



STATE OF DEGRADATION (VEGETATION & LANDSCAPE) IN MKHAMBATHI NATURE RESERVES

A Diagnostic Report - 2016/17



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DEGRADATION

According to the United Nations International Strategy for Disaster Reduction, Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable. It occurs when earth's natural resources are depleted and the environment is compromised in the form of extinction of species, pollution of air, water and soil, and rapid growth in population. Environmental degradation is one of the largest threats that are being looked at in the world today.

CAUSES OF DEGRADATION

Environmental degradation can be caused either by anthropogenic/human-driven or natural factors. The common anthropogenic factors include fire, erosion and alien invasive species.

FIRE: Despite the importance of the fire in driving ecological successions of the certain habitats, wildfires damage the vegetation cover thereby leaving the land bare and prone to several hazards including invasion by exotic plant species taking advantage subsequent empty niches created. High-intensity fires associated with drought and massive fuel load from invasive plant species also have detrimental impacts on the soil health.

EROSION: Soil erosion occurs when the soil is moved from one point to other, either from the bare ground or areas still with vegetation cover. Whereas soil erosion is a continuous process and promotes shaping of the landscapes, high levels of soil erosion compromise the integrity of the environment since it creates dongas, changes hydrological properties of habitat as well as many other functions of the habitat. All these modifications have different complex feedback impacts often negative to rest of the habitat.

INVASIVE ALIEN PLANTS: Due to release from their natural enemies and thus limited competition with new species in the incipient environment, the alien plants' population proliferate and conquer the environment at different spatial scales. Their thick density stands have deleterious effects through increased abstraction of essential resources such as water and mineral salts for the native species. Other two mechanisms by which

alien plant species decimate native species include allelopathy and invasion melt-down. Allelopathy is a situation whereby toxic chemicals are either secreted or present in the falling leaf tissues – such chemicals kill native plants in the vicinity of the canopy of the plant while invasion melt-down entail synergistic effects of the different alien plant species that are occurring in the same environment. Because invasive alien plant species change the function of the habitat both the soils and ecological processes, they can be considered as a cause of degradation.

Natural causes of environmental degradation include changes in ecological/geological processes such as increased sediment deposition/removal resulting either information or destruction of new landscapes different from the original structures. Ecological successions can also change so much that a new plant species that was not historically dominant takes over. Both these changes have implications for habitat level integrity since they change structural functions of the environment.

IMPACTS OF DEGRADATION

Loss of Biodiversity: Biodiversity is important for maintaining the balance of the ecosystem in the form of combating pollution, restoring nutrients, protecting water sources and stabilising the climate. Deforestation, global warming, overpopulation and pollution are few of the major causes for loss of biodiversity.

The loss for Tourism Industry: The deterioration of environment can be a huge setback for the tourism industry that relies on tourists for their daily livelihood. Environmental damage in the form of loss of green cover, loss of biodiversity, huge landfills, increased air and water pollution can be a big turn-off for most of the tourists

Economic Impact: The huge cost that a country may have to borne due to environmental degradation can have a big economic impact in terms of restoration of green cover, cleaning up of landfills and protection of endangered species. The economic impact can also be in terms of loss of tourism industry.

TYPES OF DEGRADATION IN MKHAMBATHI NATURE RESERVE

VEGETATION DEGRADATION:

The observed vegetation in Mkhambathi Nature Reserve has been associated with competitive interactions between the grassland species and new species that are either invading the area or other local species that are gaining the edge because changing environmental conditions. For instance, some native species tended to displayed impacts of alien invasive species and this has resulted in allowing species such as Lantana to start invading the grassland (Fig. 1 a-f). These changes are a threat as they might change the nature and function of the

ecosystem. Two notorious native species have been identified namely: *Gnidia species* (hybrid) and Slangbos (*Seriphium plumosum*). The initial adaptive response of the conservation authority was to treat them with fire in order to establish how they will react. The fire was chosen since it is the important driver the grasslands successional changes. Currently, monitoring of the after fire recovery is in progress.

