**RHODES UNIVERSITY GEF5 SLM PROJECT**

**MEETING NOTES: OUTCOME 3 THICKET REHAB & CARBON OFFSETTING**

**Date of meeting: 10 August 2018**

**Participants: C. Bolus, D. Harris, J. Reeler, M. Powell, R. Powell**

**Progress 3.2a/3.1d: Carbon baselines for new methodology and offsetting (Cosman Bolus & Dugal Harris with Mike Powell and team)**

Table below is a summary of the preliminary results from baseline carbon stocks sampling in Baviaans for three properties with different thicket degradation classes. Sampling conducted by C. Bolus. D. Harris assisted with the analysis of data and output of table (he is working on new carbon stocks methodology). The table indicates mean values for carbon stocks measurements in above ground woody+succulent vegetation and litter across the three thicket ‘health’ classes: Pristine, Moderate degraded and Severe degraded. The Standard Deviation values and Standard Error/Mean ratio are also indicated. Soil carbon for now not measured- we will try and do this through livinglands students later as it is an important component for validation of carbon stocks and offsetting later?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Subtropical thicket ‘Health’ class** | | | |  |
|  | **Pristine** | **Moderate** | **Severe** | **Severe** |  |
| **Site/property name** | Dr VanderWatt | Dr VanderWatt | Sewerfontien | Tchnuganoo | Severe consolidated |
| **Site code** | PV | MV | SS | ST | SS & ST |
| **N (samples)** | 18 | 12 | 16 | 15 | 31 |
| **Mean Above Ground Biomass (woody & litter combined)  (Ctha)** | 52.0 | 28.3 | 16.3 | 15.5 | 15.9 |
| **SD** | **14.2** | **11.3** | **7.2** | **11.6** | **9.4** |
| **SE/Mean %** | **6.6%** | **12.0%** | **11.5%** | **19.9%** | **10.8%** |
| **Mean Above Ground Biomass Woody (Ctha)** | 42.1 | 24.5 | 14.9 | 13.0 | 14.0 |
| **SD** | **11.7** | **11.0** | **6.7** | **9.0** | **7.8** |
| **SE/Mean %** | **6.7%** | **13.5%** | **11.6%** | **18.6%** | **10.2%** |
| **Mean Litter carbon (Ctha)** | 12.4 | 3.8 | 1.5 | 2.6 | 2.0 |
| **SD** | **3.2** | **2.9** | **1.6** | **3.6** | **2.8** |
| **SE/Mean %** | **6.3%** | **23.3%** | **27.9%** | **37.6%** | **25.0%** |
|  |  |  |  |  |  |
| <or close to 10% | 10% - 20% | >20% |  |  |  |

Need to reach at 10% or less SE/Mean ratio for validation of carbon stocks for woody (AGB) and litter carbon measurements. Have only reached this value for Pristine thicket (18 plots so far) but not for other degradation classes. If we combine plots done on Sewefontein and Tchnuganoo farms (total of 31 plots) in severe thicket we almost approach this 10% limit for AGB carbon data.

**Discussion of above**

* The SE/Mean ratio is high for moderate and severe degraded plots, especially for litter carbon. This could possibly be due to sampling technique for litter- small samples scattered across a large area results in lots of variation in data? Conduct more sampling to decrease the ratio.
* Replace the word ‘woody’ with ‘trees+succulents’ since this is actually what is measured?
* Tchnuganoo with high SD and SE because of acacia invasion (C. Bolus).
* Should we keep AGB-woody C and Litter carbon separate or pool data for new methodology? Need to keep these separate for validation and offsetting purposes and each needs to have an SE/mean ratio <10%.
* The above ground woody carbon for moderate and pristine thicket seems to be very high- can we check data for any potential calculation errors? (Mike Powell & Cos Bolus). **C. Bolus to send data to M. Powell for checking**.
* Litter = litter collection of debris <5 cm in size, wet weights and dry weights measured and dry weight is multiplied by a global constant of 0.48 to get carbon fraction. High SE/mean values for litter carbon is related to collection methods- scattered small samples = high variability scew results?
* Alternative method for litter C measurements- use the standard value of 0.37 for converting wet weights to dry weights to save time in laboratory? (J. Reeler). But what are the assumptions of using this standard factor in Thicket when the factor was developed for forests in northern Hemisphere. Rather do the physical measurements so we obtain accurate values for litter dry weight and then carbon fraction.
* What are the boundaries of project, can we lump Sewefontein & Tchnuganoo data for severe plots? If we lump them do we need to do anymore sampling or is SE/mean ratio of 10.8% good enough? Are they being planted at same time? Need more sampling as need to approach SE/mean ratio of <10% as suitable accuracy for validation of carbon and offsetting. Therefore we need to do more sampling in moderate and severe degradation classes to approach this (There is one more field trip left to do this, potentially two?). Also need greater accuracy so that we can develop the new carbon methodology: correlate ground truthed carbon stocks with remote sensed reflectance measurements.
* Need to do follow up carbon measurements at a point in time after planting on the properties for carbon offsetting. It therefore makes sense to separate Tchnuganoo and Sewefontein sample plots as these properties will most likely not be planted at same time? However, we could assume the two farms which are spatially close together also have similar thicket habitats and degradation conditions (they are both classed as severely degraded by Jan Vlok). Thus we could combine data and use combined plots as baseline data for anything planted on either of the farms? Will this be a problem in terms of validation? No, it shouldn’t be.

