

Making the invisible visible: the nature of sand is to move

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WHAKAPAPA

Nan



Rahera Te Kakahu
Kamoko Tamaki-te-Uru
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← Matengauroa Tuhiwai

Kate Dunn

← Maria Sheridan

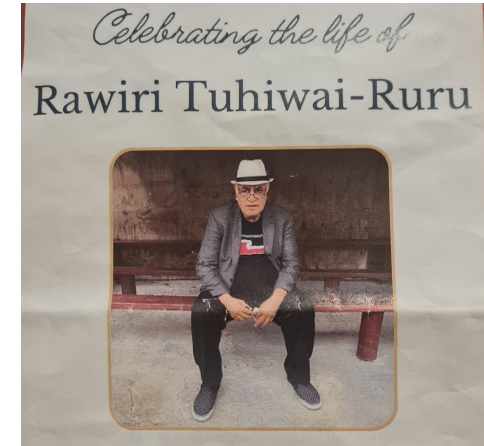
Sunset: 3.1.25



Māmā



Tuakana



Sunset: 15.8.24



Sunset: 1.2.25

Introduction

- 1... The (sandy) shoreline
- 2... Nature of sand – to move
- 3... Invisible side of sand movement



**Nature's
genius
design!**

The sandy shoreline

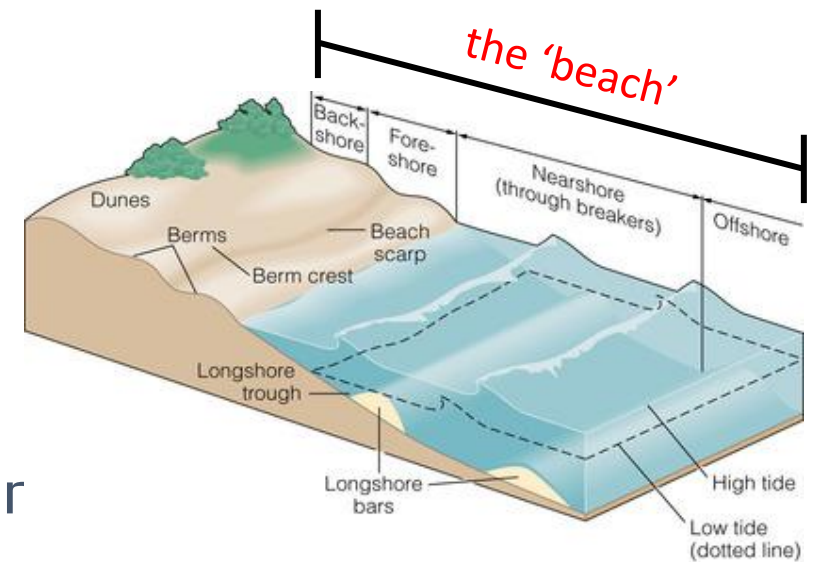
Coastal science 'beach' definition:

Dynamic & unstable: ever changing

Collision zone, cutting edge of ocean

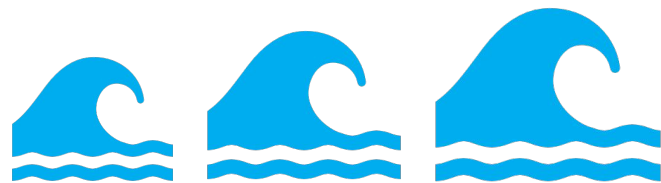
> Waves = energy = always arriving at shoreline

