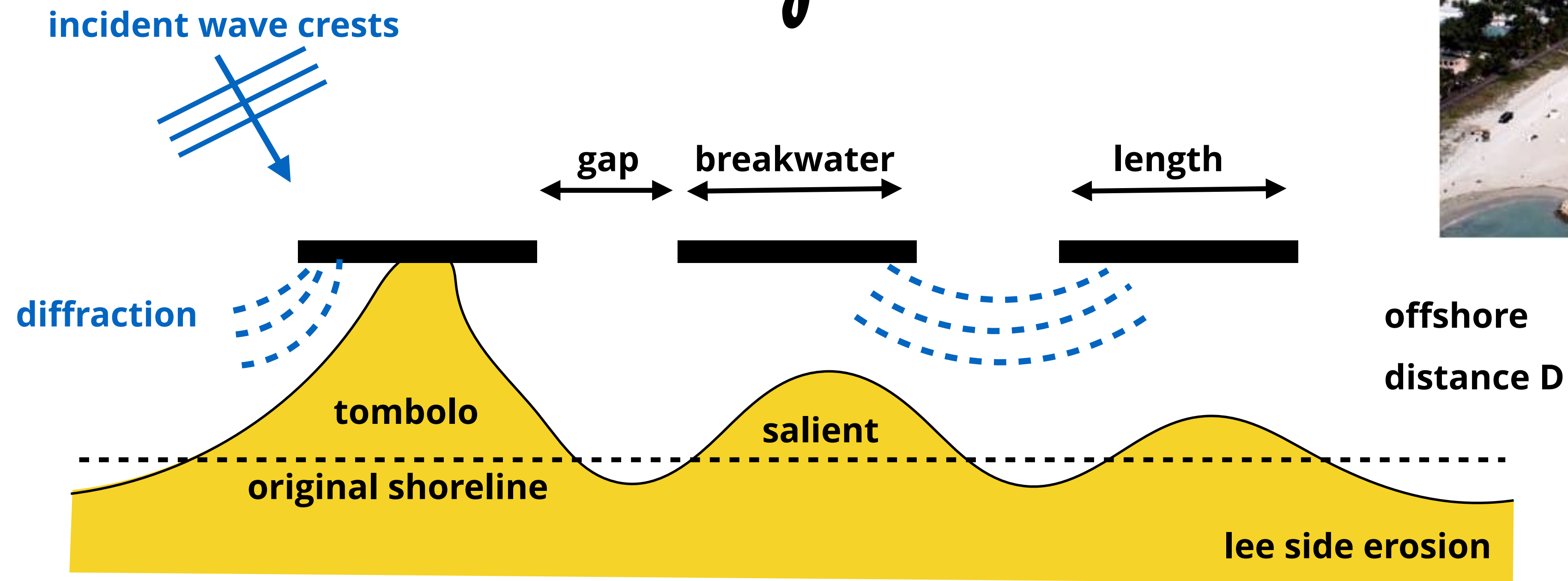


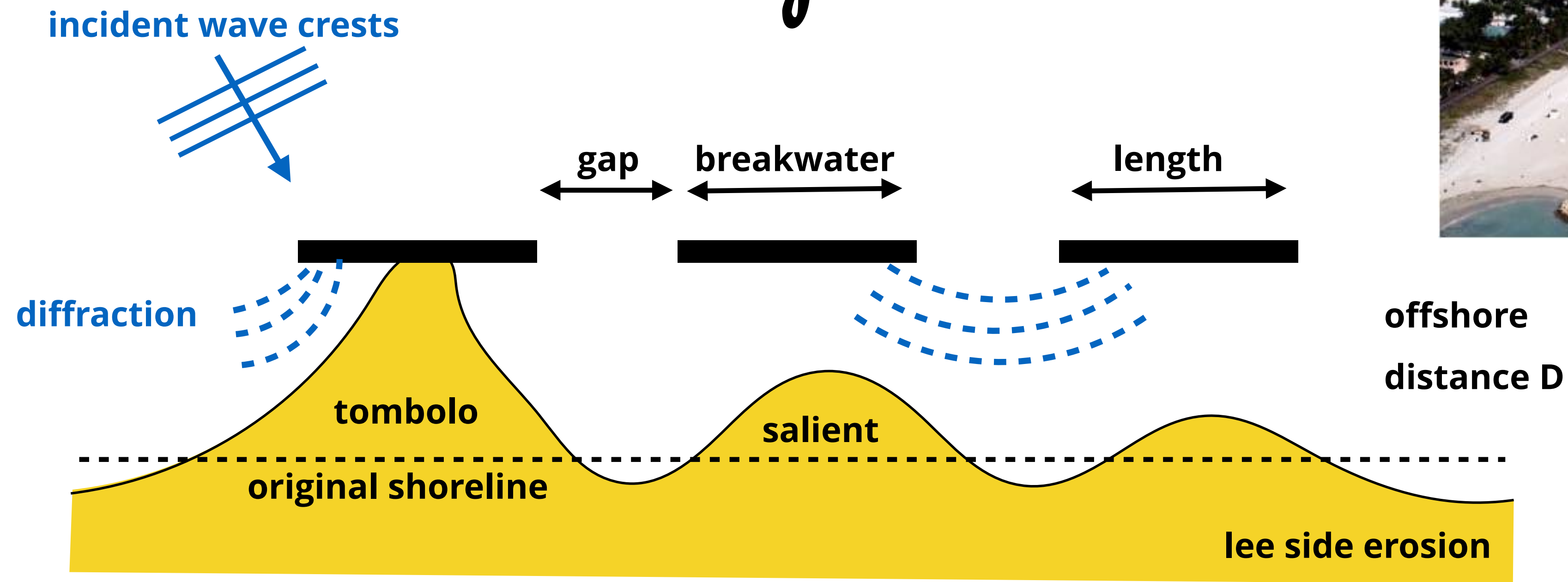
Coastal protection



► $L/D > 3$ — permanent tombolo

- the breakwater length should be larger than the gap length ($L/L_{gap} > 1$) 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 $L_{gap}/D < 0.8$; length in relation to the width of the surf zone (about -6 m to MSL)
- a tombolo behind a breakwater with $L=200\text{m}$, $D=200\text{m}$ 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

Coastal protection



- **$L/D \geq 2$ to 3; permanent or periodic tombolo** (if depth at breakwater location < 3 m) **or well-developed salient** (depth > 3 m) periodic tombolos are removed during storm conditions (highly variable wave climate)