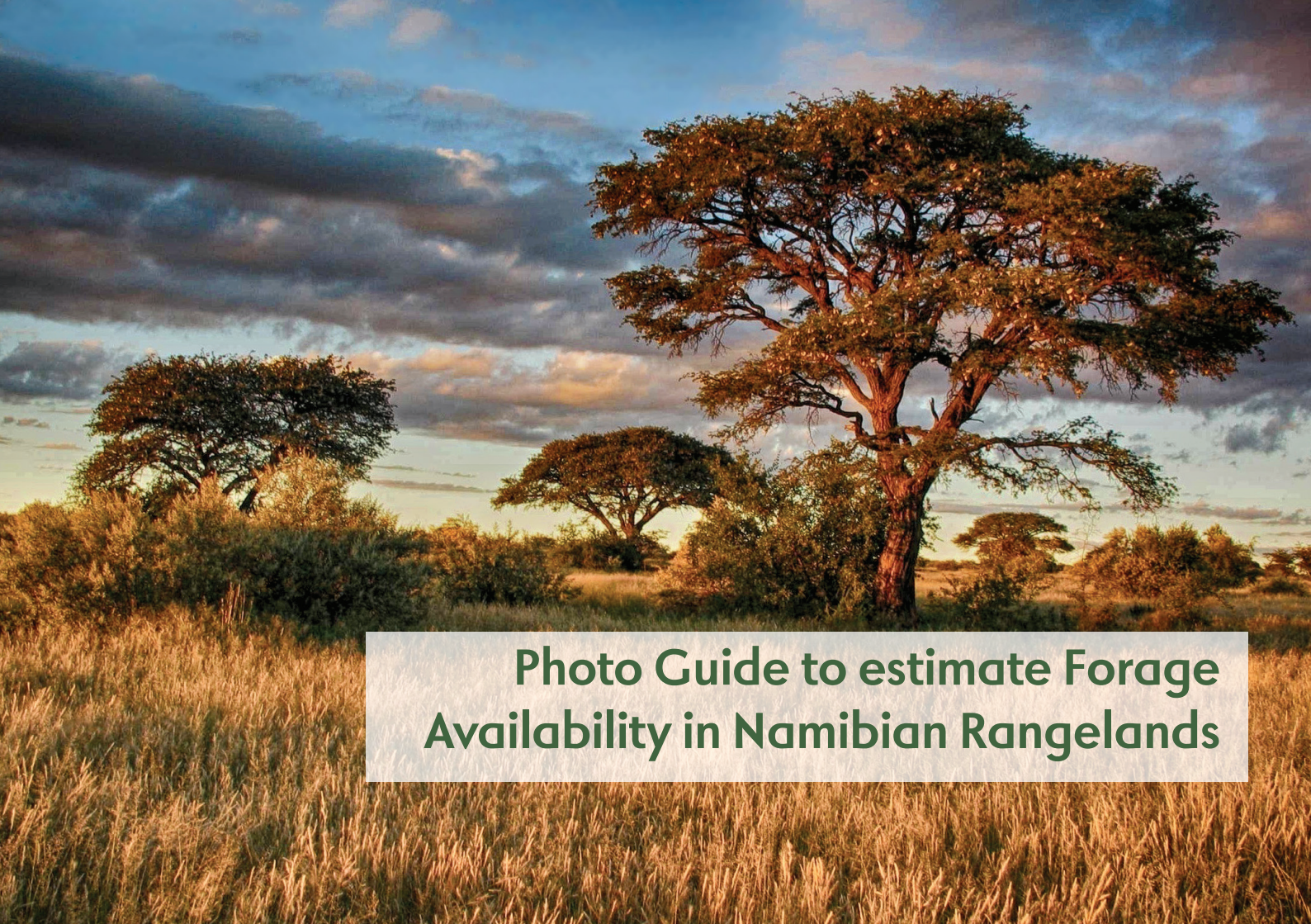

Photo Guide to estimate Forage Availability in Namibian Rangelands

The main funder

The co-funders

AGRIBANK OF NAMIBIA

SGP The GEF Small Grants Programme

agra A BETTER LIFE

The implementers

agra ProVision

Agri-Ecological Services

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Layout and Design: Mr Michael Degé • Editing: Dr Pauline Lindeque

