



Understanding (and enjoying) Storm cut erosion and recovery

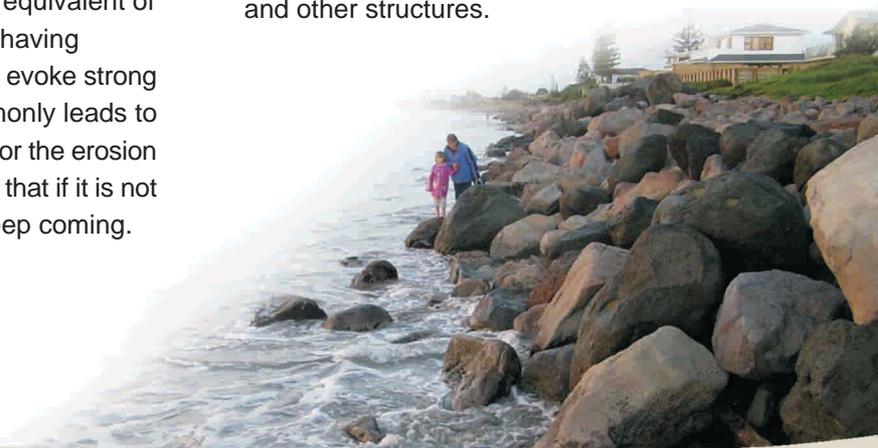
Wow!! ... what on earth is going on here?

Storm cut erosion is probably the most widespread and impressive natural process operating on the sandy beaches of the New Zealand coastline.

In just a few hours, it can radically reshape beaches, lowering beach levels and seriously eroding dunes. The result is towering vertical cliffs of sand where a gently sloping vegetated dune previously existed and the equivalent of hundreds of truck loads of sand having disappeared from sight. This can evoke strong emotions and even fear. It commonly leads to demands to “do something” and for the erosion to be “controlled”. The concern is that if it is not “stopped” the erosion will just keep coming.

This misunderstanding commonly leads to the placement of rock and other seawalls. These structures can seriously degrade the values of popular recreational beaches.

This article explains the natural process of **storm cut erosion and recovery** and how best to live with this natural process and avoid the need to cover our beaches with rock walls and other structures.

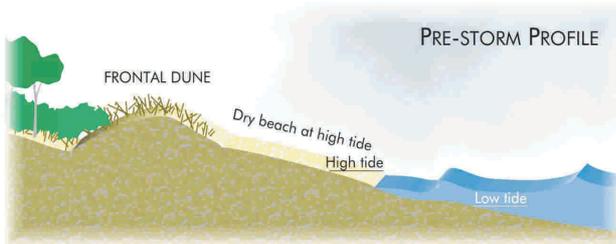




STORM CUT AND RECOVERY

Storm cut and recovery is not abnormal - it is a natural process that characterises virtually every sandy beach on ocean shorelines around New Zealand. The following diagrams provide a simple overview of the process.

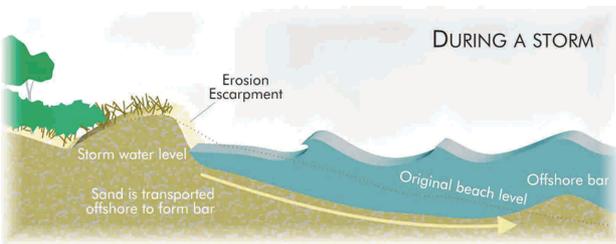
1. Before the storm



This is a sandy beach as we like to see it – a nice wide high tide beach backed by a gently sloping and well

vegetated sand dune. If the dune is in natural condition, the vegetation on the seaward face will be dominated by the native sand trapping species spinifex (*Spinifex sericeus*) and pingao (*Ficinia spiralis*). The importance of these species is discussed further below (see also Dune Restoration Trust Technical Handbook Section 7). This is what we think of as “normal”, the way things should be ... but a beach has many other moods!

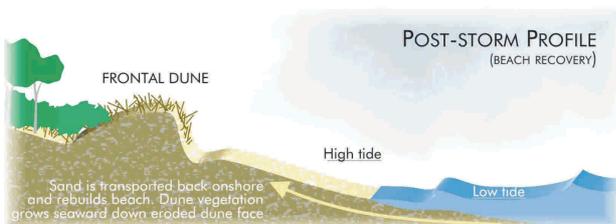
2. During a storm



During major storms, large waves occur. The beach has to change to adapt to this increased energy. Sea levels

are also elevated above predicted tides by storm surge and other effects, enabling the waves to extend further landward. The waves lower the beach and erode the dune behind. Sand eroded from both the beach and the dune is transported offshore and deposited as a bar. The lowering of the beach and the deposition of sand offshore creates a wide shallow platform - which helps dissipate the increased wave energy which occurs during storms.

