

# WHAT REGENERATIVE FARMING MEAN FOR LIVESTOCK FARMERS

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**T**he Greek philosopher, Heraclitus, who lived in the first century AD, was quoted as saying that “change is the only constant in life”. Normally, people react to change by expecting it to end soon where things will return to normal. Disruptive change, though, happens when an event or chain of events require a fundamental and permanent change of existing business models. Climate change and global warming is exactly such a disruptive force that is having a profound and permanent effect on livestock farming globally.

The top 10 visualized 2021 risks perceived as having the biggest likelihood globally, is presented in Figure 1. Of the 10 risk factors, four of the top 5 factors either directly or indirectly impacts livestock farming. They are extreme weather (no. 1 on the list), climate action failure (failure to mitigate and adapt to climate change) (no. 2 on the list), human environmental damage (no. 3), and biodiversity loss (no. 5). Of these four factors, two are regarded as amongst the top 5 risks in terms of their potential impact, i.e., climate action failure and biodiversity loss, and an additional factor, namely natural resource crises.

There is sufficient scientific evidence that climate change and global warming has changed the production environment and production base of livestock farming in Southern Africa dramatically over the past two decades, which can all be described as having a potentially disruptive effect on livestock production and food security. The more marked changes include a 1°C increase in the average temperature per annum (versus 0,65°C globally), more erratic and extreme rainfall with the wet periods becoming wetter and dry periods becoming drier, and lastly an unprecedented increase in the CO<sub>2</sub> concentration of the atmosphere.

Rank	Top Risks by Likelihood	Top Risks by Impact
#1	■ Extreme weather	■ Infectious diseases
#2	■ Climate action failure	■ Climate action failure
#3	■ Human environmental damage	■ Weapons of mass destruction
#4	■ Infectious diseases	■ Biodiversity loss
#5	■ Biodiversity loss	■ Natural resource crisis
#6	■ Digital power concentration	■ Human environmental damage
#7	■ Digital inequality	■ Livelihood crises
#8	■ Interstate relations fracture	■ Extreme weather
#9	■ Cybersecurity failure	■ Debt crises
#10	■ Livelihood crises	■ IT Infrastructure breakdown

**THE RESULTS OF THESE ARE:**

- Livestock has to endure increased heat stress.
- Increased rainwater run-off with increased soil erosion.
- Longer and more intense climatic droughts.
- Unchecked bush encroachment, decreasing the productivity and health of both Savannahs and Grasslands.

**Figure 1:** 2021 visualized top 10 risks perceived as having the biggest likelihood and impact potential globally (<https://www.visualcapitalist.com/visualized-a-global-risk-assessment-of-2021-and-beyond/>)

On top of the scourge of climate change and global warming, livestock producers also must grapple with natural resource degradation, due to years of incorrect management, as well as unchecked population growth. It is estimated that the average net primary productivity in South Africa decreased by an average of 29 kg C/ha/year over the period 1981 to 2003. The projected population growth in South Africa's is estimated to increase from 54 million currently, to 65 million in 2050, although there are projections of much higher numbers.

The global outlook is just as staggering, with a projected increase from the current 7.8 billion people to 9.7 billion over thirty years. The net result for South Africa is that the livestock industry will have to increase its capacity to feed the nation, while a disruptive change in the production environment is taking place.

Against these mounting odds, livestock farmers will have to become more sustainable and resilient and less prone to a variable climate. The answer is so-called regenerative agriculture. Regenerative farming applies principles and practices that increase biodiversity, enriches soils, improves the water cycle, and enhances ecosystem services. At the same time, it offers increased yields and resilience to a variable climate. In short, it strives to rebuild and restore ecosystem function.

## Above-ground biodiversity

Plant biodiversity and veld condition go hand in glove. As plant biodiversity of the veld improves, the veld condition improves, and vice versa. Improved veld condition presents the following benefits to the livestock farmer:

- Less rainwater run-off.
- Improved water infiltration into the soil with more plant available water.
- Improved soil health.
- A wide variety of highly productive, palatable and nutritious plant species (increased biodiversity).
- Higher and more stable fodder production.
- Improved drought tolerance, resilience, and endurance.
- Higher and more stable animal performance.
- Improved and more stable profitability from livestock farming.