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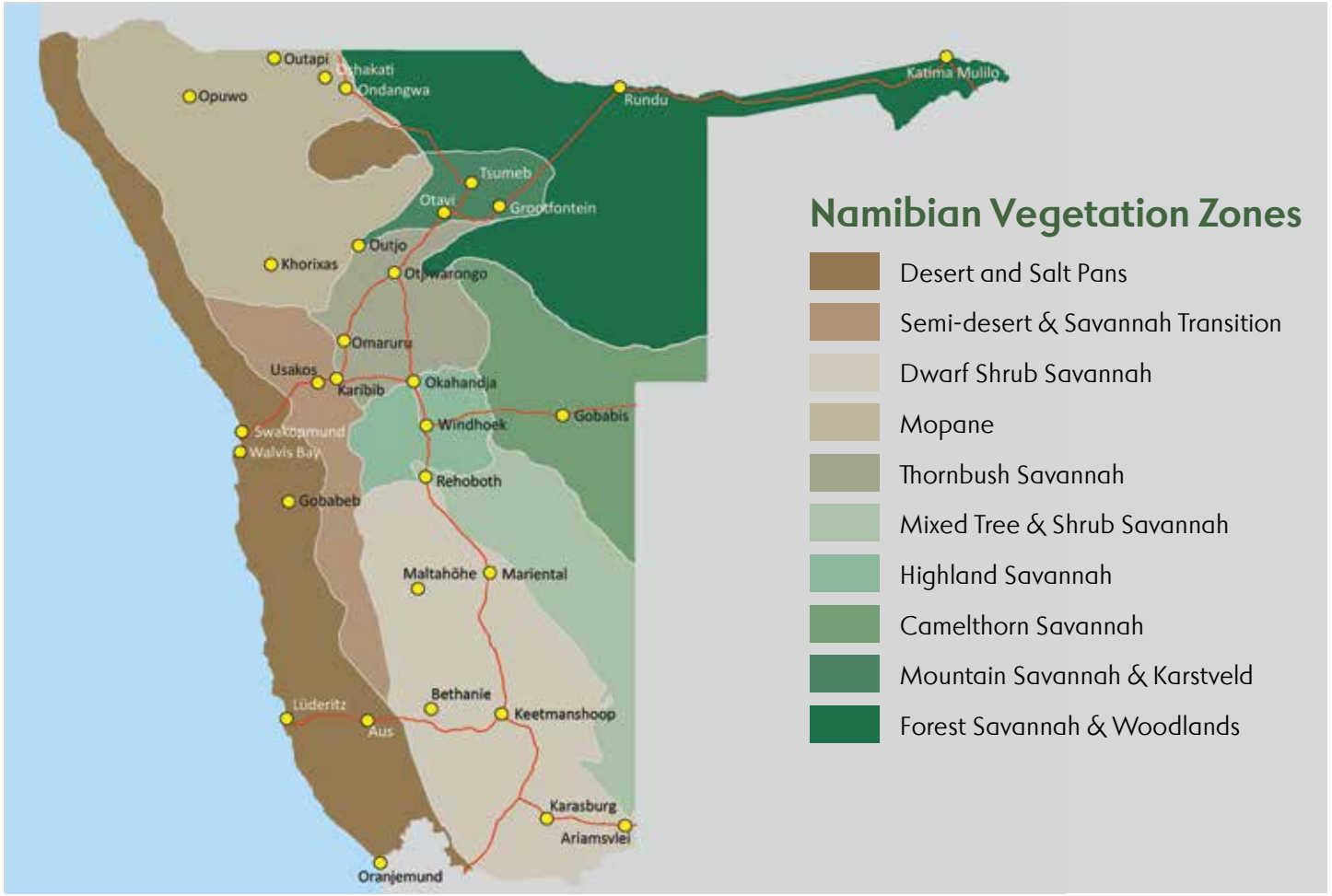
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Ondangwa
Opuwo
Rundu
Katima Mulilo
Tsumeb
Otavi
Grootfontein
Outjo
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Omaruru
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Camelthorn Savannah
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Forest Savannah & Woodlands

Background

The project "Developing and testing a rangeland production early warning system with livestock farmers in Namibia" was designed to contribute to enhanced rangeland management by providing the sector with rangeland monitoring tools based on remote sensing technology and on a proven field assessment methodology. The project was funded through an 80% grant from the 10th EDF-funded programme "Climate Change Adaptation and Mitigation, including Energy", with co-financing from Agribank, the GEF Small Grants Programme and Agra Ltd. This Photo Guide to Estimate Forage Availability on the farm or grazing area is one of the outputs from this project.

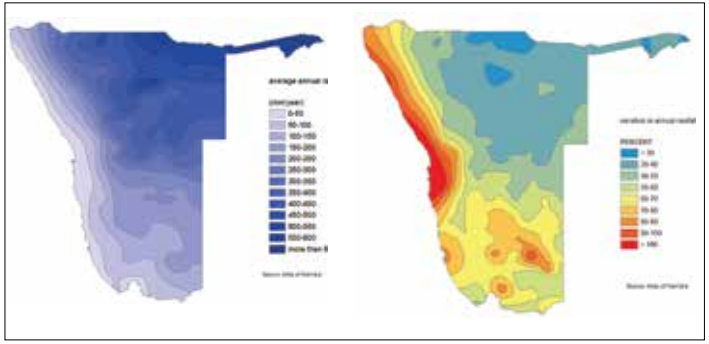


Figure 1: Rainfall variability in Namibia

Namibia is the driest country in sub-Saharan Africa with a high variability in rainfall. In Figure 1 the map on the left depicts the general average rainfall gradient from south-west to north-east, whilst the map on the right the variation in rainfall over rainfall seasons. It is expected that, with climate change, this variability will become even more pronounced.