> Breaking waves = tremendous energy

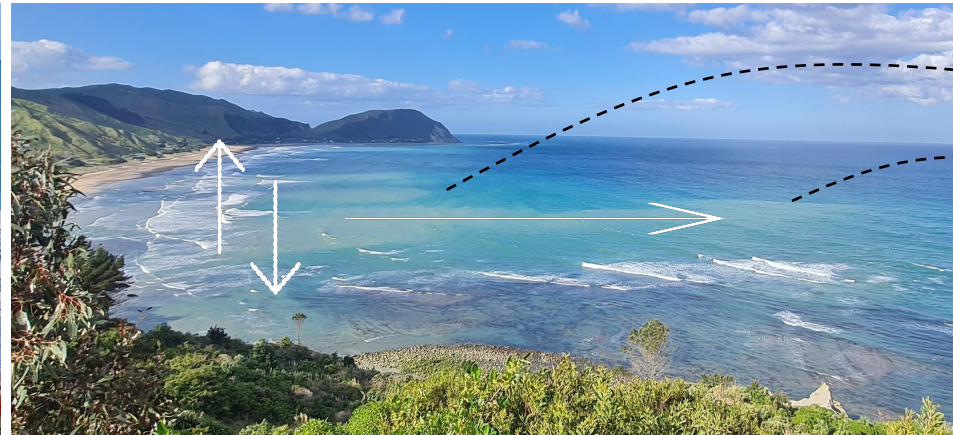
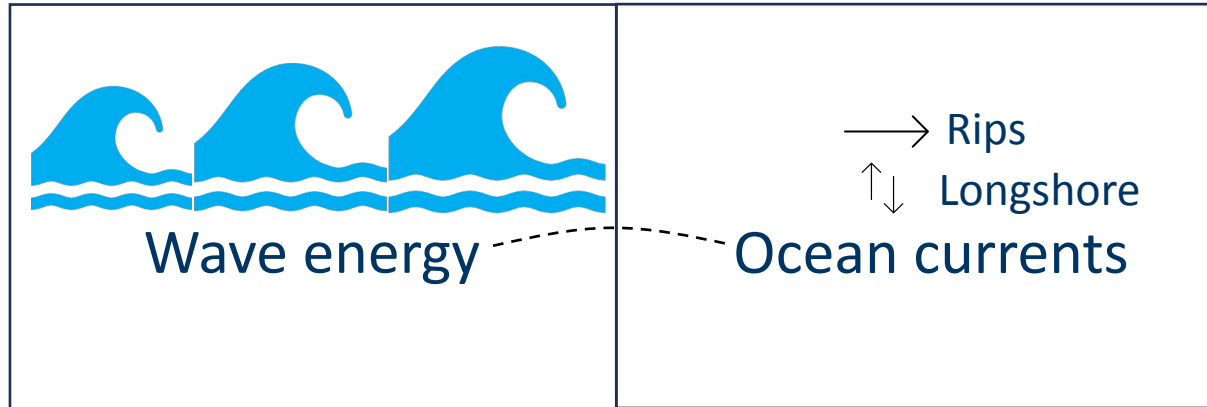


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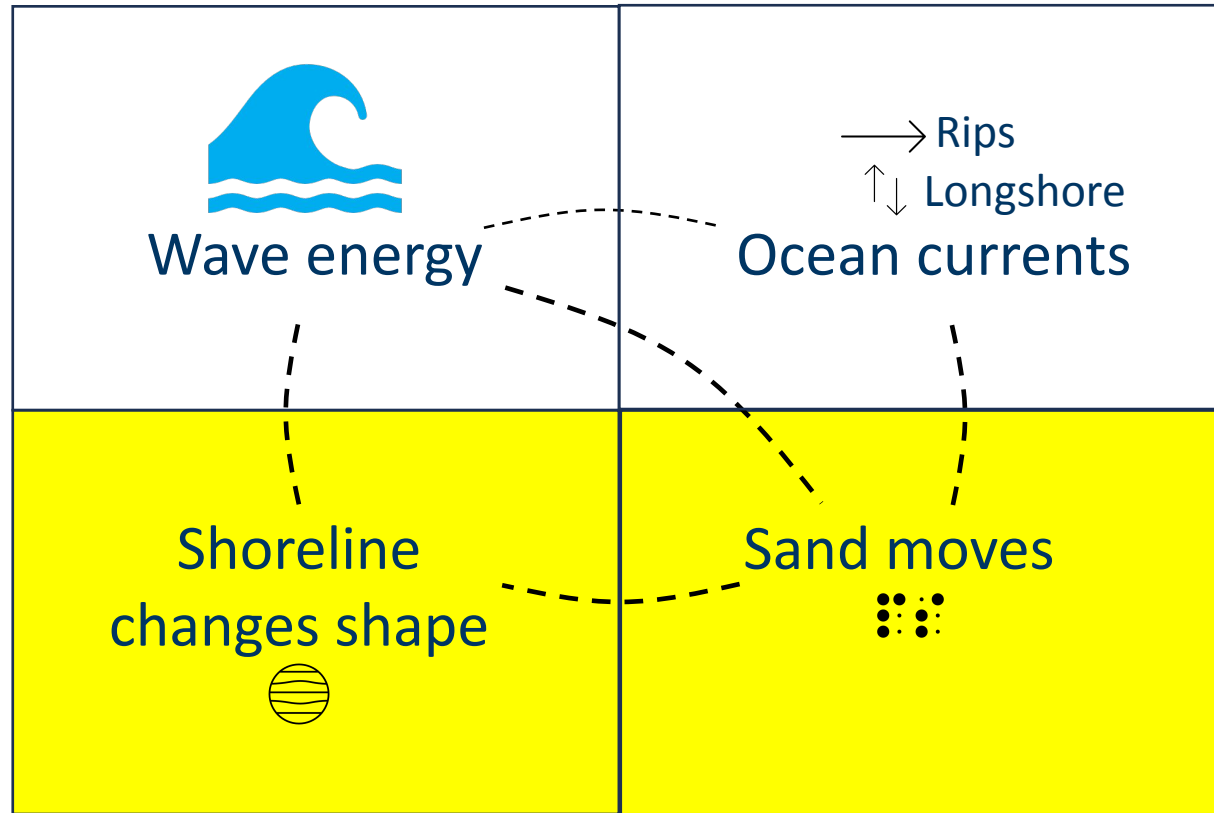
Dunes, berm, nearshore and offshore zone is the 'beach'



