

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2
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Comment on hess-2022-86

Anonymous Referee #2

Referee comment on "Prediction of groundwater quality index to assess suitability for drinking purpose using averaged neural network and geospatial analysis" by Seok Hyun Ahn et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-86-RC2>, 2022

The paper describes the application of data-driven models to predict the groundwater quality index for drinking purposes using multiple water quality parameters. Groundwater quality was assessed by 2D spatial analysis and long-term monitoring results. However, the manuscript needs to be further improved in terms of novelty, literature research, and data handling and interpretation.

Abstract: The authors need to explain more the novelty and importance of their work for international communities.

Introduction: The section must be substantially improved by citing new literature.

Lines 66-70: I disagree with the authors' statement, there are several recent works about data-driven models predicting comprehensive groundwater quality (WQI, vulnerability, suitability for drinking water,...) as shown in the examples below. Search for recent studies and emphasize improvements of the authors' research from them.

- Prediction of groundwater quality using efficient machine learning technique. *Chemosphere*, 276, 130265. <https://doi.org/10.1016/j.chemosphere.2021.130265>
- Advanced utilization of multi-learning algorithm: ensemble super learner to map groundwater potential for potable mineral water, *Geocarto International*, DOI: 10.1080/10106049.2022.2025921
- Reliability evaluation of groundwater quality index using data-driven models. *Environmental Science and Pollution Research*, 29(6), 8174-8190.

Lines 80-83: There is a doubt that 'Analyzing long-term monitoring results can evaluate the accuracy of the groundwater pollution vulnerability.' Details comments are described in the results section.

Figure 1 needs to be redrawn. Clarify the location of the authors' study area by representing neighboring countries, name of country (or region), and other essential elements of map presentation for the worldwide readers.

Lines 105-106: The authors removed 4,774 wells of groundwater quality that are inappropriate for drinking purposes. Considering the title of the manuscript, it is likely more effective to analyze both appropriate and inappropriate groundwater samples to assess suitability for drinking purpose. Is there any reason the authors removed unsuitable groundwater quality for drinking water?

Lines 151-153: In the section 2.3, the method to calculate GQI and to classify GQI into the grade was already developed. Then why the classification models are necessary? I think there is no reason to use learning models including averaged neural network, RF, SVM,... whose accuracy is not perfect. Isn't classifying according to a given classification method the most accurate?

Section 2.4: References and details are required when describing the models.

Section 2.5 also needs to be described in more detail.

Lines 198-200: It is unclear why Chungcheongbuk-do was analyzed with high resolution unlike the other regions. Is there a specific reason?

Lines 278-288: The GQI grade was estimated using groundwater quality data sampled at one time for each well. Then, what is scientific basis of the statement that long-term trends confirm the reliability of the authors' results? What is relation between increasing (or decreasing) trend and the grade? In addition, the authors only showed a long-term trend in only one area corresponding to each grade. I disagree with the authors on the following three points.

- There is no relation between long-term trend and the GQI grade.
- It is impossible to confirm the reliability of the authors' results by checking only one area per each grade.
- In Figure 6B, Site A (worrisome grade) showed increasing trend in chloride but the value is lower than Site C (very good grade) showing decreasing trend. It is not up to

expectation.

Discussion: Most of the discussion is a repeat of the previous sections. More in-depth discussion is required.

Figure S4 is not referred in the manuscript.