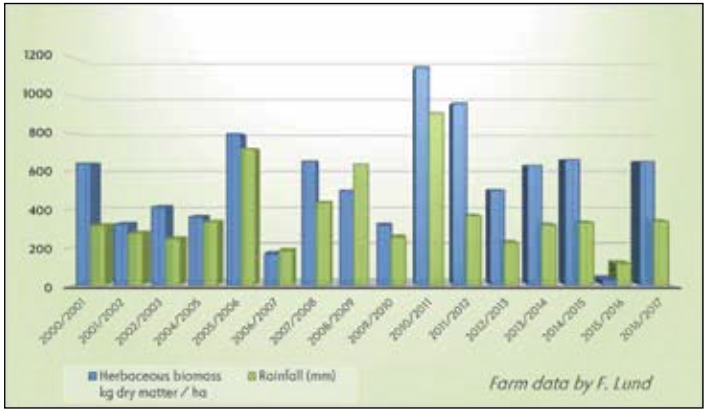


Figure 2: Variability in herbaceous production over years compared to rainfall on farm Kamombonde Ost

Forage availability at the end of the rainy season is strongly correlated with rainfall and rangeland condition. The data in Figure 2 illustrates the high variation in forage availability between rain seasons over the period 2001 to 2016 on the farm of Mrs Lund in the Omaruru area, from a high of more than a ton per hectare in the 2010/11 season to very low in 2015/16. This illustrates that fodder availability is dynamic and there is no such thing as a fixed stocking rate. Therefore, the greatest challenge

livestock farmers in Namibia face is the ability to adjust livestock numbers to these different forage availability conditions on a timely basis.

The principle should therefore be one of balancing forage demand and supply. When forage availability is in balance with forage demand, no problems should be expected. However, if rainfall is less the following season, with the same number of animals, forage demand will remain the same, whilst forage supply will decrease, leading to potential forage shortfalls.

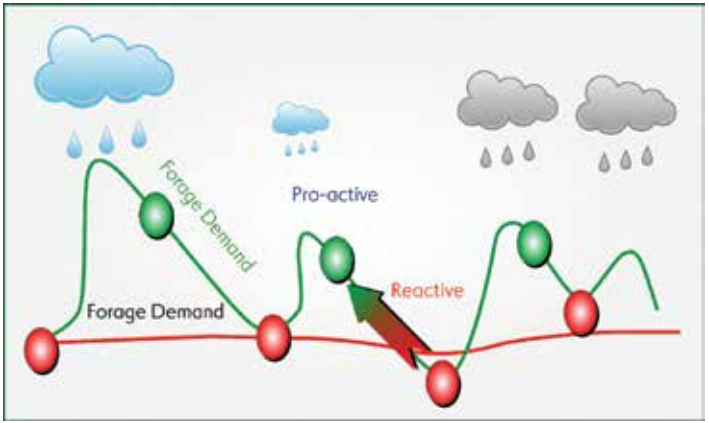


Figure 3: A schematic illustration of pro-active decision making

It is therefore important to determine at the end of the rain season how much forage is available and whether it will be sufficient to last until the following growth season. If forage will not be enough, pro-active de-stocking should take place to prevent forage shortages instead of waiting for too long, once animals are in poor condition or losses are incurred.

There are various methods and tools available to estimate forage availability. The most accurate methods involve a lot of effort by taking clippings at multiple points around the land, drying and weighing the biomass, and thereby estimating overall production per ha. Many farmers find this too time consuming to undertake.

This Fodder Availability Photo Guide therefore provides an alternative quick method to get a reasonably good estimate, without the need for physical sampling. For each major vegetation type in Namibia, a series of photos with different forage availability scenarios over a gradient, starting at picture #1 with very little forage and ending up with the highest possible forage availability for that area, is provided. By using this picture guide, a large number of sites all over the farm or grazing area can very easily be compared to the most appropriate picture in the guide, to calculate an average forage availability for a specific area or farm. Picture guides are specific to areas, so the correct set must be chosen.

Once the available biomass per hectare has been determined, it is possible to estimate the overall available biomass compared to herd sizes, to calculate if it is sufficient. To make things easier, the **Rangeland Fodder Flow App** (for Android and iOS devices) was designed as an additional tool and is available free of charge. This App allows farmers to estimate if the forage available on the farm or grazing area will last with the current livestock and game numbers and can be used to model different scenarios, as shown in Figures 4 - 6. (Kindly note that the screen captures were done on an iOS device, using an Android device the interface will look differently, however, the same information will be displayed.)

