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Working with Nature – ideation to realisation in sediment management

Welcome

Acknowledgement & respect

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.

Content

- Zand Motor
- Case studies
  - Mandurah concept design
  - Mini sand engine
  - Resort island in Southeast Asia
- Summary

Zand Motor

→ **Large-scale implementation of Working with Nature principals**

PHOTO SOURCE: https://dezandmotor.nl

Origin

- Kijkduin, NL. 2011
- Nourishment every 5 years, 2~5 million m³ per campaign
- 21.5 million m³ in a single location

Mechanism

- Placement of a large quantity of sand
- Redistribution through waves, tides, winds
- Shoreline evolution as sand moves which build up beaches and dunes along the coastline

Zand motor – benefits

- Reduced disturbance to ecosystem
- Reduced cost
- Long-term protection of at least 20 years
- New sand shoal created - new habitat for flora and fauna
- New large area which is used for recreational purposes

Case study

→ Example projects in GHD

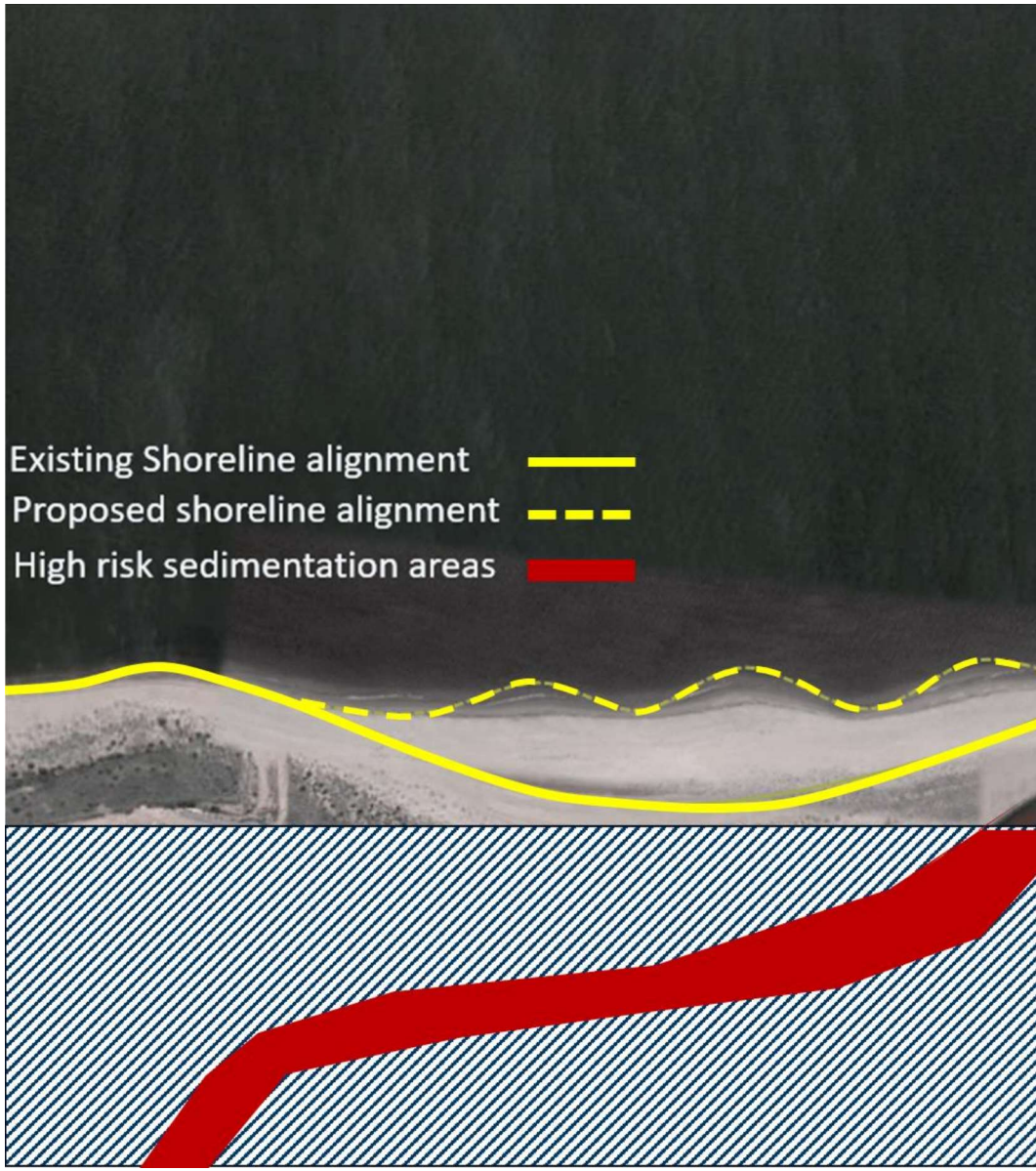
Mandurah bypassing concept design

- DoT (WA) annual campaign for safe navigation and beaches maintenance
- Natural flow of sediment continues along the coast
- 100,000 m^3/annum between June and November

