

Wind erosion management

Creating a resilient landscape for future generations

A guide for South East landholders on managing soils to prevent erosion

One of the greatest threats to land management in the South East is degradation through erosion. The top centimetre of soil is the most fertile and contains almost all of the soil's organic matter. Therefore any topsoil loss is the most expensive from an economic and production perspective.

In the short term, the loss of 1mm of soil represents a loss of 10-12 t/ha of actual soil. In cultivated sandy soils this loss can occur in as little as one minute when winds reach a speed of 75km/hr.

This can lead to losses in production through loss of nutrients, loss of grazing and cropping areas, sandblasting of crops and in the long term a reduction in property value and aesthetic appeal of the land.

There are two main types of erosion that can have an effect on the South East landscape:

- Wind Erosion
- Water Erosion

Wind erosion is the most significant contributor to soil erosion in the South East region with a total of 568,000 ha or 26%, of land area having an inherent susceptibility to erosion that is moderate or higher.

Due to the relatively flat landscape of the South East,

the inherent susceptibility to water erosion is generally low, with 62,000ha or 2.8%, of the land area having an inherent susceptibility that is moderate or higher.

Soil Erosion is a 3 step Process

1. Detachment

Breaking away of particles at the soil surface, common in soil with poor structure and low in organic matter.

2. Transportation

- *Surface Creep* - large particles that roll along the surface (>0.5mm)
- *Saltation* – skipping of particles across the soil surface (0.1-0.5mm)
- *Suspension* – particles that hold in the wind (smaller than 0.5mm)

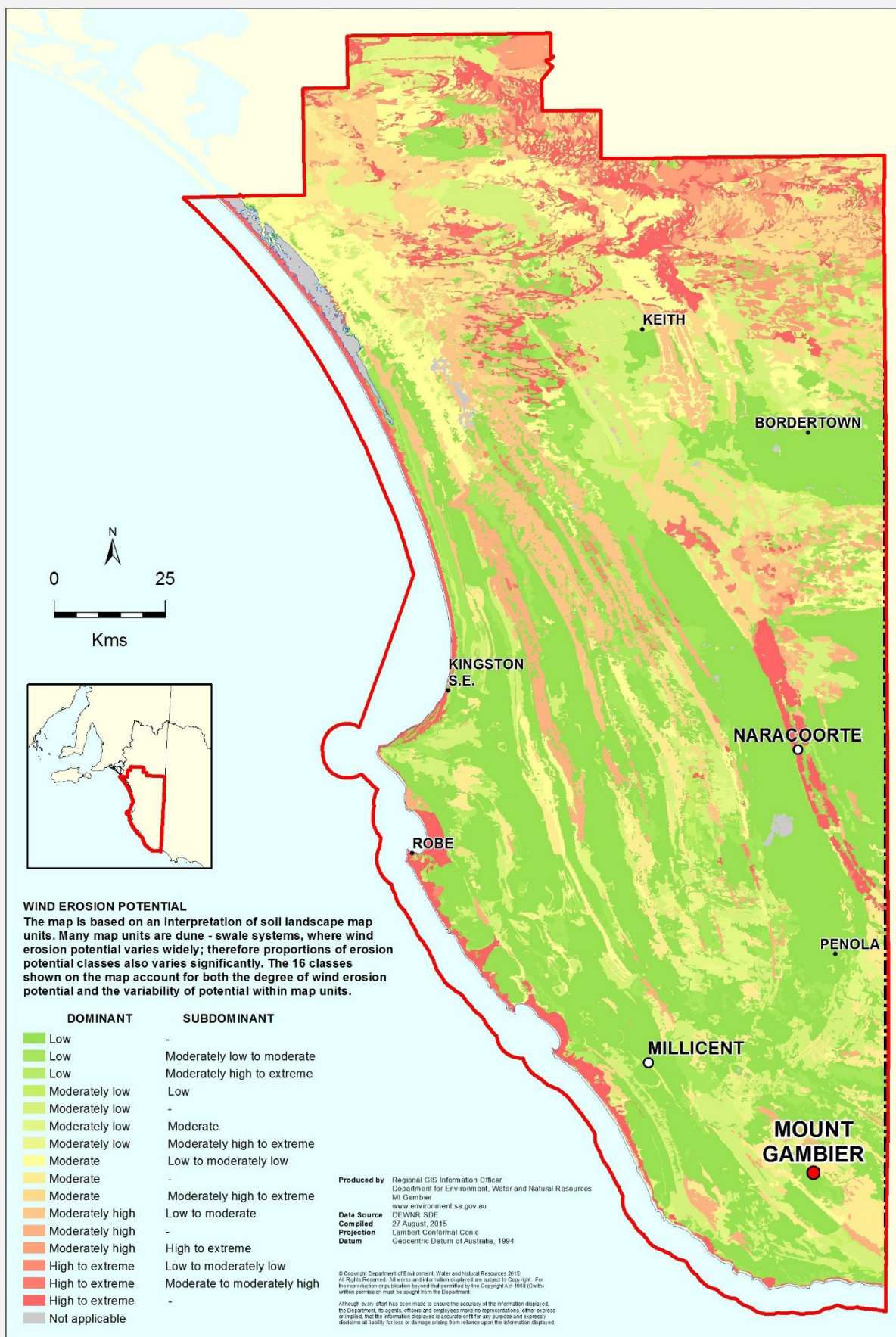
3. Deposition

When the wind or water energy that is transporting the particles stops and the particles come to rest. Deposition is very important as it has a large influence on common off site impacts of erosion, for example as sand build up against fences and treelines.



