize the scientific literature in a structured manner and against a set of analytical questions is a standard approach in academia. It is a pity that the reviewer is left with the impression that the paper primarily "reports a confuse collection of mitigation and adaptation strategies found in bibliographic items". At the same time, we take this conception seriously and have therefore heavily revised the paper to explain and discuss much more clearly the objectives, underlying concepts and steps of our approach as well as its shortcomings and limits, e.g. with respect to potential gaps between was is reported in the English scientific literature and what might be discussed in policy and practice outside of this body of data.

RC: I stress that this piece is not a critical evaluation of mitigation and adaptation strategies as it lacks the rigour and the in-depth analyses that are necessary ingredients of

a “critical evaluation”. It is rather a jumble of contrasting opinions, which share the goal of criticizing any possible solution to flooding in Jakarta.

Answer: We take note of this comment. However, the paper does not claim to provide an own critical evaluation of all mitigation and adaptation strategies discussed in the scientific literature. The paper aims to respond to the questions clearly laid out in lines 66-68. At the same time, we take the conception of the reviewer seriously and have heavily revised the manuscript to avoid the impression that an own evolution of adaptation options – and especially own opinions – is our primary objective. Revisions pertain particularly to the introduction and conclusion section as well as to language edits throughout the entire paper.

RC: The final solution supported by the Authors is nothing more than a praise of as saving as vague “hybrid adaptation approaches”.

Answer: We take note of the comment but it is not quite clear what the reviewer is aiming at. The conclusion in fact summarizes how the assessed literature on Jakarta treats hybrid solutions – and it observes that the gap of that treatment is noteworthy when juxtaposed against the co-benefits of such hybrid solutions, as reported in the literature more generally. We have difficulty to see how such a conclusion is wrong or problematic. However, we have expanded the review of those articles discussing hybrid solutions for Jakarta and the conceptual framing around hybrid solutions in the newly added conceptual section. Against this background, we have also sharpened the conclusion regarding hybrid solutions.

2. General scope

RC: In the title, “lessons from Jakarta for other coastal cities” is inappropriate. I suggest something as “Mapping the solution space for adaptation and protection from flood in Jakarta”. While it is obvious that a good work in a specific context can be of inspiration (and provide lessons) for other similar situations, this aspect must not be referenced in the title, as the present paper is not intended, nor is structured, to draw general

conclusions to be applied to other coastal cities. It only assesses (with significant limitations) the specific case of Jakarta, and I do not see much broader implications.

Answer: Thank you for this useful observation. The lessons for other coastal cities is meant not in the sense that the situation of or academic engagement with flood adaptation in Jakarta can easily be transferred to other coastal cities. Rather, the identified patterns and gaps are meant to stimulate similar assessments of the current debate in other contexts. Judging from the literature on other coastal cities, at least in Southeast Asia, there are indications that some of the patterns found here are also true for other coastal cities in the region. Triggering a more detailed look is the main objective behind the “lessons” argument. The paper has been revised to clarify this point, particularly in the introduction section, the newly added conceptual section and the conclusions. In addition, the title has been adjusted accordingly.

3. Method

RC: I don’t feel that the number of scientific papers is a good criterion to judge the attention given to different approaches and solutions, nor the number of papers can actually determine adaptation policies.

Answer: The reviewer is right, of course, in that the number of scientific papers does not necessarily translate into the level of attention given to a certain topic in general or the policies in that field – this is obvious. The paper therefore does not claim to assess this link. The paper works towards answering the research questions laid out in lines 66-68! These questions are concerned with how different adaptation options are perceived and framed in the academic debate. Here we believe that publication intensity on certain types of measures is one indicator – amongst others. We have revised the paper to explain this approach more clearly, hoping to avoid misconceptions. In addition, however, we added a discussion on whether and how scientific problem framing can in fact contribute to the framing of problems and solutions outside of academic realms. There is a long-established scientific literature on this inquiry, see for instance

the discussion of the “dominant view” of risk reduction in the second half of the past century (Hewitt 1983).

