

Interactive comment on “Assessing the tsunami mitigation effectiveness of a planned Banda Aceh Outer Ring Road (BORR), Indonesia” by Syamsidik et al.

Anonymous Referee #1

Received and published: 20 November 2018

"general comments"

This paper discussed the effectiveness of the elevated road as the construction for tsunami disaster mitigation in Banda Aceh by using numerical simulation. The elevated road was planned after 2004 Indian Ocean tsunami. However, the detailed evaluation of the road as the disaster prevention facility has not been conducted. In this paper, 4 scenarios were prepared for the tsunami inundation simulation. These scenarios included the change of land use in the city of Banda Aceh. Banda Aceh has been recovering and developing after 2004 tsunami disaster. Therefore, the viewpoint of land use is important to discuss the effect of the disaster prevention facility, such

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as the elevated road, in near future. The scenario of the magnitude of earthquake is quite severe, 8.5 and 9.15 Mw, and the reduction of the tsunami inundation area by the elevated road is not sufficient. But the effect of the road was confirmed and it is inferred that the road will have some effective functions for the disaster mitigation against the tsunami generated by earthquake smaller than 2004 Indian Ocean Tsunami. Consequently, it is expected that the results of this paper lead to the more detailed planning of the elevated road and discussion as the disaster prevention facility. Then, this paper will contribute to the future tsunami disaster mitigation and development of Banda Aceh city.

"specific comments"

- In Abstract: The condition of BORR should be written briefly.
- p.1, L.38-39: The relationship between 0.5m and "10% higher" is unknown.
- p.3, L.2: "about 500m from its coastal line from any settlement". Where is it "500m" from?
- p.3, L.15-16: From Fig.3, is the road on the revetment?
- p.3, L.23: Has the problem (increase of land price) been solved already? Is there a possibility of restarting the project?
- p.4, L.13,14: In linear SWE, $P=hu$ and $Q=hv$ are correct. However, are these correct in nonlinear SWE?
- p.4, L.33-34: Where is the reference height for "3m". If it is from the mean sea level, the height of the elevated road is less than 3.0m. But if it is from the original ground level, the height is 3.0m. At p.3, L.26, the term of "initial ground" is used.
- p.4, L.33-34: How much is the width of the road? Is the grid size of 11.5m in Layer 5 enough for the description of the road?

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- p.5, L.12-13: The land use in 2004 and its plan for 2029 should be shown. And the difference should be explained.
- p.6, L.19-20: How did you calculate the percentage of 1.2%? If this value is "% of total decrease" in Tab.5, what is the meaning of this value? If you want to say the effect of the land use change from 2004 to 2029 with BORR, you should calculate this value using 1252.0 (2004 with BORR) and 1203.47 (2029 with BORR). It is about 3.9% (>1.2%).
- p.6, L.24: What is the reason of "Interestingly"?
- p.6, L.29-30: Where are the bridges in Fig.12?
- p.6, L.31, "travel about 6km along the main rivers.": It is impossible to confirm the 6km-inundation in Fig.12.
- p.6, L.31: What is the reason of "higher than 1.5m"?
- p.6, L.36-37: There is no discussion about velocity before. Is it possible to mention the effect of velocity reduction by the elevated road here?
- p.7, L.9: It is hard to recognize this value (difference) in Fig.11. You should mention Tab.5 for this difference.
- p.7, L.11, "...about 5m with...": From the figure, "4m" is proper.
- p.7, L.18: What kind of "damages" do you consider? There is no explanation about the concrete type of damage.
- p.7, L.18: How did you calculate "about 22%"?
- p.7, L.29: What is the meaning of "dynamic variable"?
- p.7, L.41: From Fig.12, tsunami wave with 3m height does not overflow the structure. The content of this sentence is not consistent to the simulation results.
- p.8, L.3: What is the relation between the elevated road and the drainage system?

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- p.8, L.4-5: Is this sentence consistent to "p.3, L.26" and Fig.12.
- p.8, L.19: What is the "co-benefits" for tsunami wave?
- p.8, L.19: What is "Tsunami multidefense system"? There is no explanation.

"technical corrections"(typing errors, etc.)

- p.4: In equation, "sin" and "cos" should be written in Roman style.
- p.4: " Φ " should be changed to " φ " in eqs.(4)-(6).
- p.4, L.16: "g" should be written in Italic style.
- p.5, Eqs.(11) and (13): Are these descriptions correct? Is "logK" a variable, that is, is "log" not a function? Eq.(12) is the same.
- p.6, L.21: ... about 25% both in 2004 and 2029.
- p.6, L21: "Figure 12" should be labeled as "Figure 10". Because this figure is referred before original Figure 10 and 11
- p.6, L.22: ... the three transect indicated in Fig.1 that ...
- p.6, L.29, "could be reduced": "stopped" may be suitable in this case than "reduced".
- p.6, L.41: The number of figures should be changed by change of figure number of Fig.12.
- p.7, L.35: "Tokida and Tanimoto, 2014" is not found in the references.
- p.8, L.7, "overlapping process": "overtopping" or "overflowing" ?
- Figure 4,5,9,10,11: These figures should be bigger.
- Figure 10 (caption): The simulation were demonstrated by using land use ...

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- Figure 11 (caption): ...and with BORR (right).
- Figure 12: What is "Elevated Roud ($\pm 5.0\text{m}$)"? In p.4, L.34, "to plus 3.0m from the meas sea level"
- Figure 12: It is difficult to distinguish the difference of lines, especially yellow lines are unclear.
- Figure 12 (legend): Simulation code should be written in the legend because the code is used in the main sentence.
- Table 1 (title): ...setup of the six layers for ...
- Table 1: What is the "Ratio" in 5th column? If this is grid size ratio from parent layer to child layer, a blank is better in Layer 1.
- Table 1 (Layer 6): Two values in Latitude and Longitude may indicate the locations of "start" and "end", respectively. But why is only one value in Layer 6?
- Table 5: What is "Ha"? Is this "ha" (hectare)?
- Table 5: Font size in the bottom row is slightly bigger than others.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-276>, 2018.