Figure 1: Drifting sands cause damage to fences and other infrastructure

SE Wind Erosion Potential



Why are our soils susceptible?

Soil type is one of the greatest influences over which land is susceptible to erosion. Due to the dunal system dominance across our landscape, the South East region has a high proportion of soils with a sandy surface texture and low organic matter, making them highly susceptible to erosion.

These susceptible areas are predominated by the coastal landscapes, dune flats, and range country, incorporating soil types of shallow sand over Limestone, deep sands, highly leached sands and the deep sand over clays.



Figure 3. Deep sands and dunes can be susceptible to wind erosion where vegetation cover has been removed.

Impacts & Cost of Wind Erosion

Wind erosion effects can most often be seen in the forms of drifted sands along fence lines, blow outs in sloping land, cliffs or undercutting in steep sided sand dunes, flats that have eroded to bed rock or clays subsoil and cultivated soils that have a smooth look to them.



Figure 4 High stock movement around gates and water points can exacerbate erosion problems through removing residue.

The costs associated with erosion can be both immediate and longer term in nature. Added to this are other problems that present associated costs as well.

In the short term the costs come from:

- Loss of production in affected areas
- Loss of topsoil and nutrient load
- Sandblasting of crops
- Wool contamination with sand
- Works associated with re-seeding and reworking

Further to this are the longer, ongoing costs associated with larger drifts. These include:

- Cost of replacement fencing
- Machinery costs of levelling or reshaping land
- Revegetation
- Clay spreading

Other problems that could also arise in the longer term are:

- High groundwater recharge
- Road maintenance and safety
- Human health issues
- Disputes with neighbours
- Drift over fences and roads
- Loss of aesthetic value
- Loss of property value

Managing Wind Erosion

Erosion risk is reduced by keeping a sufficient amount of crop or pasture residue on the soil surface. Residues help reduce the impact of raindrops hitting the soil, slow or deflect wind away from the soil surface and help trap or bind soil particles so they are less easily blown or washed away. The area of soil covered is more important than the weight of the residue.

It is important that some cover is anchored to prevent the loose material blowing away, this cover should preferably be standing for greater wind erosion protection.

A guide to the minimum and desired soil cover is shown below in table 1. These levels will not completely stop erosion in high winds but will provide soil protection under most conditions.

Soil Type	Minimum Cover		Desirable Cover	
	%	t/ha	%	t/ha
Loam	15	0.5	35	1.0
Sandy Loam	20	0.6	50	1.5
Sands	50	1.5	70	2.5

(DWLBC 2008)

Table 1. Surface cover to protect soil from wind erosion



Figure 5. Permanent cover on deep sands can prevent Erosion

Managing contributing factors to wind erosion

Wind erosion is a natural process, but certain agricultural practices can accelerate and exacerbate the problem. The aim in managing erosion is to minimise or avoid the activities that can lead to higher rates of residue breakdown.

There are a number of common causes of trash cover removal and breakdown including:

- Over grazing / high stocking rates
- Cultivation / over working of land
- Grazing too heavily at the wrong time of year
- Inappropriate herbicide use or overuse
- Heavy stock traffic rates at gates / water points
- Poor planning / location of water troughs, fences etc.
- Burning of stubble
- Drought / climatic conditions
- Old farming practices and machinery
- Pest animals eg. rabbits
- Not farming to land capability

There are a number of ways to manage these causes including:

- Planning and grazing to land capacity
- Using No Till farming practices
- Adopting confinement feeding in dry years
- Moving gates and watering points to heavier ground
- Controlling pest animals and plants
- Calculating both dry and wet year DSE's for the farm
- Retaining enough crop residue for 50% ground cover if turning stock onto failed crops.
- Fencing susceptible areas for stock exclusion
- Matching pasture to soil type and climate

Managing erosion once it has occurred

Stabilising erosion once it takes place is a process that requires planning and careful management to achieve the desired outcomes.

Step 1

The first priority to managing the site is to exclude stock; this can be done through permanent or temporary fencing.

Step 2

Levelling or reshaping the site - it is important to remove the edges off blow outs and flatten or reshape the site to avoid the wind cutting deeper into the sands in the case of blow outs.

Step 3

Re-establishing cover on the site on small blow outs or drifts can be done by a simple physical barrier. Examples include straw bales, hessian, weed matting, branches, or any other physical barrier that will prevent wind affecting the soil surface.

On larger areas, such as drifting sand hills, it can be quite costly to cover the surface with artificial barriers. The best option in this situation is to clay spread the affected areas to form a cover on the sand.

Step 4

Re-establishing pasture - this is done at the break of the next season and with a crop such as cereal rye with perennial pasture seed mixed in. The cereal rye is relatively cheap and easy to establish in lower rainfall conditions and will protect emerging long term pasture as it establishes.

References

DWLBC (2008) Surface Cover protection against wind and water erosion.

Natural Resources Management Board (2010), Wind Erosion in the South East NRM Board Northern Group Area

Acknowledgments

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