RC: The number of papers on specific aspects could simply indicate that some issues are multifaceted and more complex than other, thus deserving greater effort and more studies. I believe that it is more complex to assess flood hazard with the due effectiveness, accuracy and reliability, than for example assessing the exposure of people and assets. It is more difficult, and more important, to assess the real mechanisms of flood hazard correctly, then considering the uncertain future scenarios associated to climate and land use change scenarios. In this view, it seems perfectly natural to see (let’s say) ten papers dealing with hydrology and the physics of flooding, and two paper on future hypothetical scenarios.

Answer: Thank you for this though-provoking comment. Complex problems might of course trigger more publications. However, we are not convinced that flood hydrology per se is a more complex scientific problem than, say, the assessment of future trends in socio-economic vulnerability in highly dynamic contexts such as Jakarta. One could also argue the other way around: There are established data sets and methodological approaches to model and assess a city’s flood hydrology, which might suggest that in fact less publications are needed to tackle this topic – very much in contrast to more open and emerging fields. The point is: The number of publications is an indicator that has to be interpreted with much care. We have strengthened the manuscript to discuss these questions more thoroughly.

RC: Furthermore, I believe that literature reviews (as the present paper actually is) should look at the scientific literature realistically. It is necessary to consider the biases that unavoidably affect the scientific production before drawing conclusions. For example, it is well-known that scientists are led to increase their scientific production enormously, with an increasing number of articles and with an inevitable reduction in research quality.

Answer: The response to this comment builds on our response to the previous comment. The amount of publications on a certain topic – in this case adaptation measures – can depend on many factors. These factors do not only include the aspects mentioned by the reviewer but also other issues such as the numbers of post-graduate students in different disciplines, different publication styles in different disciplines, the availability of data sets etc. We have added a dedicated paragraph discussing these factors and their relation to our results in section 4. The authors are not aware of large-n empirical studies in support of the sweeping statement made by the reviewer that the push towards increased academic output “inevitably” reduces research quality.

RC: The plot of Figure 2, which show an increase of papers focusing on Jakarta and floods, should be compared to the trend of research papers in the same field (e.g., concerning only “flood”).

Answer: Thank you for this helpful suggestion. We will revise the graph accordingly.

RC: Finally, according to the two previous points, I stress that judgements based on the number of papers should be avoided (or, at least, significantly limited) in the present paper, and the attention should always be brought back to the contents of scientific papers. In other words, a single paper reporting a comprehensive analysis is more important than 20 paper written to enlarge the publication record of authors eager for career advancement.

Answer: Thank you for this observation. The language has been revised throughout the manuscript and dedicated information added in cases similar to those one outlined by the reviewer.

4. Background information

RC: For a reader that does not know much of flood hazard in Jakarta, it is difficult to forge a proper idea about the different countermeasures to flood hazard/risk listed in the paper. A paragraph should be added that summarize the main source of risk

in Jakarta (e.g., coastal and/or river flooding), the areas interested by each different flooding mechanisms, the mean flow depth that is expected.

Answer: Thank you for this constructive suggestion. The revised version of the paper now features a chapter introducing the reader to the hazard context of Jakarta. It provides a brief overview of drivers and causes of flood risk in the city and it shortly describes consequences and effects of some of the most recent flood events.

RC: This is a fundamental aspect because, for example, “soft” measures are almost useless in the case of frequent flooding with water depth of more than 1 m (either you leave the area, or you keep water away, no half measures); completely different is the case of nuisance flooding.

Answer: This is a relevant comment if you consider adaptation measures to only comprise those measures that directly take effect on the flood hazard. However, adaptation measures go far beyond this realm, covering, for example, things like knowledge provision or the strengthening of social safety nets. Here, soft measures bear relevance also in higher flood scenarios. In order to clarify these points conceptually, we have added a conceptual section at the beginning of the paper. Besides detailing on our understanding of risk and other key concepts, it covers what is understood as “soft” and “hard” adaptation measures.

5. Outcomes

RC: I feel that the paper elaborates on a great misunderstanding. Structural interventions unavoidably entail negative impacts, but here the criticism of design choices because, as it seems, they are associated to the interests of the wealthiest classes, is confused with the criticism of technical solutions.