Mandurah bypassing concept design

Mini Sand Engine

- A river upstream as sediment source
- Accumulation upstream since construction (anticipated). Monitoring & Management Plan in place
- Historical campaigns with dig and truck, typ. ~80,000 m^3 in 6~8 weeks, once every 3~4 yrs
- Sediment spread across (parallel to) the shoreline, mimicking existing
- New campaign
  - Exposed & sheltered shoreline irrespective of enviroment forcing
  - Minimises rapid infill to the river
  - Reduces onshore stockpile footprint, minimises impact to sensitive terrestrial system
  - Reduces rework, thereby truck movement, noise & air quality & visual impacts, costs, GHG emissions



Resort Island in SE Asia

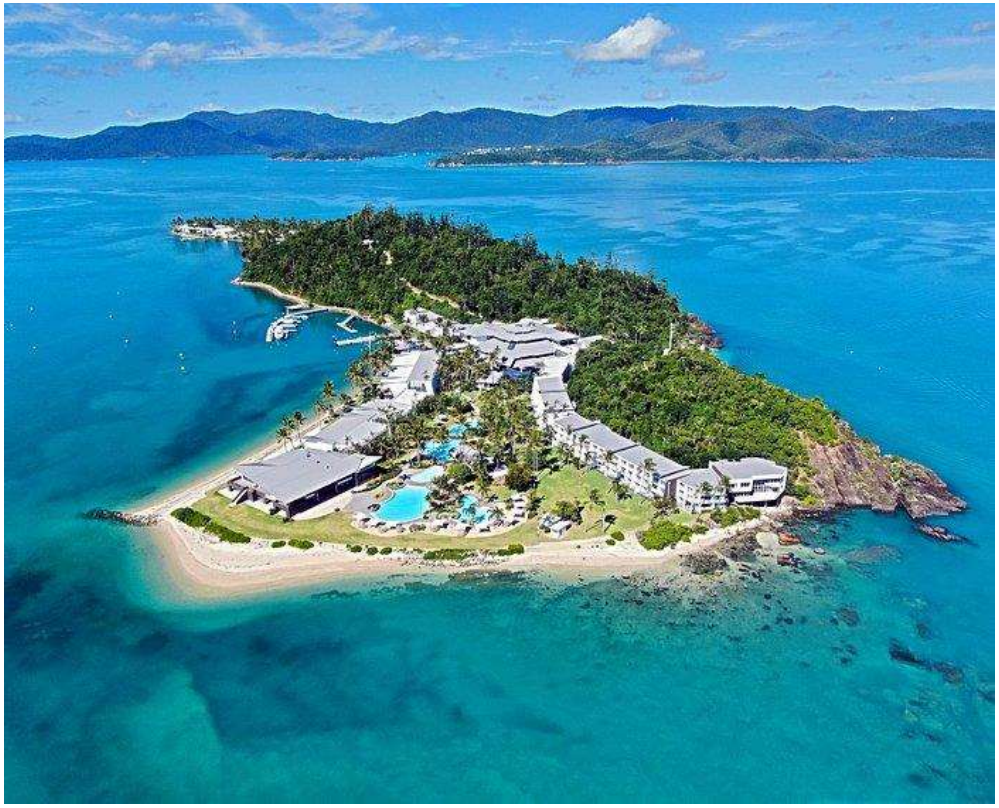
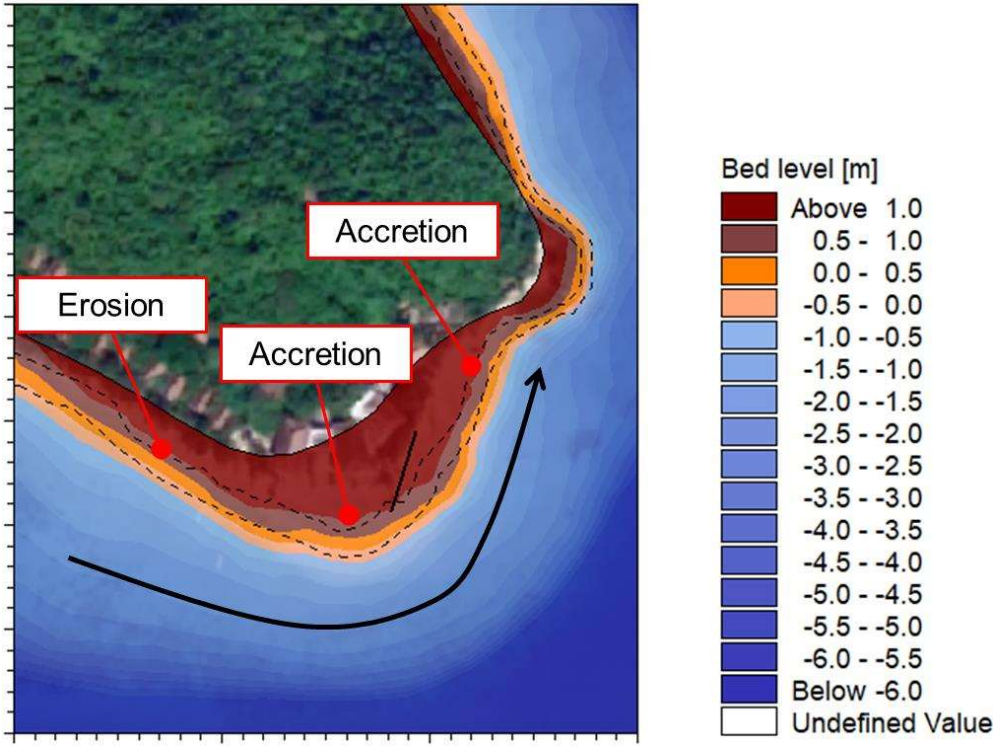


