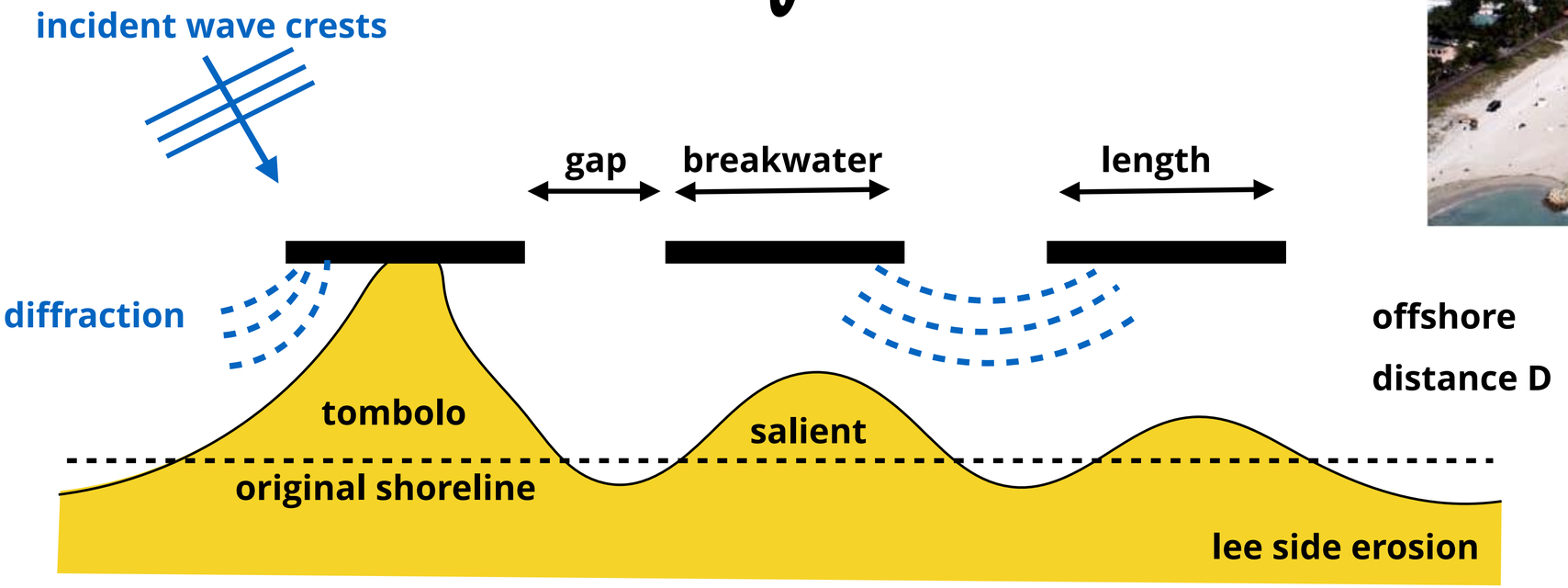
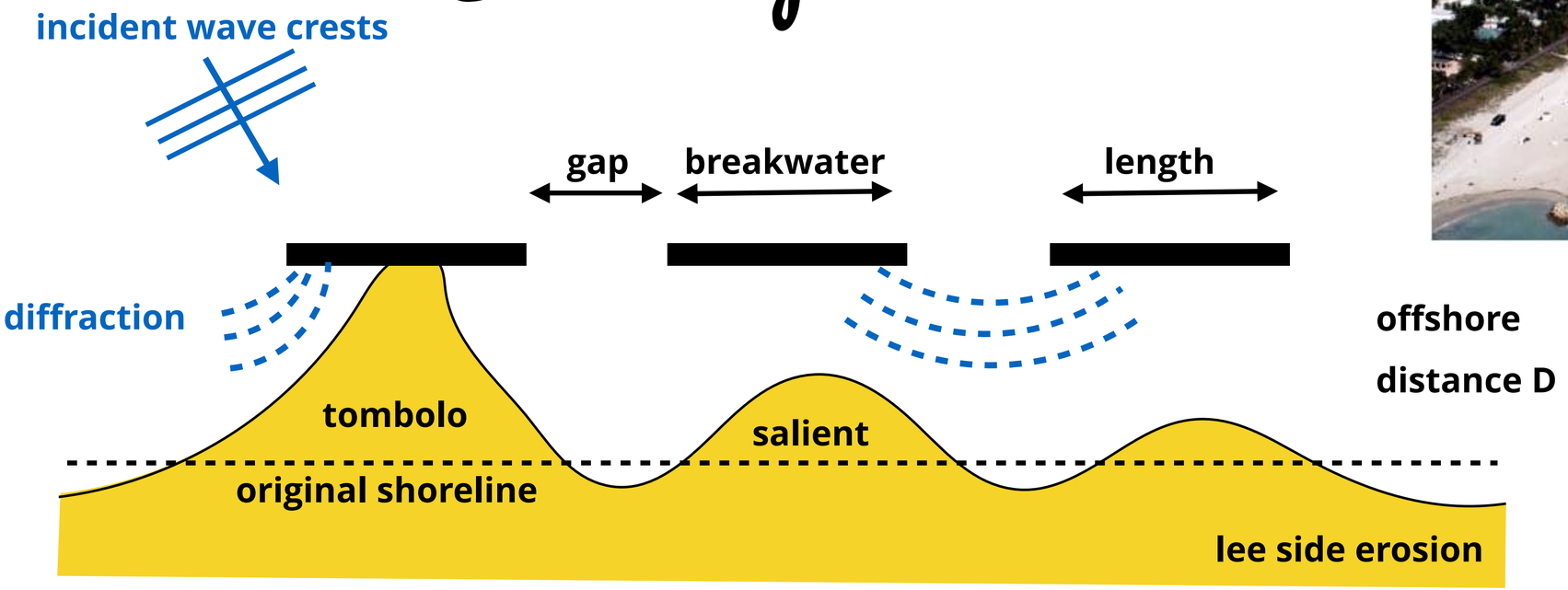
Coastal protection



The breakwater length (L) should be at least 2 times the design wave length and the gap length (Lgap) should be smaller than the design wave length. The offshore position (D) should be based on the desired shoreline pattern.

Coastal protection



- **L/D>3 — permanent tombolo**
  - the breakwater length should be larger than the gap length (L/Lgap>1) to form a tombolo; increasing this ratio, increases the amount of energy transmitted through and over the segments while decreasing the diffraction effects; no erosion opposite to the gap will occur for Lgap/D<0.8; length in relation to the width of the surf zone (about -6 m to MSL)
  - a tombolo behind a breakwater with L=200m, D=200m in a depth of 3m can be formed in 1 to 3 years
  - tombolos will be formed if the structure is placed close to the shore well within the breaker zone or if the longshore transport rate is relatively large (abundance of sand)
  - tombolos will eventually function as a groyne blocking the longshore transport