

**COMPARATIVE ANALYSIS OF WOODY PLANT SPECIES CARBON STOCK OF BUSKA
DRY EVERGREEN AFROMONTANE FOREST AND ADJACENT GRASSLAND,
SOUTHWESTERN ETHIOPIA**

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ABSTRACT: Forest ecosystems significantly contribute to climate change mitigation; however, their estimated carbon stock variations across vegetation types are limited to prioritize vegetation conservation. This study explores the carbon stock in Buska natural forest and its variation among three vegetation types: Dry evergreen Afromontane forest and grassland complex (DAF), *Combretum-Terminalia* woodland and wooded grassland (CTW), and *Acacia-Commiphora* woodland and bushland (ACB). The data was collected from 92 plots placed at 50m altitudinal difference across eight transect lines laid at 2 km apart to each other. Accordingly, 30 plots for each DAF and CTW and 32 plots for ACB were used to collect vegetation data and biometric measurements. 113 woody species were recorded from all vegetation types and 1571.8 ton ha⁻¹ carbon stock was estimated. Higher carbon stock was recorded for DAF (632.97 ton ha⁻¹) followed by CTW (554.05 ton ha⁻¹) and ACB (384.78 ton ha⁻¹). *Juniperus procera*, *Combretum molle* and *Tamarindus indica* were the first top woody species that contributed higher carbon stocks for DAF, CTW and ACB vegetation types respectively. The carbon stock variation within vegetation types was significant at $P < 0.03$. The carbon stock in DAF is significantly higher compared to ACB ($P = 0.02$). While the carbon stock variations between CTW and the remaining two vegetation types were not significant ($P < 0.05$). The Buska natural forest's carbon stock variation is influenced by species composition and basal areas. Though all three vegetation types contribute significantly, DAF vegetation type should be prioritized for conservation to mitigate climate change.

Keywords: *Acacia-Commiphora*; Buska; Carbon stock; *Combretum-Terminalia*; Dry evergreen

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INTRODUCTION

Global warming is a major threat to all biological resources (fauna, flora, microorganisms) in all levels of genetic, species and ecosystem diversity. Its consequent addresses all corners of the globe (IPCC, 2014: Climate Change, 2014). A macro and microclimate regulation are one of the major regulatory services of forest ecosystems through sequestering atmospheric carbon in above and below-ground biomass (Pradhan et al., 2019). Forest ecosystems could take a large amount of carbon and are playing a crucial role in climate change mitigation (Zhu et al., 2010). Particularly, tropical forests are considered the largest above-ground carbon store and harbor 68% of the global forest carbon. Thus, protecting the forest ecosystems is one of the climate change mitigation strategies that can help to reduce the atmospheric carbon dioxide concentration as well as emission reduction from deforestation and forest degradation (Pan et al., 2011).

The carbon stock is largely affected by biotic and abiotic factors (Chave et al., 2014). Biotic factors such as species richness, composition, diversity, anthropogenic disturbance, invasive and expansive species (Haile et al., 2021); abiotic factors such as environmental gradients (*i.e.* altitude, slope, aspect), geographical features, soil, temperature, moisture, etc. are significantly affecting the carbon sequestration potential of certain forest (Mewded and Lemessa, 2020).

Although forest ecosystems are vital for climate regulation, the current challenges in Ethiopia particularly the fast-population growth and consequent demand and poverty, it remains impossible to address the county's forest ecosystem conservation. As a result, prioritizing the conservation of multi-functional forest ecosystems is a key strategy. The variation of woody carbon stock between disturbed and undisturbed sites, protected and unprotected areas, agroforestry and woodlots are explored (De Beenhouwer et al., 2016; Gebre et al., 2019; Toru and Kibret, 2019; Ibrahim et al., 2021; Kefalew et al., 2021). However, studies on woody carbon stock variation within the vegetation and ecosystem types are limited. Although

Ethiopia has about 12 vegetation types, including desert and semi-desert scrubland, *Acacia-Commiphora* woodland and bushland, wooded grassland of the western Gambella region, *Combretum-Terminalia* woodland and wooded grassland, dry evergreen Afromontane forest and grassland complex, moist evergreen Afromontane forest, transitional rainforest, Ericaceous belt, Afroalpine belt, riverine vegetation, fresh-water lakes, lake shores, marsh and floodplain vegetation and salt-water lakes, salt-lake shores, marsh and pan vegetation (Ib et al., 2010). However, there is a lack of studies examining the relationships between these vegetation types and carbon storage or sequestration potential. Identifying which vegetation contributes most significantly to carbon stock is crucial for prioritizing conservation efforts aimed at climate change mitigation.