PHOTO SOURCE: DAYDREAM ISLAND RESORT

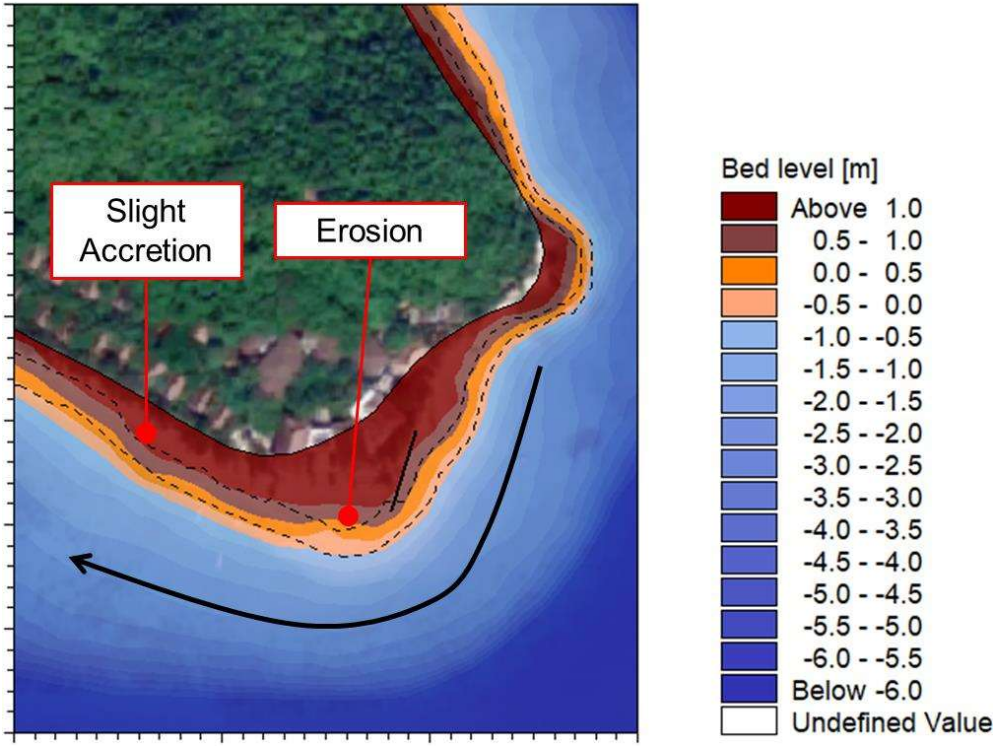
- Picture not actual project site
- *Erosion* of shoreline jeopardizing stability of existing assets
- Sediment mobilised by seasonality, exacerbated by SLR
- Root-cause analysis with numerical model to establish baseline condition
- Developed options to work with (instead of against) the natural rhythm

