Response to reviewer's comments on "ANALYTICAL AND NUMERICAL MODEL OF SALTWATER INTRUSION IN JENEPONTO REGENCY SOUTH SULAWESI PROVINCE INDONESIA, Reference No: WPT-D-22-00066", Paper, by Badaruddin et al.

Dear Dr Natasha Healy,

We are pleased to resubmit an improved manuscript on our investigation of saltwater intrusion in Jeneponto Regency, South Sulawesi Province, Indonesia, using analytical solution and numerical modelling.

We have addressed the comment (given in italics) from the reviewer and our responses are detailed below. We acknowledge that the reviewer input allowed for significant improvements to be made to this article. Please note that any changes mentioned in this revision notes are referring to the clean revised manuscript.

Best wishes,

Sugiarto Badaruddin

Reviewer 1:

An interesting manuscript to review with regards to the subject of the investigations. The following are some of the comments that might further enhanced the manuscript:

The Keywords that have been selected should be replaced with other keywords of more relevant and impact to this investigation.

Response:

Thank you for your suggestion and we have replaced the keywords in the manuscript in Line 38 to 39.

In the Introduction section, more recent references on this subject should be included in which the rebuttal of the results of the study should be used in the discussion section, where relevant. The origin of Eqn. 1 is unfounded, unless purely derived based on Fig. 2 which is to be determined.

Response:

Thank you for your suggestion and we have revised the manuscript to put more recent relevant references, such as in the introduction section in Line 48, 50, 57, 80, 82, 84. Some additions were added also in the discussion part in Line 220 to 223 and also in Line 265 to 270. Yes it is true that the eqn. 1 is purely derived based on Fig. 2a and the complete version in deriving this equation can be found in Strack (1976) and Werner et al. (2012). These both references are available in the manuscript.

Strack, O.D.L., 1976. Single-potential solution for regional interface problems in coastal aquifers, Water Resources Research 12: 1165-1174.

Werner, A. D., J. D. Ward, et al., 2012. Vulnerability indicators of sea water intrusion. Ground Water 50 (1): 48-58.

The relevant equation(s) related to the Numerical Modelling should be included in Section 3.3. The method of obtaining the results should be described in the relevant section. All the associated software used in this study should be included at the relevant juncture to further enhanced the depth and quality of the manuscript.

Response:

Thank you for your comments. We believe that showing the relevant equations used in the SEAWAT which uses a finite difference method and couples flow and transport equations will increase the length of the manuscript significantly and therefore, instead of showing this in the manuscript, we prefer to direct the reader to the complete version of references of the software which is explained in Line 168 to 173 in the methodology section (i.e., Guo and Langevin, 2002 and Langevin et al. 2008).

Guo, W., Langevin, C., 2002. User's guide to SEAWAT: A computer program for the simulation of three-dimensional variable-density ground-water flow: USGS Techniques of Water Resources Investigations, Book 6, Chapter A7.

Langevin, C.D., Thorne, D., Dausman, A.M., Sukop, M.C., Guo, W., 2008. SEAWAT Version 4: A computer program for simulation of multi-species solute and heat transport: USGS Techniques and Methods, Book 6, Chapter A22

In Section 3.1, since the financial constraints hindered the acquiring of the stated data, have other secondary or relevant data of similar nature elsewhere being referred instead of simplifying the soil heterogeneity of the aquifer?

Response:

Thank you for your comments and we have clarified this in Line 104 t0 109 in the methodology section to show the reference we used in determining soil heterogeneity of the aquifer.

Results of the discussion with regards to analytical method is very limited in its present form. Counter checks work should have been made from other reported work of similar studies to comment on the results obtained from this method. As it is, the discussion is too limited and unsupported to have much impact to the overall investigations.

Response:

Thank you for your suggestion and we have revised the manuscript in the discussion section in Line 220 to 223 to compare the results found in this study with the results from other studies.

As to the results of the numerical studies, the discussions lack the comparison of results with other similar studies elsewhere (around the globe) that would enhanced the results obtained.

Response:

Thank you for your suggestion and we have revised the manuscript in the discussion section in Line 265 to 271.

To further enhanced the relevant references by using the relevant and current ones.

Response:

Thank you for your suggestion and we have revised the manuscript accordingly.

Reviewer 3:

The paper needs major revisions:

The following paragraph needs references and more robust clarifications:

Over the last decade, there has been rapid population growth worldwide, including in Indonesia, particularly in Jeneponto Regency in South Sulawesi Province, which has resulted in massive groundwater exploitation. This phenomenon has harmed groundwater quantity and quality, including decreased groundwater levels, increased fluctuations, and decreased groundwater quality, as well as SWI in several regions. As a result, a concerted effort on the government, the public, and the private sectors are required to mitigate these negative consequences

Response:

Thank you for your suggestion and we have revised the manuscript by adding some references and also some clarifications in the paragraph in Line 78 to 86.

Innovation and motivations need to be expanded in the introduction.

Response:

Thank you for your suggestion and we have clarified this in the introduction section in Line 90 to 96.

The present results need to be compared with literature review.

Response:

Thank you for your suggestion and we have revised the manuscript including some additions in the introduction section in Line 78 to 86 and also in the discussion part in Line 220 to 223 and Line 265 to 271.

Increase number of literature review

Response:

Thank you for your suggestion and we have revised the entire manuscript including adding some references in the introduction section in Line 48 to 57 and also in Line 78 to 86.

The performance of the present research should be statistically done by using MAE and RMSE.

Response:

Thank you for your suggestion. However, since there is no enough field investigation of saltwater intrusion (i.e., groundwater salinity profiling) has been conducted in the respected area, it is difficult to measure the performance of the present research using MAE (Mean Absolute Error) and RMSE (Root Mean Square Error). The only thing can be done is by comparing the results of this research with the field investigation results from other research which is near from the respected research area. This has been explained in Line 265 to 271 in the results and discussion section.

The present research should be carried out for other boundary conditions.

Response:

Thank you for your suggestion. Since this research is conducted as a preliminary investigation of saltwater intrusion in Jeneponto Regency, Indonesia and also for comparing the prediction of analytical solution and numerical modelling, therefore, involving other boundary conditions (i.e., effects of sea level rise and groundwater level decline) will become the subject for our future research. We have explained this in the conclusion section of the manuscript in Line 295 to 299.