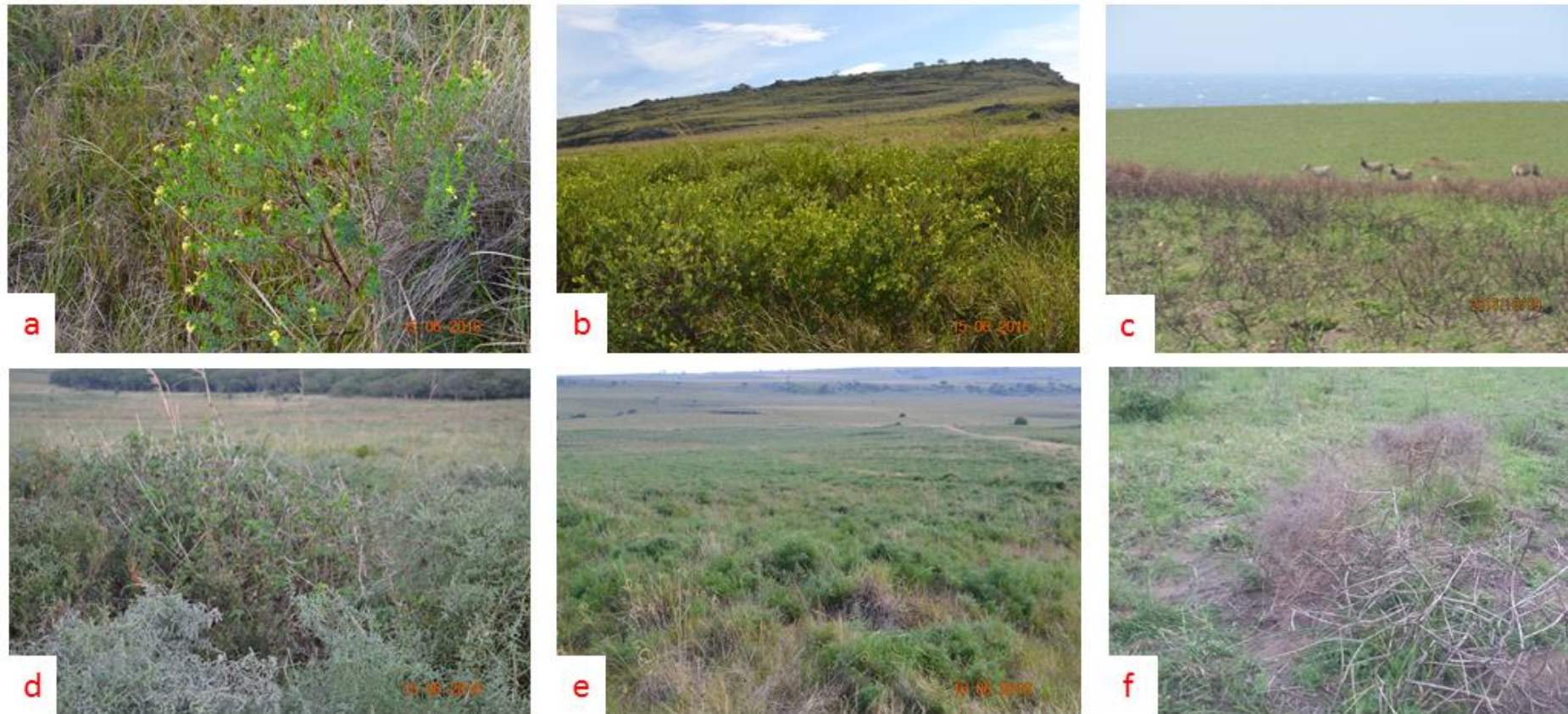


Figure 1. Causes of vegetation degradation: Image a, b & c show Yellow Bauhinia (*Gnidia triplinervis*) and the thickets it creates to eliminate grassland while image c shows the recovery after burn treatment; d, e & c Slangbos (*Seriphium plumosum*) eliminating grass species and allowing other invaders (e.g. *Lantana camara*) to take over the vegetation structure while image f shows the recovery after burn treatment

SOIL/LANDSCAPE DEGRADATION

Due runoff of water from along sides of the management roads in the reserve, several wetlands have been degraded through soil erosion (donga erosion). Water has been channelled to flow out to the wetland situated on a sloppy terrain (Figure 2 a, b & c). Because the channelled water gain speed and force, the flow has incised the wetland developing a huge donga require trenches to be built to rehabilitate the wetland and stop soil erosion. Addressing this problem also requires a structural change in the design of the water control furrows along the roads.



