

SOIL EROSION

PRACTICAL TIPS ON HOW TO PREVENT AND MANAGE THE LOSS OF SOIL

Types of soil erosion

Various forms of soil erosion can be distinguished depending on the causal factors and soil response to them. The three most common forms found within the eThekweni Municipal Area (EMA) are:



- **Sheet erosion.** This is the loss of a thin layer of topsoil over large areas by wind and water action. It is usually characteristic of gentle gradients and sparsely vegetated terrain.



- **Rill erosion.** Rills are small channels caused by rapid water run-off. If left unchecked they can develop into large erosion gullies.



- **Gully erosion.** Often called “dongas”, gullies are deep and often wide channels that can waste to large areas of land.

Soil erosion weak spots

Soil erosion results from a variety of factors, including the following:

- Steep gradients and drainage lines.
- Areas in the immediate proximity to footpaths, dirt tracks, borrow pits, poorly constructed stormwater drain outlets and cleared areas.
- Areas of weak vegetation growth due to overgrazing or too frequent, uncontrolled fires.
- Areas laid bare by the improper removal of invasive alien plants.
- Fine, silty or clay soils that naturally have a low infiltration rate.

Reducing soil erosion

The following guidelines should be followed to reduce the risk of soil erosion.

- Management burns should be kept to a frequency of once every two years.
- If introducing game, ensure that the land size is large enough. Locate artificial feeding troughs and water holes away from soil erosion weak spots.
- Never overstock, and ensure that vegetation is suitable for game introduction prior to applying for introduction permits.
- When keeping horses, ensure that your land is large enough to sustain them. When kept on grassland paddocks, rotate them frequently or they can over-graze and trample vegetation, leaving an erodable dust bowl.
- Keep all off-road vehicles on properly constructed tracks and roads and avoid riding them through the veld, and up and down slopes.
- Pathways and access tracks should be planned to follow natural contours as far as possible.
- All service roads, driveways, etc. should be properly cambered and have an efficient drainage system.
- Stormwater drainage should be designed so that flow velocity is reduced and volume is dispersed evenly over a large, well vegetated area so as to increase soil infiltration and reduce water run-off.
- Embankments created during cut-and-fill excavation should be swiftly vegetated. Grass species with a vigorous root growth, such as Cottonwool Grass (*Imperata cylindrica*), are more efficient at binding the soil than decorative ground covers that are slower growing.
- When felling alien trees on slopes, ensure that they are felled horizontally across the slope. Those felled vertically or diagonally can channel water run-off, which can create gullies.
- When eradicating dense stands of invasive alien plants on slopes and steep areas, always work along contours and employ the practice of cutting swaths, leaving intermediary hedgerows which can be removed once the treated swaths have rehabilitated sufficiently to protect the topsoil. Create barrier lines on bare areas with the cut brushwood. This will slow down water run-off and reduce scouring.



Soil erosion caused by the irresponsible use of off-road motorbikes.

Reclaiming eroded areas

Three basic principles always apply when planning a reclamation and/or rehabilitation programme. These are:

- Slow down the velocity of water run-off. This will reduce the scouring effect of water flow.
- Disperse the water flow so that infiltration is increased and run-off is decreased.
- Revegetate as soon as possible with appropriate indigenous vegetation.

Water run-off dispersal and velocity can be managed with the use of physical barriers, the most commonly used are called barrier lines. Barrier lines can be made from various commonly available materials such as logs, brushwood, rocks and pebbles, straw bales, old car tyres and bamboo poles. Concrete barriers, Reno Mattresses, gabion baskets and geo-textiles may also be used, but they can be costly. If purchased gum poles are used, avoid using those that have been chemically treated as this may retard the re-vegetation process.

Using barrier lines to control RILL EROSION on embankments

- Logs or bamboo poles are recommended. Barrier lines should extend horizontally into areas where there is adequate vegetation. Poles should be laid in trenches dug to a depth of roughly a third of their diameter or buried to a depth lower than any emerging rills so as to create an efficient barrier. Merely placing barriers on the soil surface will result in water eroding underneath them. Knocking pegs into the ground on either side and binding them tightly with fencing wire will ensure that they remain in place.
- Vertical distance between each barrier line will vary depending on the size of the area to be rehabilitated. They can be at intervals from between 0.5 m to 3 m. It is strongly recommended that, if in doubt regarding this point, advice is sought from someone experienced in land management practices.



Barrier lines being placed across slope.

Denuded, flat or gently sloping areas which have developed a hard crust on the surface of the topsoil

- Dig small hollows about 500 mm x 500 mm into the topsoil at 1 m intervals.
- Use the removed soil to create a small berm on the down-slope part of the hollow.
- Fill each hollow with old straw or grass mulch which keeps the soil moist for longer and is an ideal seedbed for germinating pioneer plants and grasses.
- On areas too large to dig by hand, a tractor and disc plough with an elliptical guide-wheel can be used to achieve the same effect.

Reclaiming GULLIES

- On a network of erosion gullies, with clear points from where a number of gullies branch off, silt traps (some times known as plugs) must be constructed at the confluences. If the gully is long and deep, then silt traps can be laid across the gully floor at predetermined intervals.
- Steep gully sides should be retained by packing the walls with old straw or packs of twigs that are held in place by pinning scraps of old chicken wire, Bonnox or shade cloth over them.
- It is very important to conduct a thorough inspection of the state of the vegetation surrounding the gullies as the direction of the incision of a rill or gully will be backward from the widest part of the channel. It is, therefore, important to retain a healthy vegetation cover around these areas.

Grasses suitable for rehabilitation work

Appropriate grass species should:

- be indigenous to the area,
- be hardy, and
- have good stolon or rhizome growth.

Grasses commonly found in the EMA that are suitable for rehabilitation due to their ability to grow in disturbed areas include:

- Ngongoni Bristle Grass (*Aristida junciformis*)
- Sickie Grass (*Ctenium concinnum*)
- Narrow-leaved Turpentine Grass (*Cymbopogon plurinodis*)
- Broad-leaved Turpentine Grass (*Cymbopogon excavatus*)
- Common Finger Grass (*Digitaria eriantha*)
- Silver Finger Grass (*Digitaria monodactyla*)
- Broad-leaved Bluestem (*Diheteropogon amplexens*)
- Thread-leaved Bluestem (*Diheteropogon filifolius*)
- Heart-seed Love Grass (*Eragrostis capensis*)
- Narrow Heart Love Grass (*Eragrostis racemosa*)
- Spear Grass (*Heteropogon contortus*)
- Common Thatching Grass (*Hyparrhenia hirta*)
- Cottonwool Grass (*Imperata cylindrica*)
- Broad-leaved Setaria (*Setaria megaphylla*)
- Black-seed Bristle Grass (*Setaria nigrirostris*)
- Ratstail Dropseed (*Sporobolus africanus*)
- Buffalo Turf Grass (*Stenotaphrum secundatum*)

It is advisable to plant two or three species together as some species will grow faster than others or be more suited to the specific condition of the area.

For more information or guidance on the above contact the following:

- Ezemvelo KZN Wildlife, mortyk@kznwildlife.com or 031 274 1150
- eThekweni Municipality Parks, Leisure and Cemeteries Department: Natural Resources Management Division, MkhwanaziSibusiso@durban.gov.za or 031 311 6717
- eThekweni Municipality Environmental Management Department pettersont@durban.gov.za or 031 311 7011
- Your local Conservancy