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Measuring grassland biomass in the Sahel: Can it be more easily done?

Biomass is defined as the total amount of living vegetation in a certain place. When comparing the amount of biomass between several years, for instance, you can get a measure of the difference in weight of the vegetation from one year to the other. This information can be very useful in ecological studies and when investigating resources for livestock.

This study has been performed during the wet season in Senegal, which lies in the Sahel; a transition zone south of the Sahara desert and north of the African tropical savannas. In the Sahel there is only enough rain to support vegetation growth from July to October, the rest of the year is very dry. So, even if there are trees and bushes during the dry part of the year, there is no grass, and grass is important for the livestock to get nutrition and feed. Therefore it is of particular interest to study grassland biomass in this area.

Commonly, one would measure biomass either in the field, by simply cutting the vegetation and then weigh it after it has been dried, or through remote sensing, where satellites are used to cover a large part of the ground. As always, though, one cannot have everything. The cutting-method is destructive and takes a lot of time and effort. And the satellite-method is not as precise as the cutting-method – especially not when the vegetation is at its very peak.
This is why the objective of this study was to find a method that was simpler than cutting and weighing the vegetation but which also could cover larger areas. In order to do this, two ways of acquiring information about grassland biomass have been tested. Firstly, a digital camera was used to photograph the ground at 28 different spots on a Senegalese study site. The information in digital color images are divided into three channels: red, green and blue. This was later used in different formulas that could enhance the green image information. Secondly, grass height was measured at the same 28 spots using a scale. Finally, the results from the formulas that had been applied on the digital camera images, and the height measurements of the grass were compared to the actual weight of the vegetation from cutting and drying the grass in order to see which method corresponded the best to grass biomass. It turned out that the camera images did not hold enough information to be used for grassland biomass. But grass heights, on the other hand, corresponded to the actual biomass quite well. The height measurements can even be performed by farmers around the Sahel themselves, so one could easily get information about biomass over larger areas, and sometimes that can be more useful than very accurate information from just a small sample site. Especially in the Sahel, with extensive livestock production that depends on the nutritious grasslands.

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