Therefore, this study aims to analyze the variation in carbon stock within the Buska natural forest. Specifically, it compares carbon stocks across three vegetation types within the forest: the dry evergreen Afromontane forest and grassland complex (DAF), the *Combretum-Terminalia* woodland and wooded grassland (CTW), and the *Acacia-Commiphora* woodland and bushland (ACB). Additionally, the study investigates the factors that affect the carbon stock of Buska natural forest.

MATERIALS AND METHODS

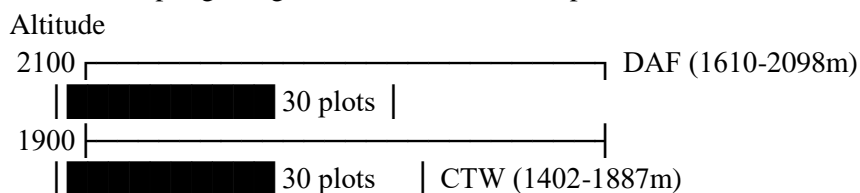
Study area

The study was conducted in Buska natural forest located in Hamer District, South Omo Zone, Southern Nations, Nationalities, and Peoples' Region, Ethiopia. Buska natural forest mainly contains three types of vegetation adjacently. These are dry evergreen Afromontane forest and grassland complex (DAF), *Combretum-Terminalia* woodland and wooded grassland (CTW) and *Acacia-Commiphora* woodland and bushland (ACB) vegetation. The characteristics of key species, along with other environmental and geographical factors, were used to identify these vegetation types.

Sampling Design

A systematic stratified sampling approach was implemented to capture vegetation variation across the dominant altitudinal gradient (845–2098 m.a.s.l.), a key determinant of biomass and species distribution (Körner, 2007). Eight parallel transects were established at 2 km intervals spanning this elevation range. Along each transect, 20 × 20 m sample plots were systematically positioned at 50 m altitudinal intervals. This design resulted in a total of 92 plots, encompassing a sampled area of 3.68 hectares. The plots were distributed across three principal vegetation types identified in the Buska Natural Forest: Dry Evergreen Afromontane Forest (DAF), *Combretum-Terminalia* Woodland (CTW), and *Acacia-Commiphora* Bushland (ACB). This stratification ensured representative sampling of the forest's ecological continuum, with 30 plots sampled in both DAF and CTW types, and 32 plots in ACB. The systematic, elevation-based framework provided a robust spatial structure for comparative analysis of forest structure and carbon stocks across distinct ecological zones (Fig. 1).