Wave energy at the shoreline

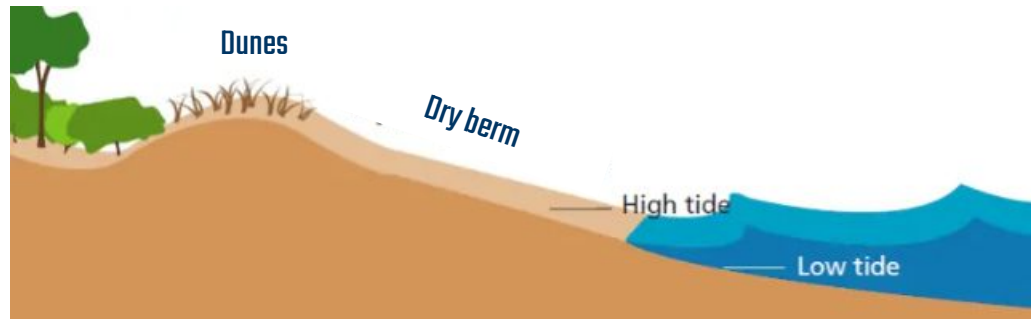


Wave energy moves sand

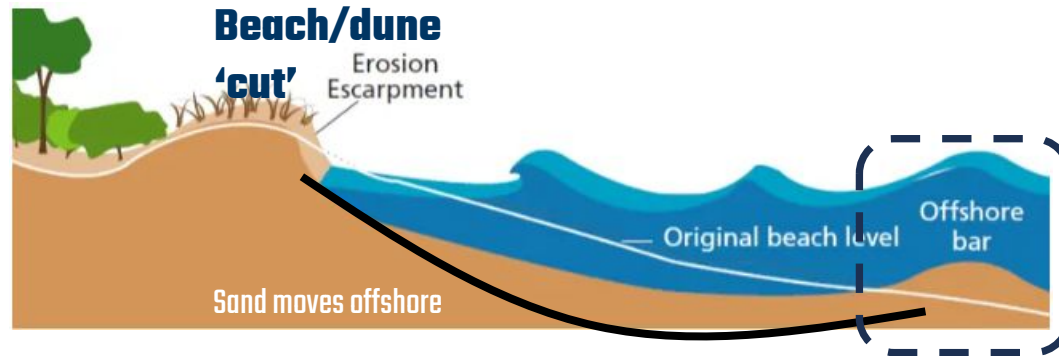


Sand moves strategically

Normal beach profile:



During storm events:



Nature's genius design!