Resort Island in SE Asia

End of SW season



End of NE monsoon



Resort Island in SE Asia

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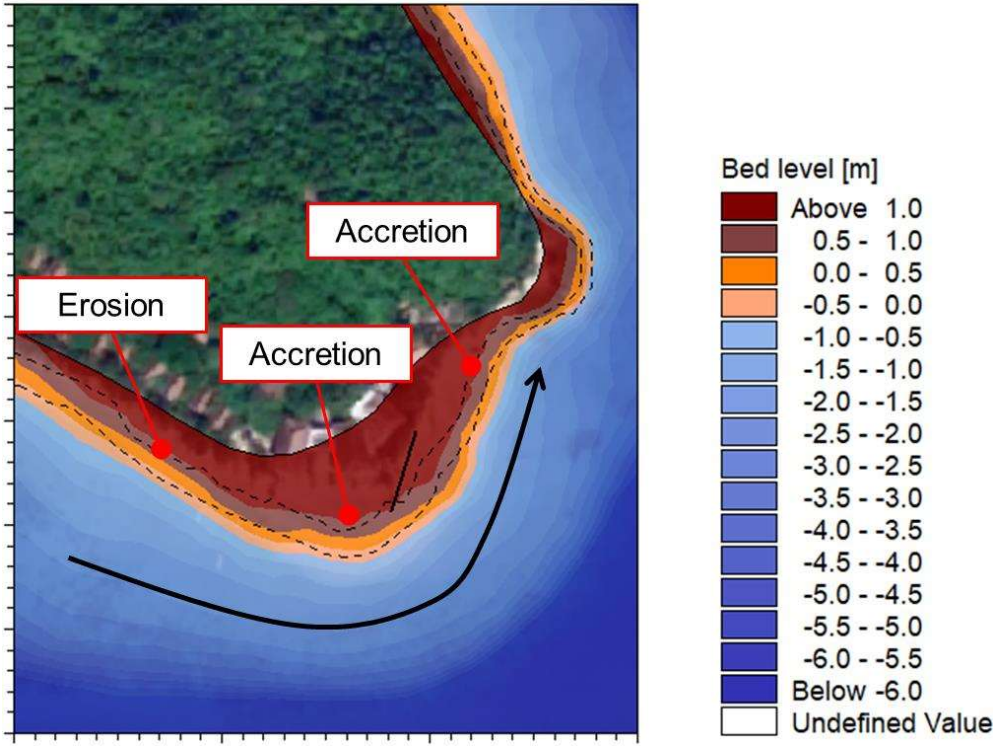

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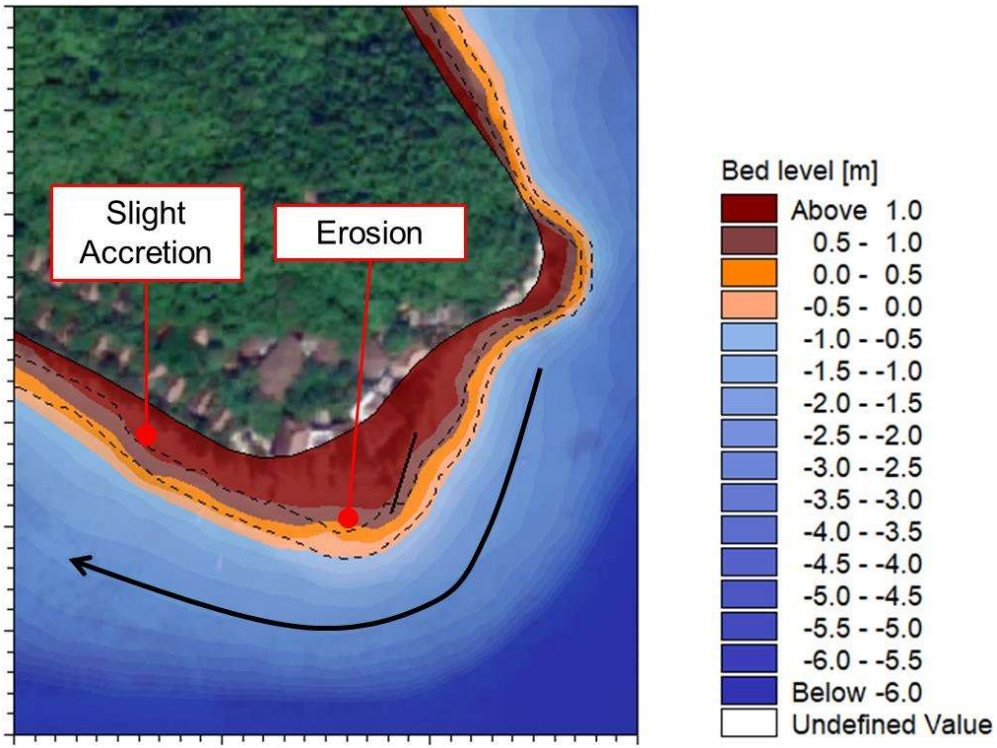