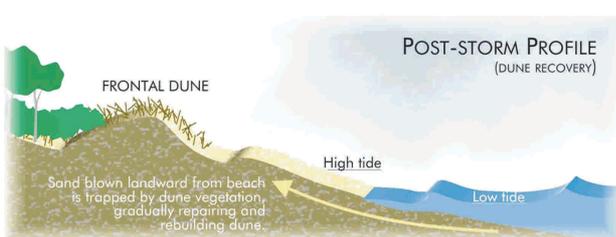
3. After the storm (first few weeks) – beach recovery



Over a period of weeks (and sometimes months) after

the storm, more gentle waves gradually return the eroded sand from offshore back to the beach. This restores a high tide beach. If the dune has a good cover of spinifex and pingao behind the eroded dune face, this sand trapping vegetation begins to extend down the dune face. The steep dune face will also gradually collapse to a more gentle angle.

4. After the storm (longer term) – dune recovery



As the native sand trapping vegetation grows down the seaward dune face, it slows the wind close to the ground.

This reduces the amount of sand the wind can carry – so large volumes of sand carried in the wind drop out and are trapped by the plants. This natural sand trapping process gradually builds and repairs the dune. This natural dune repair is critically dependent on having appropriate native sand trapping species. The plants do not stop erosion (no vegetation can do this) – their importance lies in natural repair of the dune after the storm.



Placement of rocks and other seawalls to combat erosion can seriously degrade the values of popular recreational beaches and even the loss of a sandy beach at high tide.



Evidence of natural storm damage where a cover of native sand binders will trap wind-blown sand naturally repairing the eroded foredune.

Natural cycles

The most significant shoreline fluctuations associated with storm cut and recovery often occur over periods of decades, rather than years. Dune erosion can accumulate over periods of years during climate cycles with a higher incidence of coastal storms. Similarly, dune recovery can accumulate over years during periods with a relatively low incidence of storms. Such multi-decadal cycles of storm cut and recovery are particularly notable on the east coast of the North Island.

So, how do we best live with the natural cycle of storm cut and recovery?

Most New Zealanders do not want to have to cover our high value recreational beaches with rock seawalls. So, how do we avoid this? The three critical factors are:

1. The critical requirement is a sufficient width of dune between coastal development and

the sea to absorb the dynamic shoreline fluctuations associated with storm cut and recovery.

The width of dune required varies from place to place and requires expert assessment. However, many councils now have coastal setback lines defining this high risk area, with regulations to ensure that new houses and roads are kept out of the area.

2. The second critical factor is to ensure the protective dune has a good cover of native sand trapping vegetation, particularly spinifex and pingao on the seaward dune face. The native sand binders are very effective at trapping sand and naturally repair dunes after erosion.

3. The final factor is to understand what is happening. Storm cut erosion and recovery is a natural cycle, it is not abnormal. The cycle is in fact critical to many of the things we value about beaches, but that is another story!





Evidence of the natural state of storm damage and recovery.



A recently formed stormcut where the seaward toe of the foredune has been eroded away leaving the native sandbinders trailing over the scarp.



Spinifex and pingao continue to extend down the collapsing steep dune face trapping wind-blown sand.



Eventually a more gently sloping dune is formed.

CONCLUSIONS

In summary, with storm cut erosion and recovery the shoreline is simply fluctuating backwards and forwards over time. Unless the beach is losing more sand than it gains (which is far rarer than we think), the erosion is not permanent. If you have all three factors in place at your beach ...

- sufficient dune width
- cover of native sand binders
- an understanding that storm cut and recovery is natural

... you can sit back and enjoy the natural spectacle of storm cut and recovery!

Other Technical Articles covering shorelines near rivers and tidal estuaries, shoreline recession (permanent erosion) and the potential impact of climate change can be found in the New Zealand Dunes Restoration Trust Technical Handbook, particularly Sections 2 and 4.



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Sustainable Management Fund

The Ministry for the Environment does not necessarily endorse or support the content of the publication in any way.

The mission of the Dunes Trust is:

'To see the majority of New Zealand dunes restored and sustainably managed using indigenous species by 2050'.