Shoreline/beach changes shape: berm goes, bar forms offshore

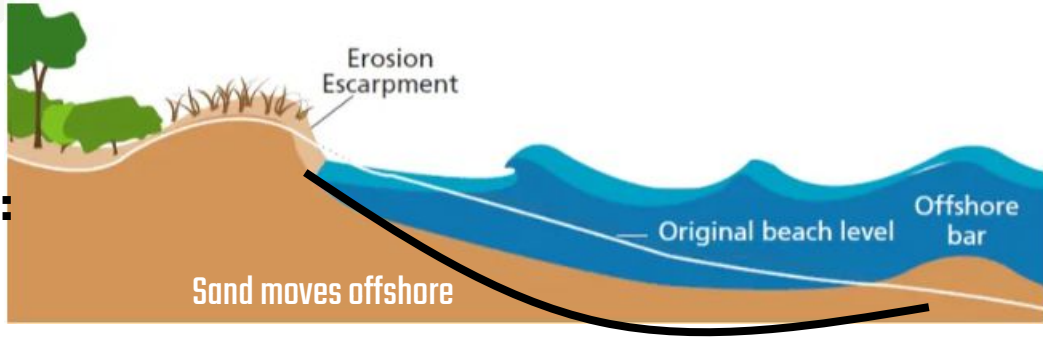
- Berm profile to bar profile
- Dry sand storage to wet underwater storage

Why?

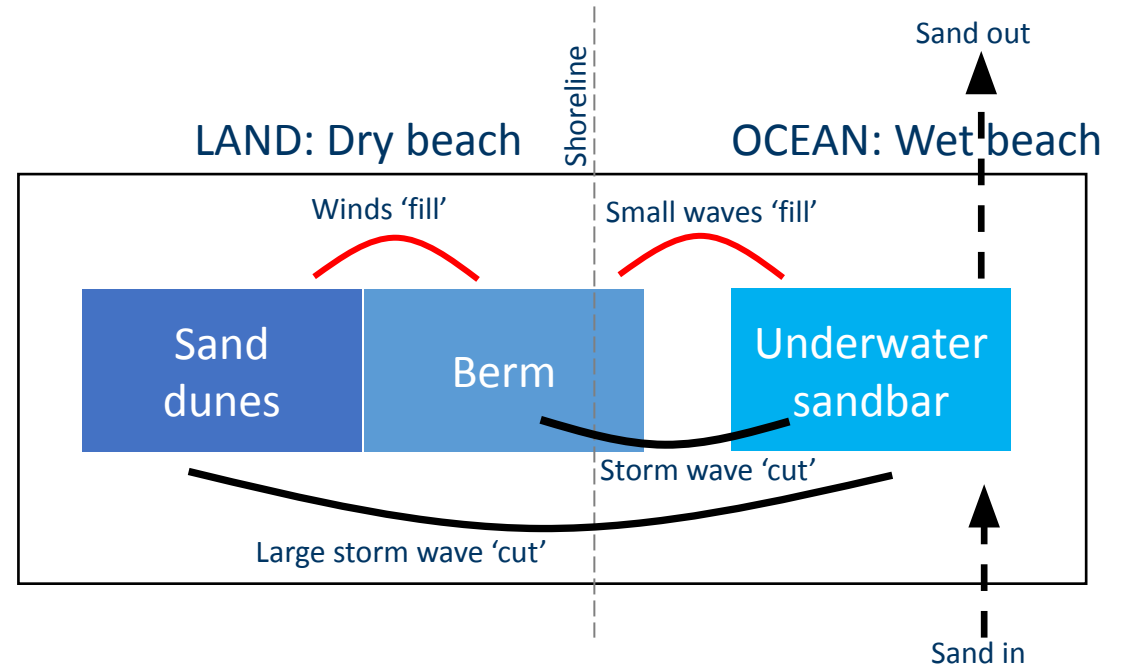
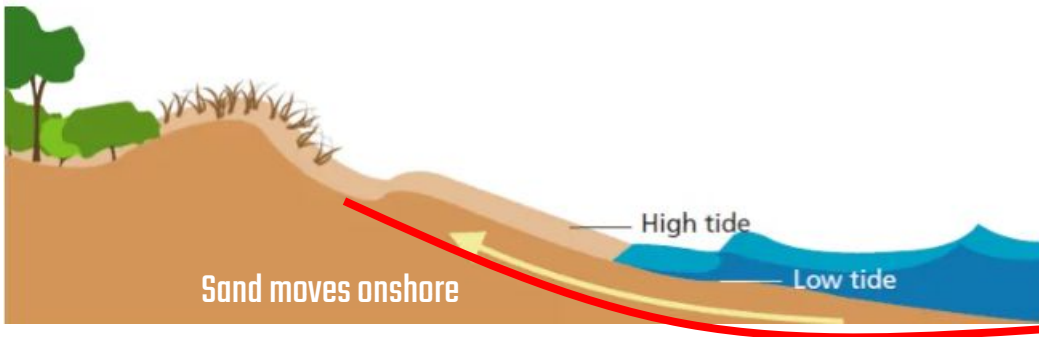
- > Bar breaks waves (max wave energy at sea)
- > Widening of dune/berm area for wave energy dissipation

