

Supplementary Materials

S1. Inverse distance weighting method

The generic equation for inverse distance weighted interpolation is

$$u(X) = \frac{\sum_{i=0}^N \frac{w_i(X)u_i}{\sum_{j=0}^N w_j(X)}} \quad (S1)$$

Where

$$w_i(X) = \frac{1}{d(X, X_i)^p}$$

X : The estimation value.

X_i : The sample value in point i.

d : The distance of the sample point to the estimated point.

N : The total number of predictions for each validation case.

p : The distance coefficient that is an exponent defined by the user

Tables:

Table. S1. The mixing ratio of fresh-groundwater to saline-groundwater in each region

Area		Mixing ratio(%)
East	Gujwa	5.6
	Seongsan	15.5
	Pyoseon	11.0
West	Daejeong	34.8
	Hankyung	51.7
	Hallim	17.5
Average		13.4

Table S2. Spearman's ρ correlation analysis between electrical conductivity and TDS

Spearman's ρ	
	TDS
EC	0.70*

*: $p < 0.05$

Figures:

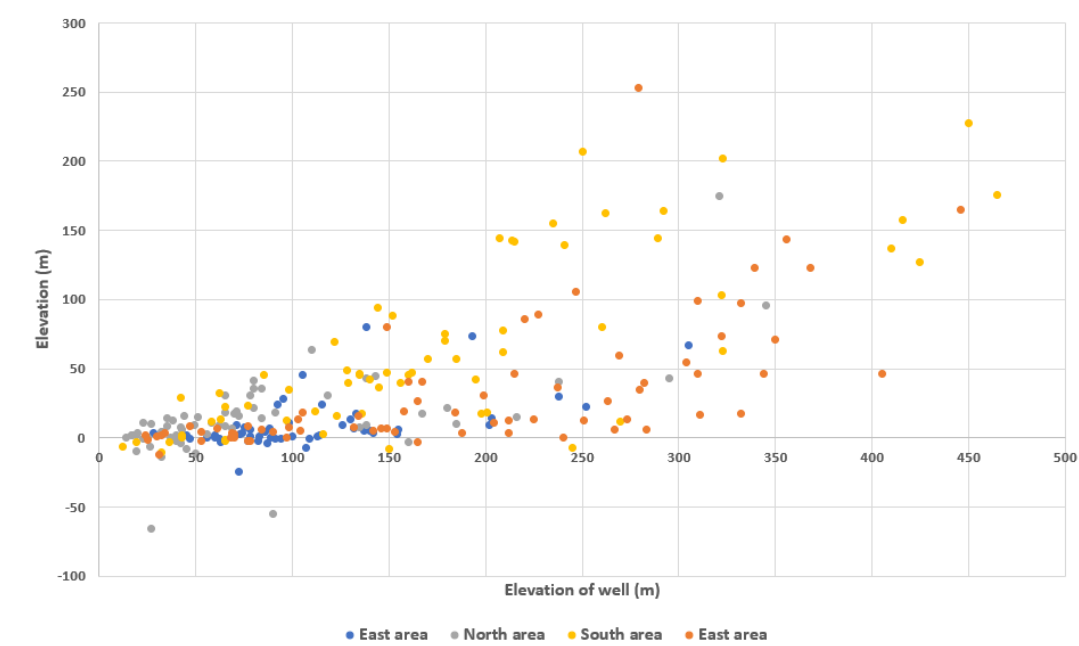


Figure S1. Plots of groundwater level according to the elevation of well in each region of Jeju island (data from MOE and K-water, 2018)