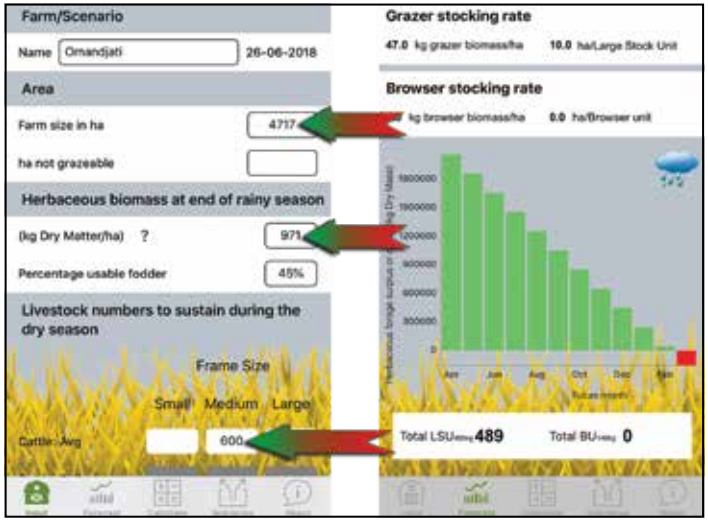


Figure 4: Stocking rate calculator scenario 1

Figure 4 shows the results from a farm size of 4 717 ha and a forage availability of 971 kg/ha, with 600 medium frame cattle. The model shows such a farm will have sufficient forage until February the following year. There is therefore no need for the farmer to reduce livestock numbers.

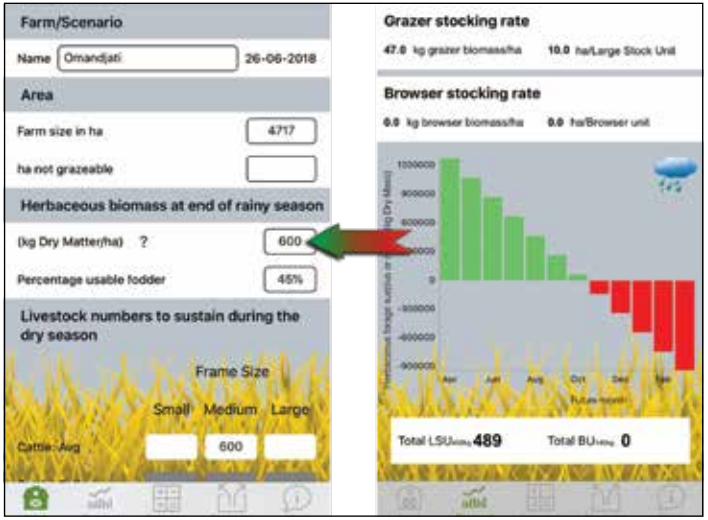


Figure 5: Stocking rate calculator scenario 2

Scenario 2 in Figure 5 shows the results of the same farm, if forage availability is decreased from 971 kg/ha to only 600 kg/ha. Under such conditions, forage shortages are foreseen from October onwards. By reducing the livestock numbers to 350, as reflected in Figure 6, the balance between forage availability

and forage requirements is restored and the forage will be sufficient to last until February the following year.

