**Supplementary Material for**

# Introducing ICEDAP: An 'Iterative Coastal Embayment Delineation and Analysis Process' with Applications for the Management of Coastal Change

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## ***TEXT S1: INFLUENCE OF TIDAL EFFECTS***

The global surface water dataset does not provide a quantitative assessment of the influence of tidal effects. To test the influence of tidal effects on changes in water area, we estimated the lateral extent based on the average slope and tidal range for each portion of the South Korean coast. Here, we used the SRTM 1 Arc-Second Global dataset to extract information on local elevation (resolution: 30x30m) within a 500m buffer around the coast. We then calculated the average slope for each portion of the coast using the *Slope* tool in ArcGIS and used a simple 2D model to estimate the lateral tidal extent by dividing the average tidal range by the average slope (Figure S1).

The east and south coast of South Korea are generally characterized as microtidal environments with relatively steep slopes (Table S1). As a result, the possible lateral tidal extent along these coasts is therefore less than one pixel (i.e., 30m) to the effect that our toolbox would be unable to identify changes in the surface water extent due to tidal effect in this region. On the other hand, gentle slopes and a large tidal range suggest a relatively large lateral tidal extent of up to five pixels (or ~150 m) (Table S1). Despite the possibility of a relatively large lateral tidal extent, the overall tidal effects on changes in surface water area remain negligible compared to the massive anthropogenically driven loss of coastal habitats along many portions of the western peninsula (e.g., Figure 7 and 8).

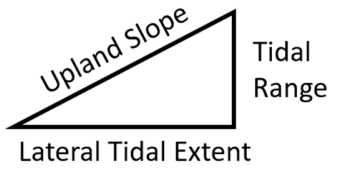


***Figure S1.*** *Simple 2D model showing effects of tidal range and upland slope on the lateral tidal extent.*

***Table S1.*** *Average slope, tidal range, and lateral tidal extent along each portion of the South Korean coast.*

| Coast | Average Slope () | Average Tidal Range (m) | Average Distance (m) |
|---|---|---|---|
| West | 0.046 | 7.0 | 152.21 |
| South | 0.095 | 2.5 | 26.29 |
| East | 0.076 | 1.0 | 13.21 |