

Evaluating the reduction of erosion by European coastal biotopes

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Objective

We evaluate the contribution of ecosystems to reducing coastal erosion with the aim to identify locations where nature-based solutions can help strengthening the coast and increasing biodiversity.

Methodology

1. We map European biotopes using the EUNIS typology.
2. We assign scores R_k 1 to 5 for the erosion reduction capacity of each biotope, adjusted for the width perpendicular to the coastline.
3. We sum the scores per biotope for each 500 m coastline using Root Sum Squares (RSS):

$$ES_{erostot} = \text{MIN} \left(\sqrt{\sum_{k=1}^N (R_k)^2}, 5 \right)$$

4. We assign rank scores 1 to 5 for the EMODnet coastal migration rate obtained by satellite data for each 500 m coastline.
5. We subtract both scores to obtain a score for the ecosystems' contribution to erosion reduction.

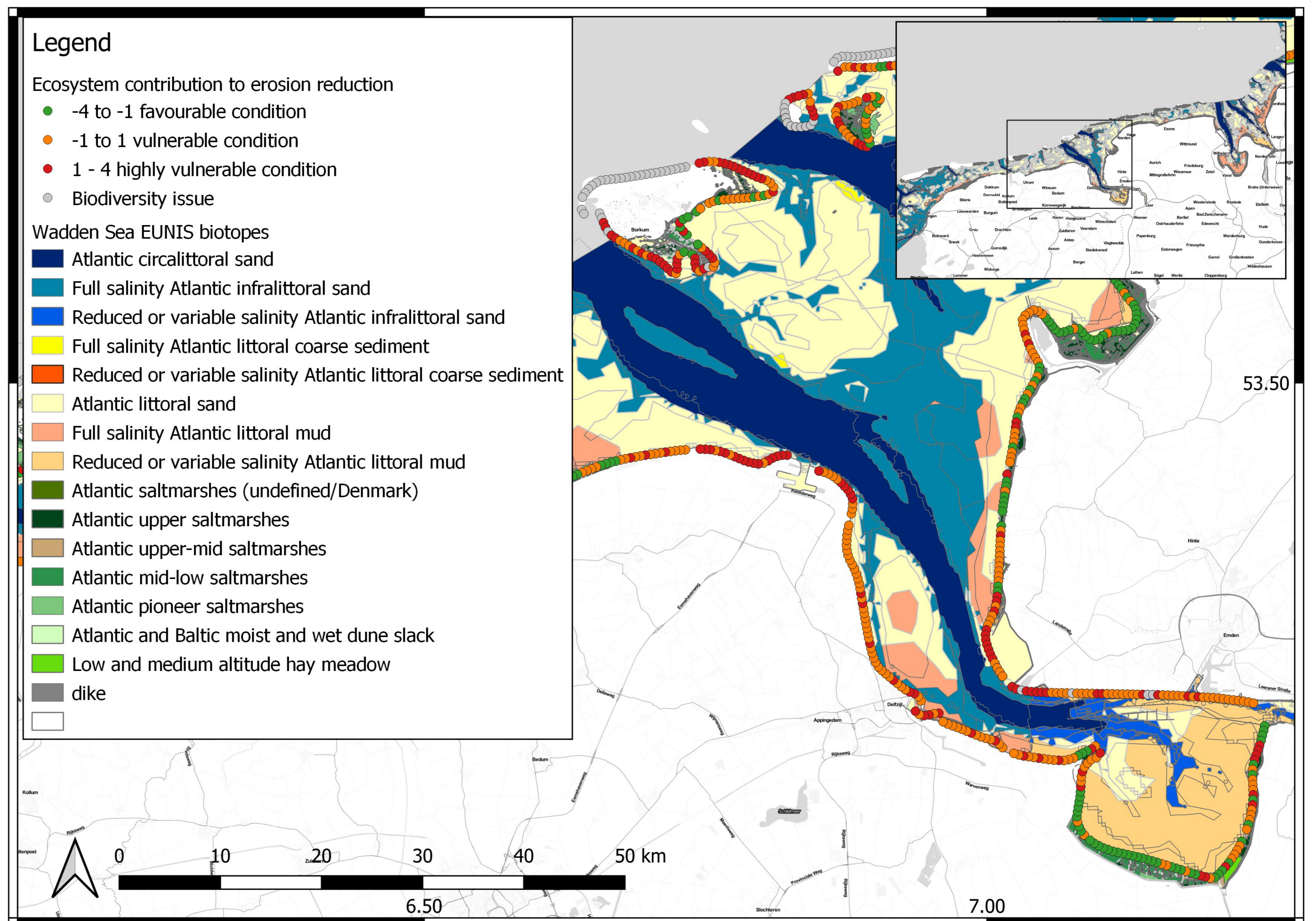


Figure 1. Scores for the contribution of coastal ecosystems in reducing coastal erosion for the Ems estuary (NL/DE).