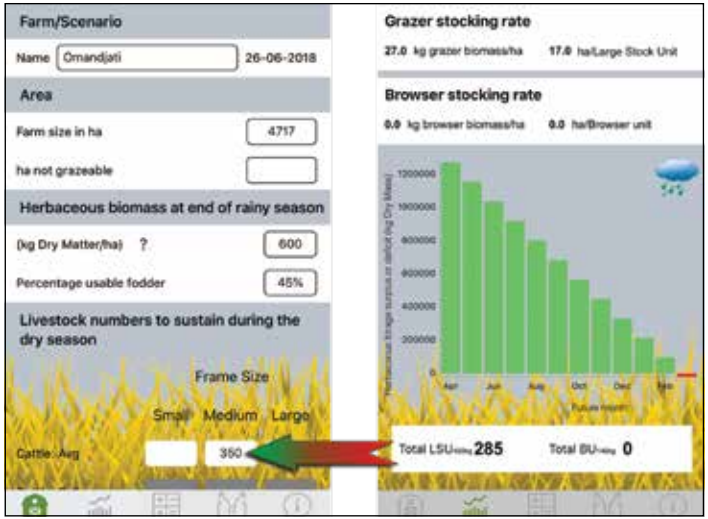
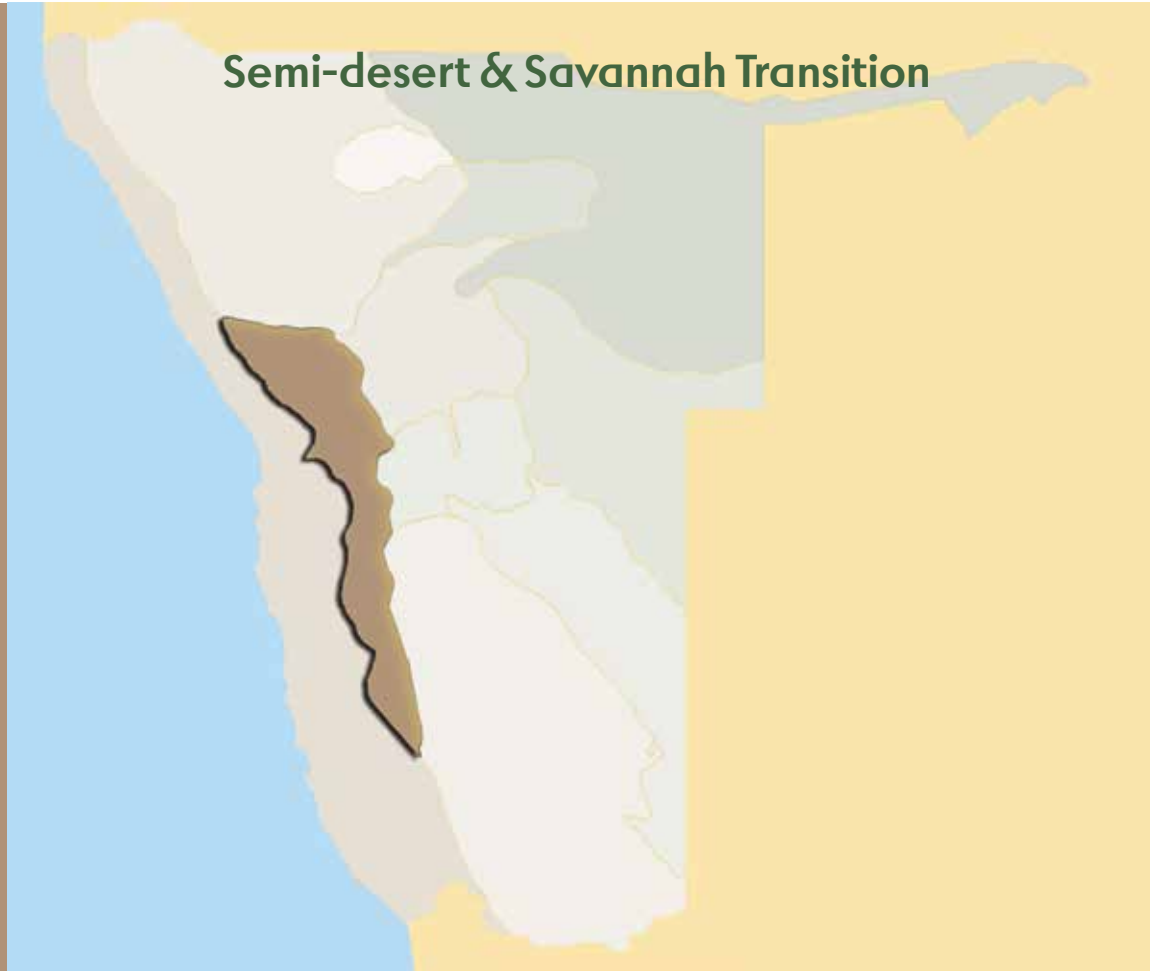


Figure 6: Stocking rate calculator scenario 2 (alternative)

In this model we use small, medium and large frame sizes to calculate forage requirements. The following cattle breeds serve as a guideline, (keep in mind that within each breed there can be variations in frame size):

- Small frame size, e.g. Nguni/Sanga
- Medium frame size, e.g. Afrikaner, Bonsmara, Beefmaster
- Large frame size, e.g. Simmentaler, Simbra, Brahman.


Semi-desert & Savannah Transition

Semi-desert & Savannah Transition Picture No. 1 100 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 2 227 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 3 284 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 4 343 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 5 523 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 6 554 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 7 645 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 8 1265 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 9 1372 kg dry matter / hectare