Sand moves strategically

With large waves:

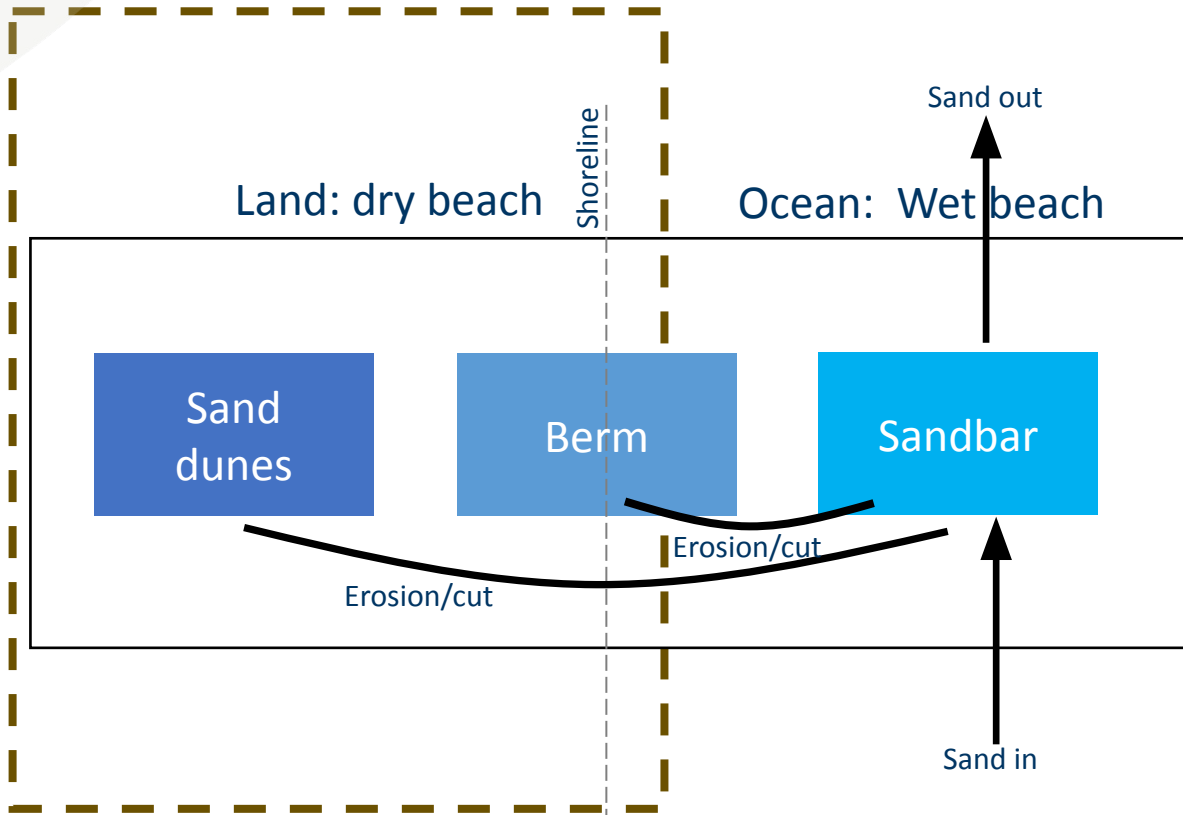


After storm events:

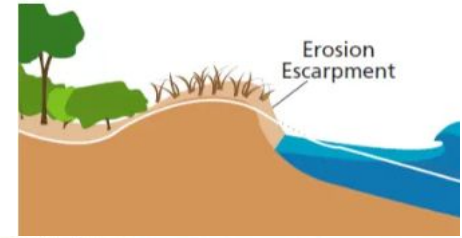


There is post-storm sand return too!
Nature's genius design!