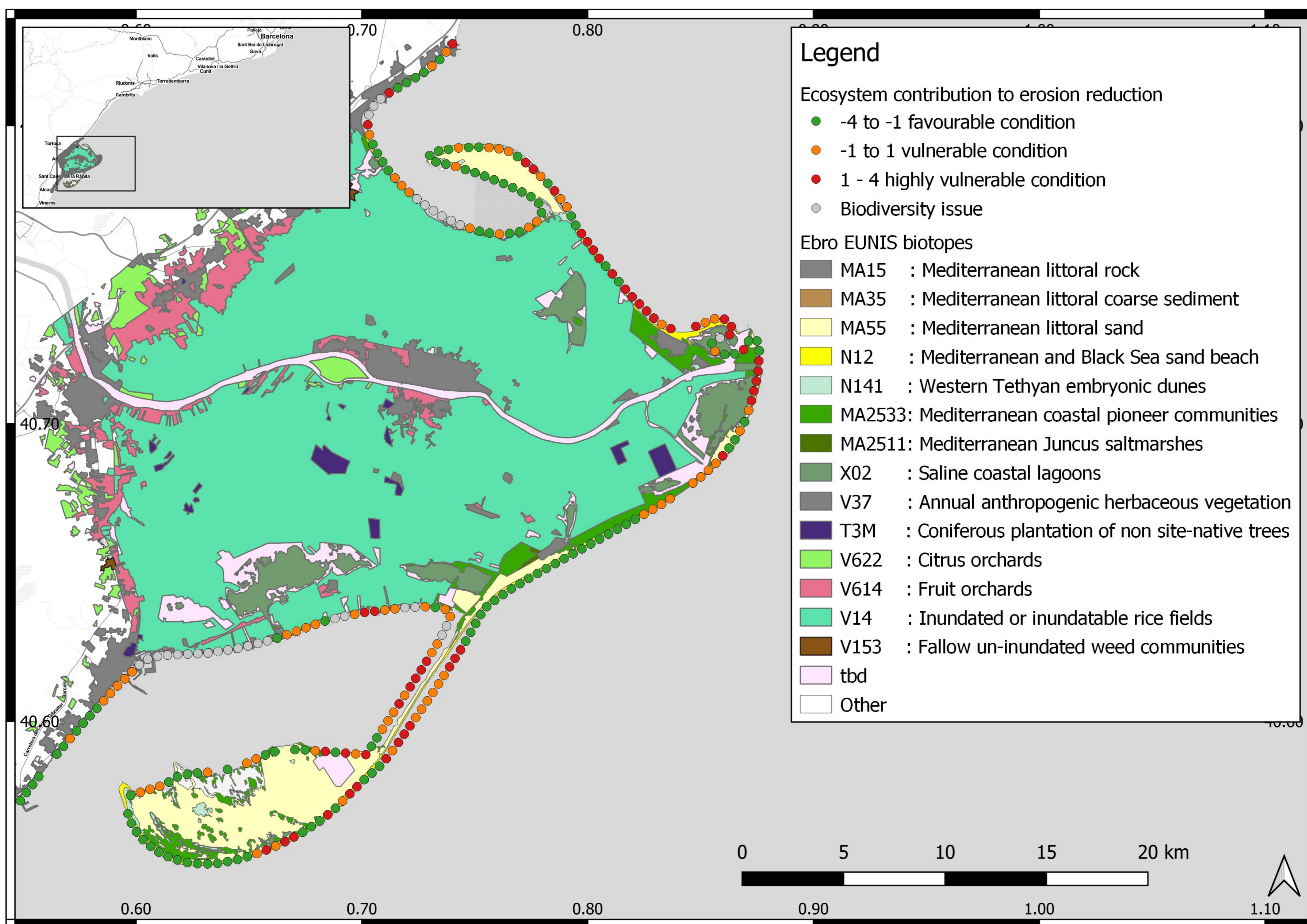


Figure 2. Scores for the contribution of coastal ecosystems in reducing coastal erosion for the Ebro delta (Spain).

Table 1. Score tables for coastal erosion rank score and total summed score for contribution to reduction of coastal erosion.

Coastal erosion rank score

- 5 (severe erosion < -2 m/yr)
- 4 (moderate erosion -1 to -2 m/yr)
- 3 (mild erosion, -0.5 to -1 m/yr)
- 2 (stable -0.5 to 0.5 m/yr)
- 1 (accretion > 0.5 m/yr)

Total summed score for contribution to reduction of coastal erosion

- 1-2 (very low reduction)
- 2-3 (low reduction)
- 3-4 (medium reduction)
- 4-5 (high reduction)
- 5 (very high reduction)

Outlook

Applying our method for European-wide harmonized EUNIS maps will show which parts of European coasts have vulnerable locations where coastal restoration is desired to strengthen their ecosystem services and to increase biodiversity, thus contributing to the European Green Deal.