Semi-desert & Savannah Transition Picture No. 10 2244 kg dry matter / hectare


Dwarf Shrub Savannah

Dwarf Shrub Savannah Picture No. 1 10 kg dry matter / hectare

Dwarf Shrub Savannah

Picture No. 2

100 kg dry matter / hectare

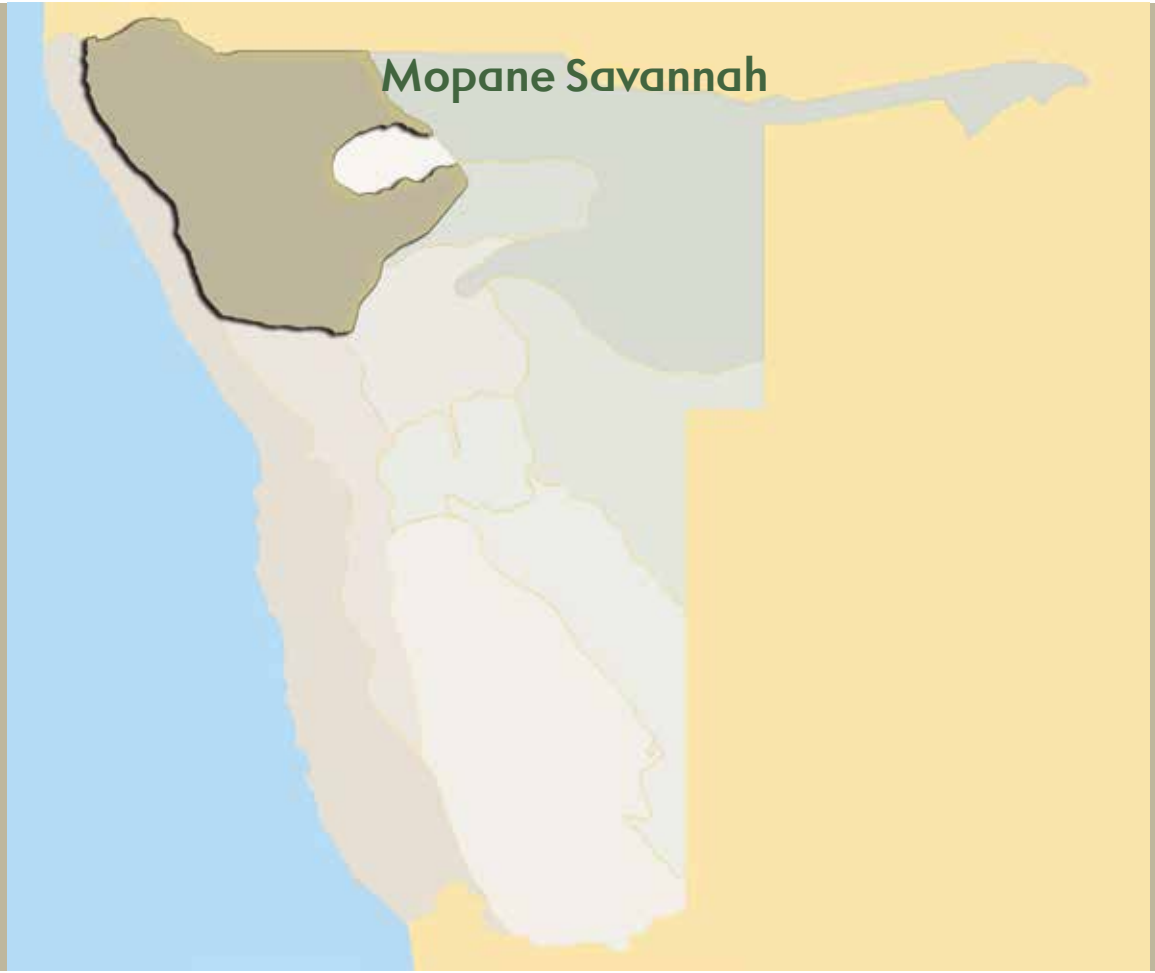
Dwarf Shrub Savannah Picture No. 3 330 kg dry matter / hectare

Dwarf Shrub Savannah Picture No. 4 430 kg dry matter / hectare

Dwarf Shrub Savannah Picture No. 5 750 kg dry matter / hectare

Dwarf Shrub Savannah Picture No. 6 800 kg dry matter / hectare

Dwarf Shrub Savannah Picture No. 7 950 kg dry matter / hectare


Mopane Savannah

Mopane Savannah Picture No. 1 81 kg dry matter / hectare

Mopane Savannah Picture No. 2 145 kg dry matter / hectare

Mopane Savannah Picture No. 3 302 kg dry matter / hectare

Mopane Savannah Picture No. 4 578 kg dry matter / hectare

Mopane Savannah Picture No. 5 774 kg dry matter / hectare

Mopane Savannah Picture No. 6 906 kg dry matter / hectare

Mopane Savannah Picture No. 7 1022 kg dry matter / hectare

Mopane Savannah Picture No. 8 2285 kg dry matter / hectare


Thornbush Savannah

Thornbush Savannah Picture No. 1 30 kg dry matter / hectare

Thornbush Savannah Picture No. 2 141 kg dry matter / hectare

Thornbush Savannah Picture No. 3 190 kg dry matter / hectare

Thornbush Savannah Picture No. 4 300 kg dry matter / hectare

Thornbush Savannah Picture No. 5 511 kg dry matter / hectare

Thornbush Savannah Picture No. 6 900 kg dry matter / hectare

Thornbush Savannah Picture No. 7 1000 kg dry matter / hectare

Thornbush Savannah Picture No. 8 1203 kg dry matter / hectare

Thornbush Savannah Picture No. 9 1950 kg dry matter / hectare

Thornbush Savannah Picture No. 10 2200 kg dry matter / hectare


Mixed Tree & Shrub Savannah

Mixed Tree & Shrub Savannah Picture No. 1 192 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 2 302 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 3 412 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 4 618 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 5 690 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 6 832 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 7 1032 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 8 1132 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 9 1367 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 10 1459 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 11 1466 kg dry matter / hectare