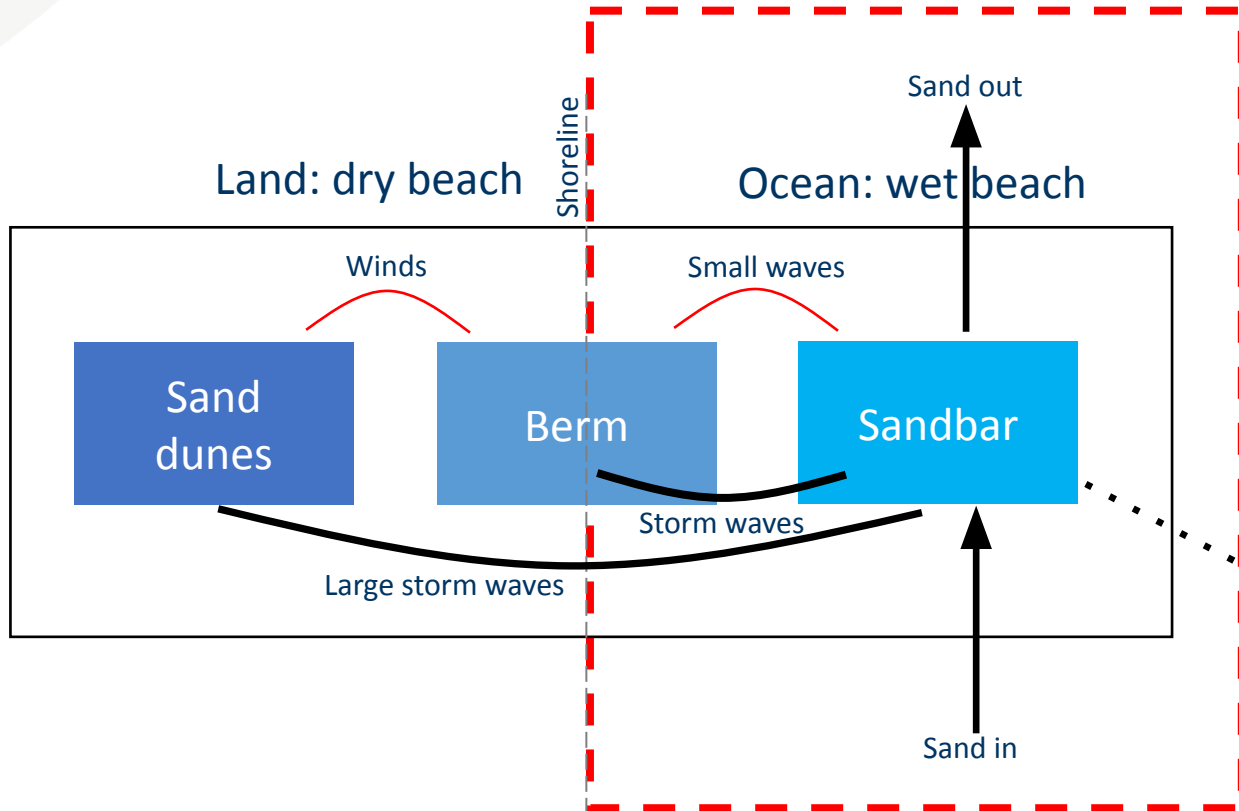
Some sand movement is visible



**VISIBLE SAND
MOVEMENT**
Erosion features



Most sand movement is invisible

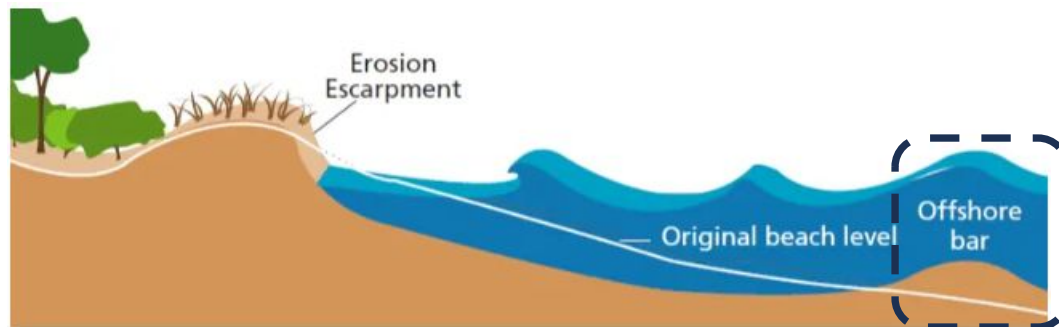
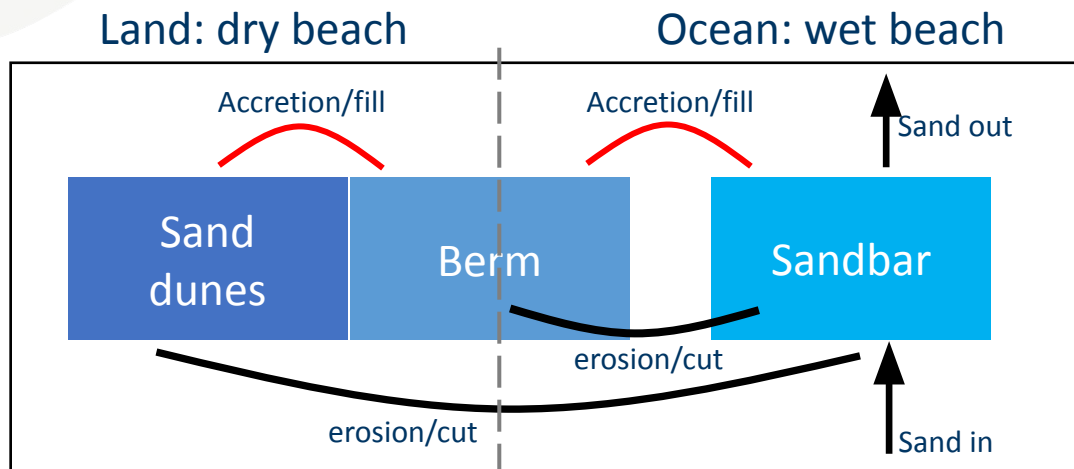


INVISIBLE SAND MOVEMENT

(or 'seen' with a trained eye)



Sand is meant to move



Beach/dune cut & fill cycle:

Dune & berm erosion (cut):

- to create offshore sandbar to break waves
- Sandbar = **surfbreak** (for sand bottom beaches)