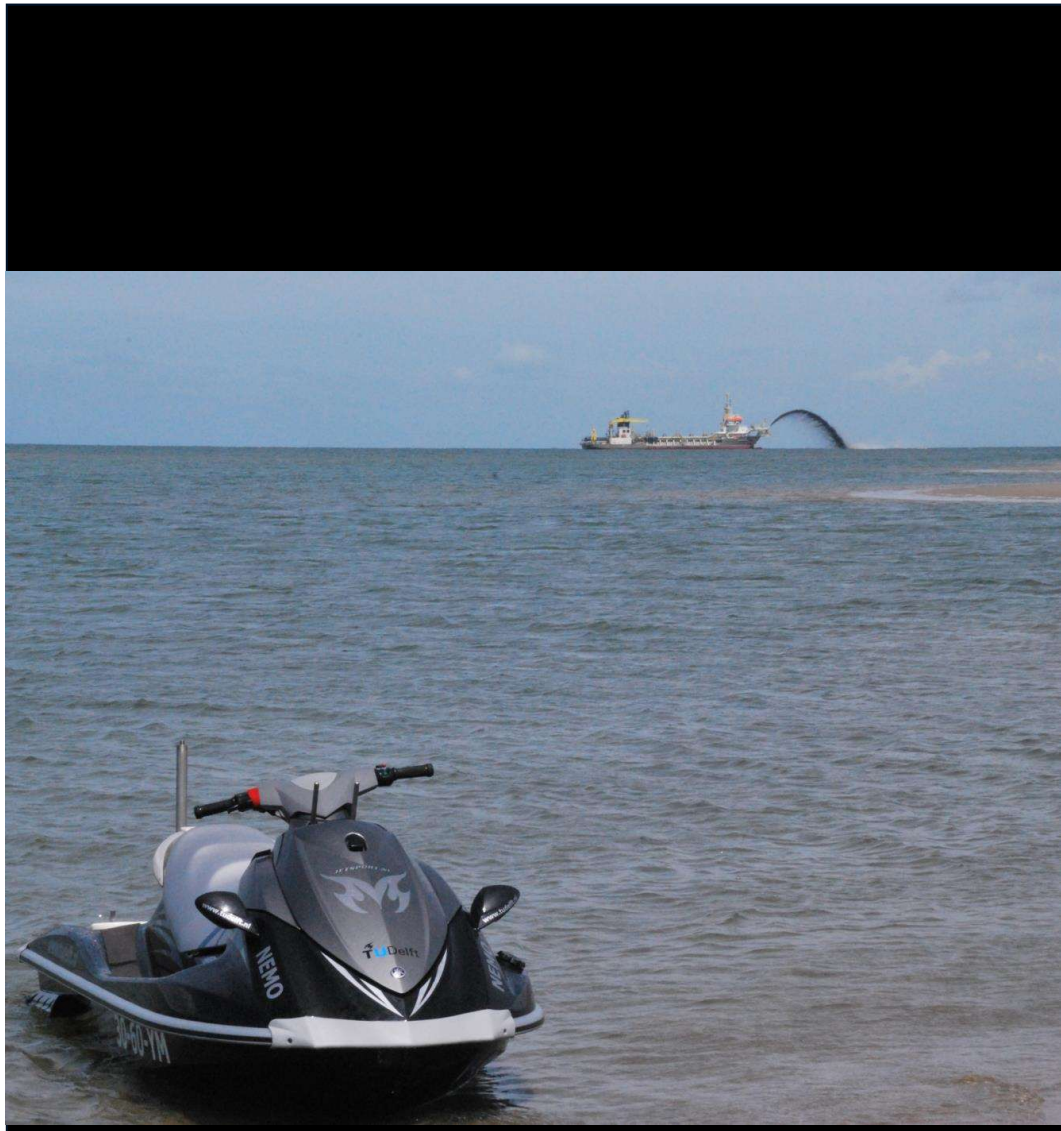
Summary

→ So, what have we learnt?

Lessons learnt

- Work **with** Nature
- Alignment with UN SDGs
- Baseline understanding (geology, contamination, coastal, marine ecology/biology, habitat)
- Certainty
- Environment impact (good or bad)
- Community engagement and consultation
- Risk sharing/acceptance
- Measure of success & trigger levels
- Leadership and commitment

↳ *Creating lasting community benefit*



* Thank You

→ ghd.com