Answer: We thank the reviewer for this thought-provoking comment. From our point of view, the overall success of a measure can be evaluated from different perspectives – and disentangling negative impacts can be quite complicated in a complex political

economy such as the one of Jakarta. Technical solutions can be effective in avoiding flooding and hence be evaluated as successful. However, as the case of Jakarta shows, the implementation of such technical measures are often accompanied by the eviction of highly vulnerable groups. In the end, this can increase vulnerability to flooding of certain groups instead of reducing it. In other words, the separation between critique on “design choices” of technical solutions and critique on technical solutions overall might not be as simple as suggested by the reviewer. However, these considerations show that the issue indeed needs a more explicit discussion in the paper. We have revised the manuscript to add this discussion accordingly.

RC: In summary, on one hand the paper turns out to be a critique of the Great Garuda Project (a major structural intervention that is to be built). I do not claim that the Great Garuda Project is a right choice or not, the problem here is that the motivation against the Great Garuda Project are not clearly reported nor analysed in the paper!

Answer: This is an interesting comment. We would like to clarify that our study is not meant to be a critique to the Great Garuda Project. We assess how different adaptation measures are being reflected in the academic literature. With the Great Garuda Project being the single largest flood risk reduction measure in Jakarta it is not surprising that it receives significant attention also in the scientific literature. What is more, this being a highly contested measures it is further not surprising that some of the literature is quite critical of it. This is mirrored in our review and assessment of the literature. However, we revised the manuscript to change any sections that could be interpreted as a critique of the Great Garuda Project driven out of a personal motivation.

RC: The alternatives to the Great Garuda Project, and to the classic engineering approach of “protection from flood”, are extremely vague, unsubstantiated, not analyzed in depth and, indeed, of dubious utility considering the extent of the flood risk. Indeed, the analysis neglects a fundamental aspect: soft measures are almost useless against hard flooding.

Answer: Thank you for this interesting comment. It is true that in the literature on flood risk reduction in Jakarta, one finds a lot of critique on the Great Garuda Project but less debate on what could be viable and effective alternatives. We revised the manuscript to strengthen this aspect, particularly in the discussion section. The comment on alleged uselessness of soft measures is tackled in one of our above responses.

RC: Much of the conclusions reported in the paper are not supported, nor they are the logical conclusion of the given premises. For example (l. 451-453) "the pursuit of such infrastructural measures despite their questionable effectiveness and major critique shows that the city government sticks to its traditional protection approach". Are there effective alternatives to infrastructural measures? This issue is not clearly addressed in the paper, so the conclusion that "the city government sticks to its traditional protection approach" is not the logical consequence. If an "outdated" structural measure is the only effective solution to a present problem, even a government devoted to the future would be obliged to choose this one.

Answer: Thank you for this comment. We have added more nuance to the conclusions, especially with regards to the framing and evaluation of infrastructure measures, as discussed in the literature. We have also made the line of sight to the underlying assessment in the paper more visible. In addition, we revised the conclusion to more carefully differentiate between evaluations put forward in the assessed literature and own judgements. One of the key critiques raised in the literature is that infrastructure measures are not fully effective, whilst generating substantial externalities (social and ecological). At the same time, the literature does not discuss potential alternatives in great detail. We strengthened the discussion of this gap in section 4 and the conclusions.

6. Other

RC: l. 29: Tellmann et al. (2020) and Wolff et al. (2020) are missing in the bibliography. l. 130: Figure 4, not 3. l. 324: "While there hence exists. . ." is an awkward

construction. l. 419: please introduce DRR acronym. l. 773: the title of the paper is repeated two times.

Answer: Thank you. The manuscript has been revised accordingly.

RC: An analysis of a coastal area affected by land subsidence, flooding and population dynamics, is reported in https://doi.org/10.1016/j.scitotenv.2018.09.121 Two examples of adaptation measures supported by technical studies are https://doi.org/10.1016/j.ejrh.2020.100702 and https://doi.org/10.3390/w12061609

Answer: The suggested references are appreciated and will be carefully considered for inclusion in the manuscript.

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