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Development of prioritization method of seawater intrusion countermeasures for sustainable groundwater resources in coastal area

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As sea levels rise due to the influence of global warming, coastal areas are increasingly being damaged with the expansion of seawater intrusion areas. As a result, there has been a corresponding increase in the number of studies focused on influence radius for seawater intrusion or relieve and prevent damage from seawater intrusion. A great deal of research is being done to project and mitigate seawater intrusion damage on a global scale. However, to efficiently plan against seawater intrusion damage, it is necessary to select areas where such damage is actively occurring and then design a response that is suitable to the characteristics of the area. We suggest a three-step method for reducing seawater intrusion areas by predicting future damage to groundwater being used continuously. First, the area most vulnerable to seawater intrusion damage is selected from among 12 areas on the east coast of the Republic of Korea. Having identified the most vulnerable area as the region in question in the second step, we use RCP 4.5 and 8.5 as future sea level rise scenarios and predict the future usage of groundwater using linear-regression analysis of data for the past 10 years. In the third step, the effectiveness of seawater intrusion reduction measures is analyzed considering the projected future situation and the local characteristics of the most vulnerable area. After considering the effects of alternative locations, as well as seawater intrusion related data, alternatives were prioritized using a multi-criteria decision-making method. We judged that by applying seawater intrusion area reduction measures according to this result, we will achieve the biggest effect. The results show that by considering future situation and local characteristics, this approach effectively prioritizes feasible alternatives that can be implemented into sustainable groundwater resources rehabilitation plans.