Mixed Tree & Shrub Savannah Picture No. 12 2021 kg dry matter / hectare


Highland Savannah

Highland Savannah Picture No. 1 240 kg dry matter / hectare

Highland Savannah Picture No. 2 290 kg dry matter / hectare

Highland Savannah Picture No. 3 390 kg dry matter / hectare

Highland Savannah Picture No. 4 480 kg dry matter / hectare

Highland Savannah Picture No. 5 650 kg dry matter / hectare

Highland Savannah Picture No. 6 730 kg dry matter / hectare

Highland Savannah Picture No. 7 816 kg dry matter / hectare

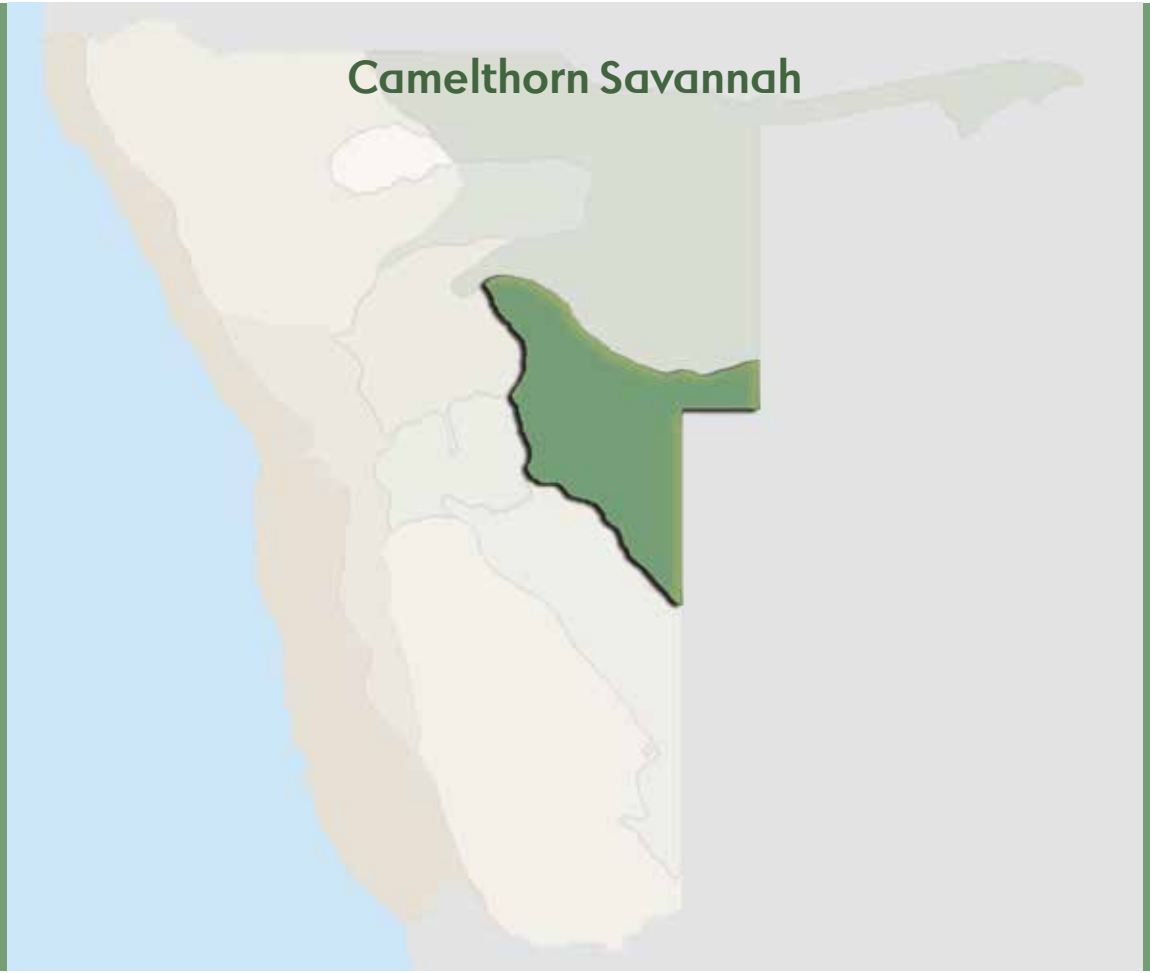
Highland Savannah Picture No. 8 982 kg dry matter / hectare