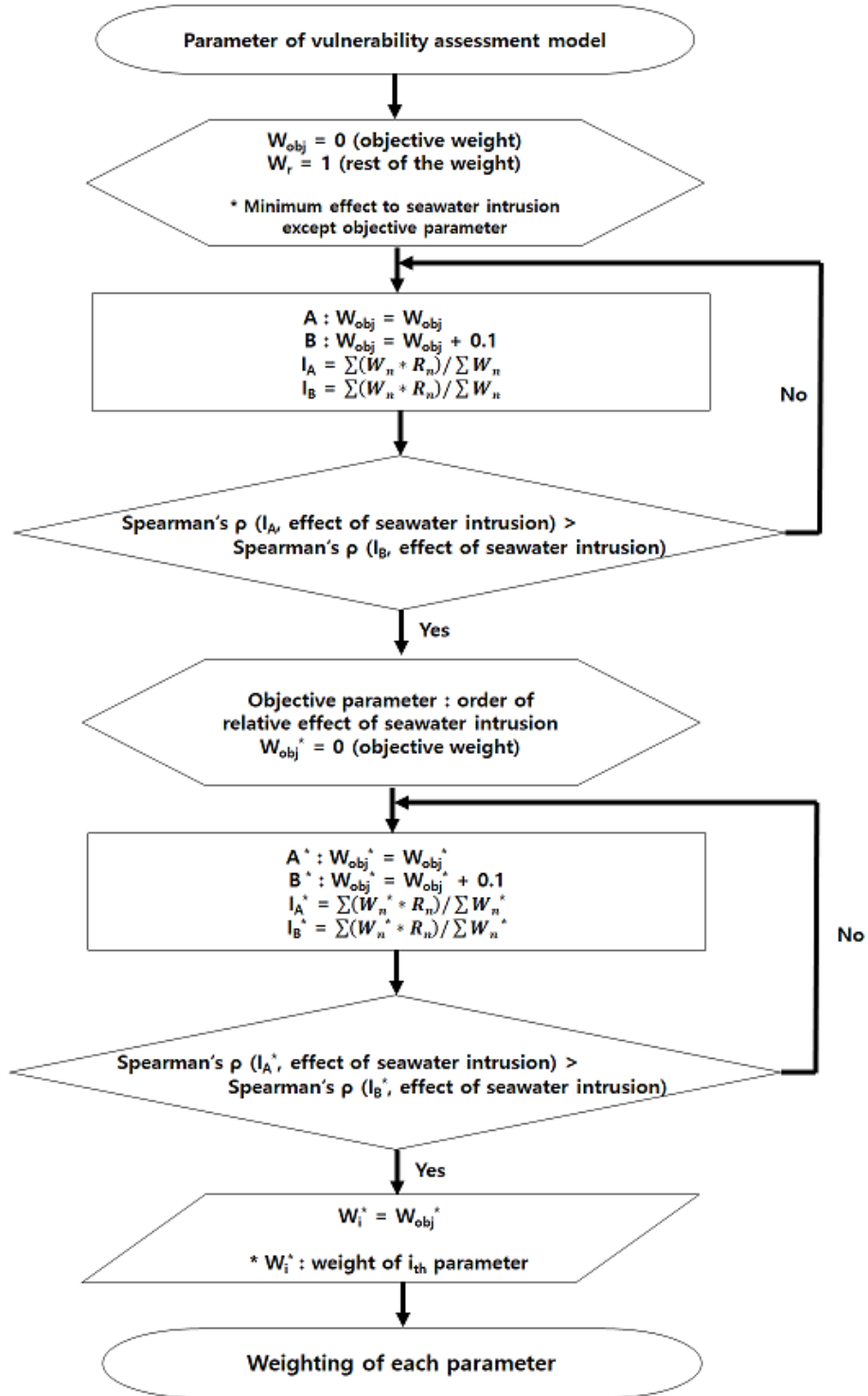
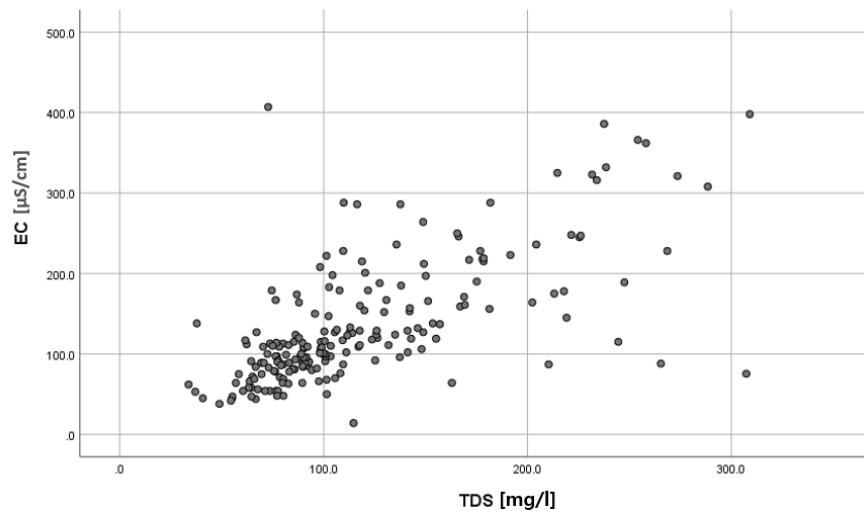


Figure S2. Flow chart of the weight optimization method



Figures S3. Correlation plots of the total dissolved solids against electrical conductivities of groundwater