## Soil health and below-ground biodiversity



It is only recently that grassland and pasture scientists have started to study the life below ground in earnest, with just a few South African pioneers, the likes of Francois van der Heyden and Nicky Allsopp. The preliminary results are startling, to say the least.

Historically, there was a firm belief that it is mainly the plant organic matter content in the soil that plays a role in soil health. We now know otherwise. Life in and amongst the soil consists of micro-organisms (collectively called the soil's microbiome), of which bacteria and fungi are the most numerous and important. In the past, it was believed that the microbiome was more or less evenly distributed throughout the soil, but recent studies demonstrated increased microbial diversity in the rhizosphere (the rhizosphere is the area in and between the roots of plants) compared to the bulk soil.

The roots of plants excrete so-called root exudates, which some of the bacteria and fungi feed on in exchange for nutrients provided by and through the microbiome through an interdependent symbiotic relationship. Plant rhizospheres are thus hotspots of microbial activity and carbon sequestration within the soil in the form of microbial organic matter, much more than plant organic matter.

Studies further indicate that each plant species is the architect of the structure and species composition of the specific rhizosphere associated microbial populations. It is thus hypothesised that above-ground biodiversity goes hand in glove with below-ground microbiome biodiversity. Above-ground ecosystem degradation thus also leads to below-ground ecosystem degradation and vice versa.

A farmer who looks after the health of his veld, thus gains healthy soils, as the two are closely interconnected.

# Bush encroachment and alien invasion

There has been a steady increase in the density of indigenous and alien bush species in South Africa for the past 100 years, with a rapid expansion over the past 30 years. This is having the following negative effects on ecosystem function from a livestock production perspective:

- The woody plants compete with the herbaceous layer for light, water, nutrients and space. As its density increases, it gradually suppresses and reduces the cover and species composition of the grass, leading to a reduction in the herbaceous grazing capacity and a decrease in biodiversity.



- At high densities of woody plants, they exhaust the rainwater in the soil rapidly which lead to shorter periods of available soil water. This gives rise to the woody plants dropping their leaves more often and for longer periods due to a shortage of water. This is detrimental to browsers as it leads to a reduced browser capacity. On top of that, the bush often becomes so dense that animals are prevented from accessing it to browse or graze.

- The high water usage of a dense woody cover leads to reduced groundwater recharge, with boreholes drying up.
- Woody plant invasion and encroachment can thus be considered a threat to ecosystems and the services that it provides to the livestock farmer. Bush control thus needs to be given serious attention.

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On the upside, woody plants remove carbon from the atmosphere and capture it in its roots, stems, etc. and an increase in bush density may be seen as a benefit to carbon sequestration. The question is therefore rightly asked whether the control of woody plants is not exactly counterproductive in terms of this carbon sequestration?

A report published by the Department of Environmental Affairs in 2019 investigated this issue and came to the following conclusion:

**“..... addressing bush encroachment would outweigh the mitigation benefit of allowing it to proceed. While the exact amount of carbon sequestered through bush encroachment in South Africa is unknown, even if it were substantial, the risk of losing biodiversity and further degrading ecosystem services from allowing bush encroachment to continue unheeded is considered unacceptable. Moreover, the potential risk to the biodiversity of allowing bush encroachment would contradict the commitments made under the UNCBD. It is clear that bush encroachment should be considered a form of land degradation under the UN commitments, and that other, less damaging, emission reduction opportunities should be employed to meet those targets.”**

## Carbon sequestration

More and more international field studies indicate that the restoration of degraded rangeland greatly increases carbon capture and storage rates in the soil. For example, it is estimated that soils can store about 2.3 times more carbon as organic matter than the carbon in atmospheric CO<sub>2</sub> and 3.5 times greater than the carbon in all living terrestrial plants.

As was demonstrated in a previous paragraph, soil microbial communities that exist in symbiosis with plants, play a major role in biogeochemical cycles by influencing carbon and nutrient cycling. The better this plant-soil interaction, the better the capacity of soils to sequester atmospheric carbon. Healthy veld through improved veld management practices thus has the potential to contribute greatly to the reduction of atmospheric carbon and its detrimental effects on man and the environment.

In conclusion, the healthy veld is not only the saving grace of the livelihood and future of livestock farming, but it also contributes positively to the earth's health. ■

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