Highland Savannah Picture No. 9 1100 kg dry matter / hectare

Highland Savannah Picture No. 10 1500 kg dry matter / hectare

Highland Savannah Picture No. 11 2150 kg dry matter / hectare

Camelthorn Savannah



Camelthorn Savannah Picture No. 1 80 kg dry matter / hectare

Camelthorn Savannah | Picture No. 2 | 246 kg dry matter / hectare

Camelthorn Savannah Picture No. 3 287 kg dry matter / hectare

Camelthorn Savannah Picture No. 4 620 kg dry matter / hectare

Camelthorn Savannah Picture No. 5 824 kg dry matter / hectare

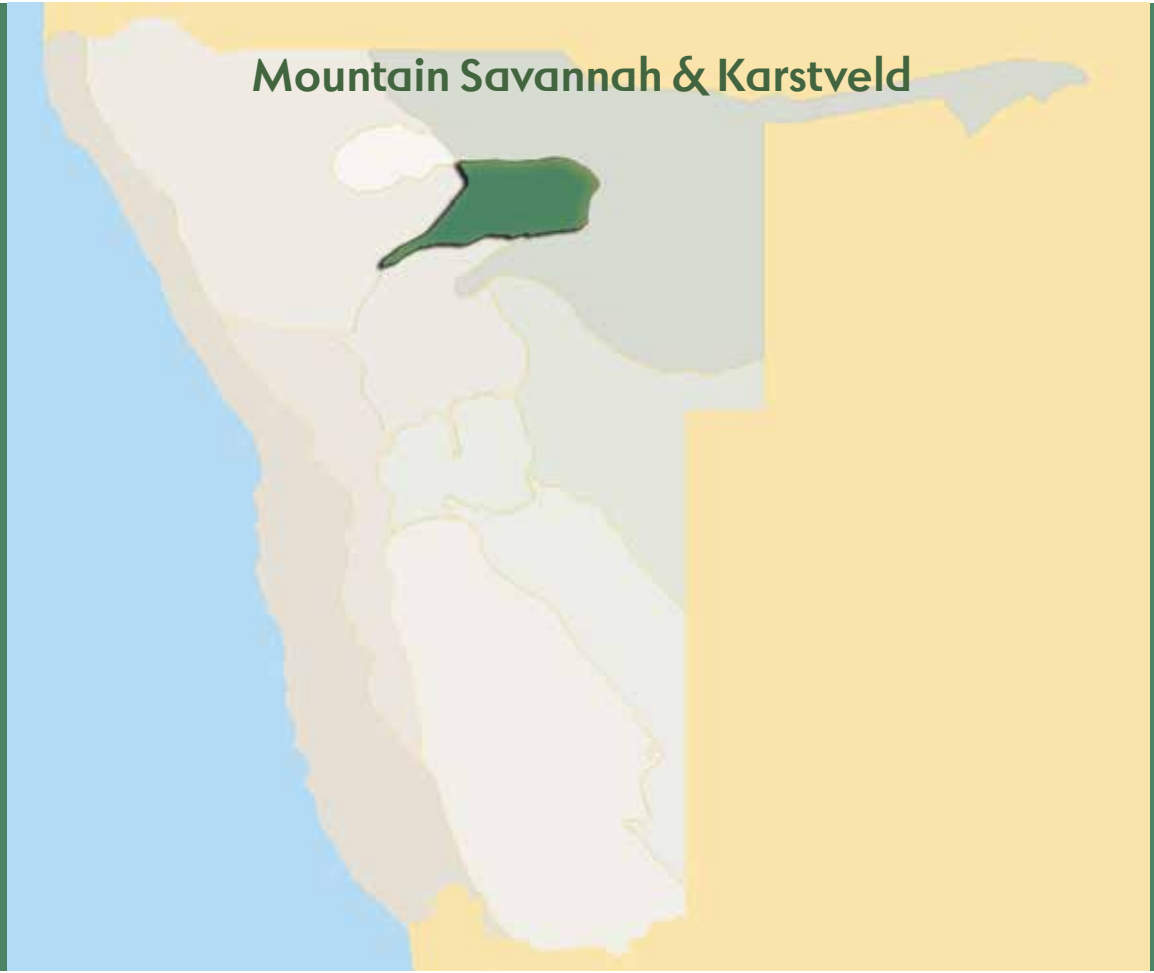
Camelthorn Savannah | Picture No. 6 | 1009 kg dry matter / hectare

Camelthorn Savannah Picture No. 7 1297 kg dry matter / hectare

Camelthorn Savannah | Picture No. 8 | 1430 kg dry matter / hectare

Camelthorn Savannah Picture No. 9 1900 kg dry matter / hectare

Camelthorn Savannah Picture No. 10 2523 kg dry matter / hectare


Mountain Savannah & Karstveld

Mountain Savannah & Karstveld Picture No. 1 36 kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 2 213 kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 3 539 kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 4 723 kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 5 749kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 6 1092 kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 7 1279kg dry matter / hectare

Mountain Savannah & Karstveld Picture No. 8 1662 kg dry matter / hectare


Forest Savannah & Woodlands

Forest Savannah & Woodlands Picture No. 1 35 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 2 397 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 3 591 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 4 974 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 5 1205 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 6 1404 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 7 1809 kg dry matter / hectare

Forest Savannah & Woodlands Picture No. 8 2921 kg dry matter / hectare