Figure 2. Wetland degradation caused by water runoff from roadside – donga erosion

Another case of degradation has been documented and the cause has been diagnosed to be natural. Heavy sediment deposition on the face of the wetland has led blocked the flow of the wetland water to flow in the ocean (Figure 3 a – h). Consequently, filling up of the water in the wetland led to change in the direction of flow of water of incised the ground deep enough to also lower the water table. Lowered water table led to vegetation degradation and soil erosion because roots of plants are short to reach water of which lead to dryness and absence of vegetation cover exposing soil. Addressing this problem requires rehabilitation of the wetland to return water table and stop soil erosion. Since it may be difficult to reverse the sediment deposition, the direction of the flow can be left towards a new direction.

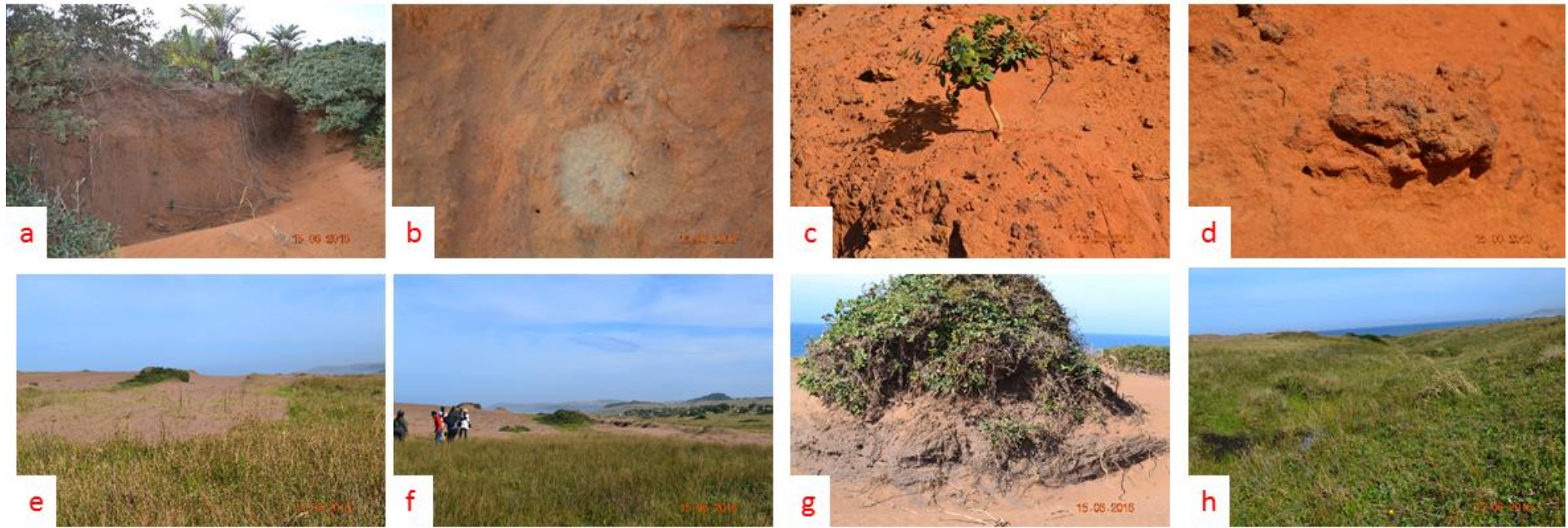


Figure 3. Landscape degradation caused by changing sediment deposition process – blocking flow direction of the wetland and change in water table due to change in direction of water flow