



Formation and Functions of Beaches and Sand Dunes



In partnership with...



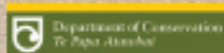
Western Bay of Plenty District Council



Tauranga City



Opotiki District Council



Department of Conservation
Te Papa Ataturu

working together to care for our coast



Coast Care
BOP
Programme

Coast Care Information Brochure Number 2

To understand the development of coastal land areas we need to look back in time. Between 17,000 and 7,000 years ago melting ice caused sea levels to rise. Large amounts of sand moved onshore and alongshore to build barrier spits and dune ridge sequences. This deposit, referred to as the Holocene barrier, generally ceased developing about 2,000 years ago when the transport of sand from the continental shelf ceased. This barrier system has assumed increased importance to hundreds of coastal residents, as this is the buffer that now protects their properties from the sea.

Coastal Processes

Most of Bay of Plenty beaches and dune sands have been derived from rivers draining high country areas, like the Rotorua-Taupo volcanic zones.

Wind, waves, currents, tides and floods (coastal processes) influence the distribution of sediments and thus the shape of the coastline. Along the Bay of Plenty coast line, tectonic warping or plate tectonic movements, have also influenced the formation of coastal lands.

Wind, the primary source, generates waves which can cause direct changes to the coast line by:

- Stirring up sand from the seabed;
- Creating currents, and
- Eroding or building up beaches and dunes depending on the wave conditions.

The combination of waves and currents can move large volumes of sediment in various directions:

- Onshore under the direct actions of waves,
- Offshore by rip currents, and
- Along shore by longshore currents.

Beach changes are cyclical in nature:

- Storm waves move significant quantities of sand from the beach and dune to build offshore storm bars (erosion).
- Subsequent calm weather produces onshore movement of the sand to re-establish the volume of sand on the beach (accretion), and
- Prevailing onshore winds blow sand back into a dune system where it can be trapped by surface vegetation, if plant cover is adequate (i.e. dune rebuilding).

The short term fluctuations of the shoreline are often very large and may mask the long term accretion or recession.



As there is little additional sand being fed to the coast, only a finite amount of sand is available to form beaches and dunes, meaning our beaches are in a state of “dynamic equilibrium”. Many of the dunes along the Bay of Plenty coastline have been damaged by human activity and then modified by wind action forming transgressive blowout, and parabolic dunes, resulting in sand being permanently lost from the beach system.

Ever Changing Beaches and Dunes

Storm erosion

- During coastal storms, waves cut the beach and frontal dunes, moving sand offshore.

Rebuilding the beach

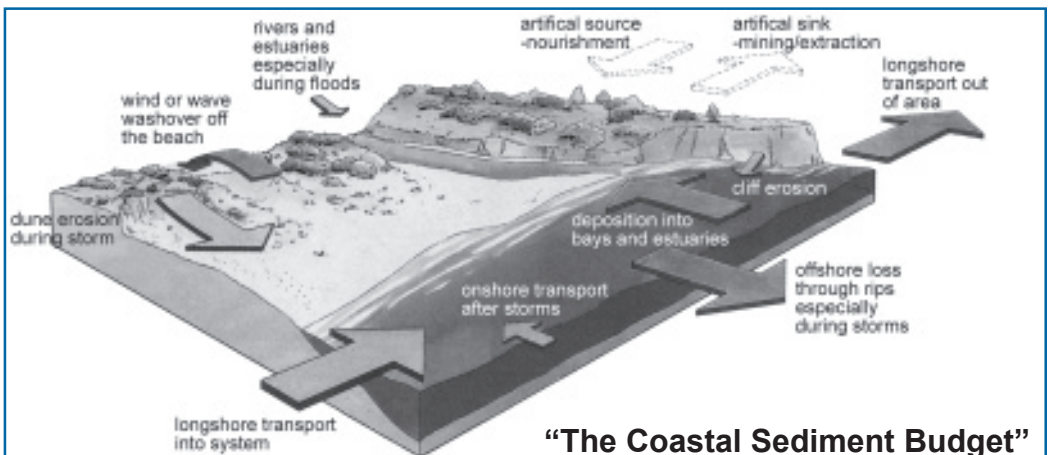
- During calmer conditions, sand is moved back onshore by waves, building up the beach.

Dune repair

- Prevailing onshore winds blow dry beach sand landward, where it is trapped by dune vegetation, particularly the native sand binding grasses spinifex (*Spinifex sericeus*) and pingao (*Desmoschoenus spiralis*).

The dune steadily builds up as these plants trap the wind blown sand. Gradually the plants become buried and grow up through the sand, continuing to trap sand as they do so. Over time the eroded dune is repaired.

This natural process of dune repair has maintained coastal dunes over centuries despite episodes of severe coastal erosion.



In Summary

Coastal erosion is a natural process-beaches naturally come and go.

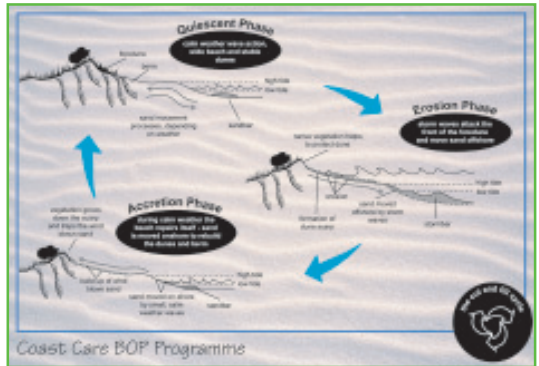
- Dunes are our protection from coastal erosion and flooding.
- If we protect the native dune plants, dunes and beaches will recover and rebuild after storms.
- Use beach access ways wherever possible.

And remember:

No plants = no dunes

No dunes = no beach

No beach = no fun!



Titles in this information series are:

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| No. 1 | Bay of Plenty Coast Care | No. 7 | Control of Vehicle Damage in Sand |
| No. 2 | Formation and Functions of | | Dunes |
| | Beaches and Sand Dunes | No. 8 | Sand Ladders - Getting you to the |
| No. 3 | Foredune Vegetation | | Beach |
| No. 4 | Dune Usage | No. 9 | Backyard Buffers |
| No. 5 | Coastal Plants - Pingao | No. 10 | Coast Care Code |
| No. 6 | Coastal Plants - Spinifex | | |

Contact

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