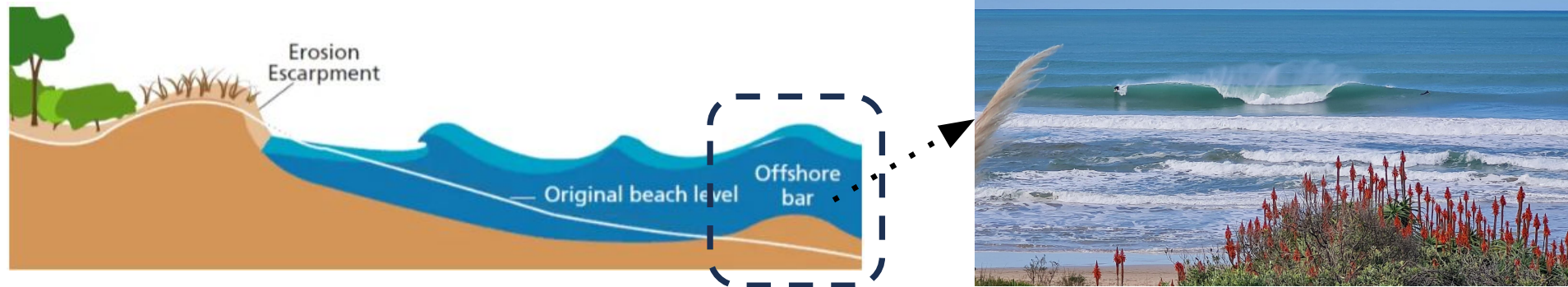
Dune & berm accretion (fill):

- Sandbar breaks down and sand returns to beach (waves) and then the dunes (wind)
- Fill material may not return to the same place (due to alongshore sand movement)

Sand is meant to move

Rachel Carson ...nearly 50 years ago:

“See nature as a system of processes rather than static conditions”



The preservation of beaches/dunes AND the protection of coastal properties require an understanding of **coastal processes** - Paul Komar