* **Final consensus- baseline C database**:
  + Do more sampling in moderate & severe degraded thicket to improve SE/mean ratio. Sampling during next trip (20-30 plots): try get additional 20 plots in moderate and severe classes.
  + There is a technique to use to indicate no of plots required to reach 10% SE to mean ratio. James Reeler can look into this and help us figure out how many more plots needed per degradation class.
  + Combine sample plots for severe degraded thicket for Sewefontein and Tchnuganoo farms (total of 31 plots) and use as single baseline database for validation of any planting on either of the properties later (need to still confirm this is 100% ok under different validation standards?).
  + Make sure that enough additional sampling done to ensure that litter carbon SE/mean ratio falls below 10%.

**New carbon methodology in relation to above**

* Dugal Harris has been working on measurements of carbon per plant and totals using Marius van der Vyfers allometric equations and Cosman Bolus carbon data. Then uses this data to test for correlation between ground carbon stock measurements for species and degradation classes and remote sensed imagery reflectance.
* Dugal Harris correlations for carbon ground measurements and imagery reflectance: R2 of 0.8 and root mean square error 8 tons/ha across all degradation classes, which is quite good for now. To improve R2 value what do we need? Need more sampling and even sampling across degradation classes to get more representative data to improve R2 values. Consolidate carbon baseline data for severe plots on Tchn and Sewe helps. Need to improve model for moderate degraded veg class- this will be done during additional sampling.
* Vlok initially had 4 degradation classes- which classes do we use for new methodology and for the rehabilitation planting work? For example, Vlok defined a Pristine-near moderate class and a moderate-severe degraded class. The Pristine-near moderate class is a low hanging fruit for rehabilitation and offsetting- good returns on investment. Moderate-severe as the next class that is tackled. Can we see a big difference between pristine-near moderate and moderate-severe degradation classes? Hard to see differences but more spaces in moderate-severe? Dugal Harris mapped the pristine and moderate classes using imagery- reflectance, but did look at Jan Vloks classes of severe, moderate and pristine thicket. Dugal needs to be specific in his report on what criteria/basis he defined the different classes.

**Other discussion pnts**

* Can we use the southern facing mnt slopes to do some rehab work? Which degradation class is it and should we do some sampling there? Yes, should look into sampling on southern mnt slopes where there is moderate to severe degraded thicket if landowners give permission.
* Need to use the budget initially allocated to pristine plots for Dugal’s methodology to do the additional sampling to improve correlations for new methodology. **Rebecca will email the value of funding left for this and Cosman will work out a budget for remaining work needed.**
* There are a few plant species that need to be identified: where is best to get these identified? **Email photos to Mike and will find a way to ID. If can’t ID then take a sample to send away.**
* LL setting up lab in Kloof (ovens, scales etc for students). They are going to do some soil sampling. Are we still doing additional soil samples and can we use what they are doing? Can we use their data if they can apply our methodology? They may be doing 1 m x 1m samples. Yes, let’s try and link in with LL and get a representative number of soil samples across degradation classes for validation and offsetting purposes. **Place on agenda for 21/22 August workshop in Gtown**.
* There is a recent paper on ABC stock estimation using spot 5 imagery in great fish river. Anyone aware of this study? Adolf et al. Share data with them to see if method can be extended spatially? D. Harris will send paper.

**Progress 3.1d: Engagement with Treasury new carbon tax & methodology (WWF James Reeler with Tony Knowles)**

* Reeler has been engaging with treasury but struggling to gain contact with department of energy who are the gatekeepers in terms of new carbon tax. He will keep pushing with help of Tony Knowles, Barney Kgope and others.

**Next meeting?** Try and meet to confirm budgets, sampling in two weeks time. Rebecca to coordinate.