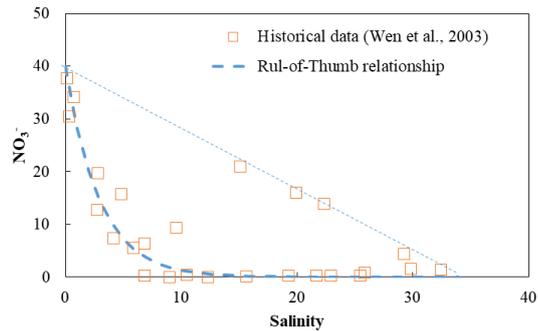


## Supplementary Materials

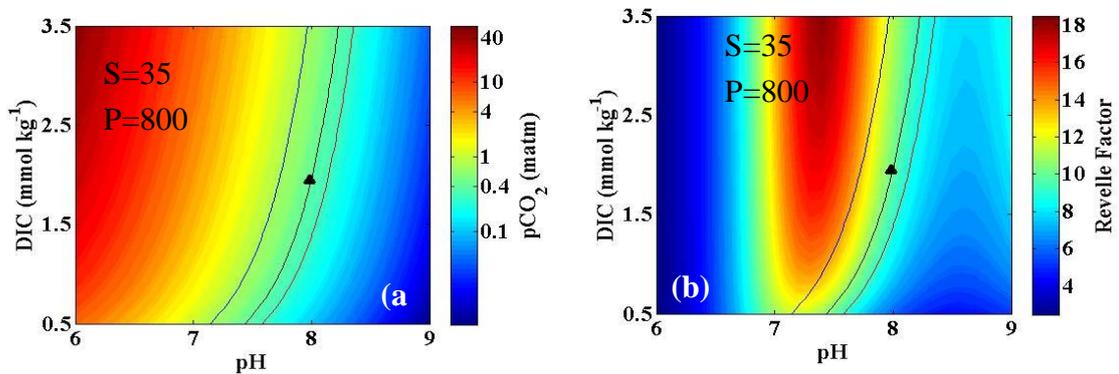
For the Danshuei River, we used data in Wen et al. [1] and assumed a rule-of-thumb relationship between salinity and  $\text{NO}_3^-$  ( $\mu\text{M}$ ):

$$[\text{NO}_3^-] = [\text{NO}_3^- \text{ end-member}] \times 0.71^{\text{salinity}}$$

This relationship was based on historical data from Wen et al. [1]. We have noted that the nutrient dynamics are complex in the Danshuei River and this relationship only represents the case of biological effect. Other factors, such as tidal mixing and heavy rain during a typhoon, may also affect the carbonate system in the Danshuei River. However, the other cases are over the discussion scope of this study.



**Figure S1.** The nitrate to salinity relationship at the Danshuei River estuary. This data was adopted from a previous study (Wen et al. [1]).



**Figure S2.** The variation of  $p\text{CO}_2$  and Revelle factor against the pH and DIC for waters of salinity 35 and a pressure of 800 atm. Among the changing DIC and pH variations, the  $p\text{CO}_2$  varied non-linearly (a) and the maximum Revelle Factor occurred between pH 7 to 7.8, depending on the corresponding DIC concentration (b). The three lines from the right-hand side to the left-hand side represent  $p\text{CO}_2$  values of 290 (pre-industry  $\text{CO}_2$  level), 400 (modern  $\text{CO}_2$  level) and 800 (2100 year  $\text{CO}_2$  level)  $\mu\text{atm}$ , respectively.

## References

1. Wen, L.S.; Jiann, K.T.; Liu, K.K. Seasonal variation and flux of dissolved nutrients in the Danshuei Estuary, Taiwan: A hypoxic subtropical mountain river. *Estuar. Coast. Shelf Sci.* **2008**, *78*, 694–704.