Systematic sampling design in Buska Forest, Ethiopia



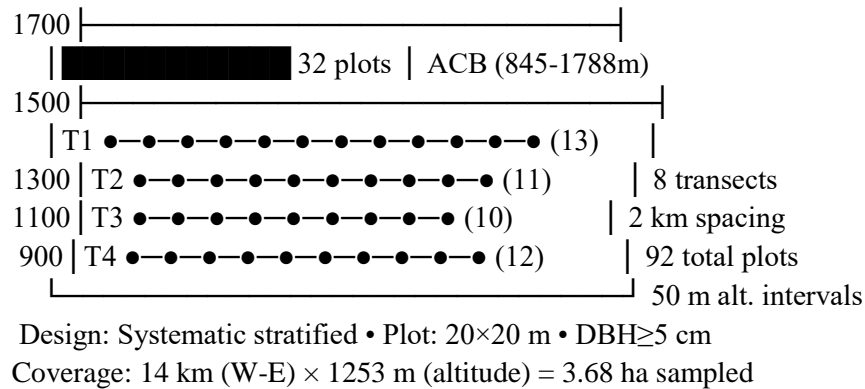


Figure 1. Systematic stratified sampling design employed in Buska Natural Forest

Data collection

Woody species data

All individuals of woody species (trees, shrubs and lianas) with diameter at breast height (DBH), diameter at stump height (DSH) ≥ 5 cm were measured and their growth habits were recorded as suggested (Awoke and Mewded, 2019; Mac Dicken, 1997) for carbon stock estimation method. DBH was measured at 1.3 m height and DSH at 0.3 m. Trees and shrubs with multiple stems were measured separately and converted later by square rooting the sum of all squared stem DBH. DBH, DSH, and height were measured using diameter tape and hypsometer (Forestry Pro), respectively. The geographical location and altitude of sample plots were recorded using GPS (Garmin 72). The plant specimens were collected, labeled, pressed, dried, and identified at Ethiopian Biodiversity Institute (EBI) and National Herbarium (ETH), Addis Ababa, Ethiopia.

Above-ground carbon stock estimation

Above-ground biomass was estimated from a diameter of woody species (Pearson et al., 2013) tropical county forests field carbon stock measurement guideline. Above-ground biomass was converted to carbon stock by multiplying by 0.5 which is the default carbon fraction (IPCC, 2006).

$$AGB = 34.4703 - 8.0671(DBH) + 0.6589 (DBH^2)$$

$$AGC = AGB \times 0.5$$

Where AGB is the above-ground biomass (kg), DBH is the diameter of individuals (cm) and AGC is the above-ground carbon.

Below-ground carbon stock estimation

In addition to above-ground biomass, roots play an important role in the carbon sequestration and cycle (Darcha and Birhane, 2015). However, below-ground biomass estimation is difficult and time-consuming. Hence, different scholars (Houghton et al., 2001; Achard et al., 2002; Ramankutty, et al., 2007; Gibbs et al., 2007; Sharma and Chaudhry, 2015), are agreed on the root biomass is typically estimated to be 20% of the above-ground forest biomass. Accordingly, the amount of below-ground carbon was estimated as

$$BGC = BGB \times 0.5$$

Where BGC is below-ground carbon, BGB is below ground biomass and 0.5 is the conversion factor

Data analysis

The mean and total carbon stock of woody species was calculated using Microsoft Excel for the Buska natural forest and respective vegetation types. The carbon stock variation among vegetation types was statically tested using a one-way analysis of variance (ANOVA) with the R statistical program (version: 3.4. 6). The effects of altitude, species richness, abundance and basal area of species on woody carbon stock were determined by regression coefficient.

RESULTS

Overall, in Buska dry evergreen forest and adjacent vegetation types, 113 woody species belonging to 74 genera and 39 families were recorded. The Fabaceae family has the most species with 22, followed by the Euphorbiaceae and Rubiaceae families with 7 species each (Appendix 1). Five endemic species to Ethiopia were recorded (*i.e.* *Erythrina brucei*, *Maytenus arbutifolia*, *Millettia ferruginea*, *Vepris dainellii* and *Vernonia rueppellii*). *Prosopis juliflora* which is a highly invasive alien species was also recorded in two plots of *Acacia-Commiphora* woodland and bushland (ACB) vegetation type. In terms of growth habit, 58 species (51%) were trees, 48 species were shrubs and seven species were woody climbers. From these woody species, 5903.77 ton carbon stock was estimated in the studied sample which is 1571.78 ton ha⁻¹ (average 17.08 ton ha⁻¹). *Combretum molle*, *Juniperus procera*, *Ficus vasta* and *Podocarpus falcatus* were the top four woody species that contributed higher carbon stock in the study area. Their carbon stocks were estimated to 149.93, 137.08, 108.21 and 107.07 ton ha⁻¹, respectively (Table 1). These woody species contributed 31% of above-ground and below-ground carbon stock in the studied forest.

Table 1. Overall top woody species contribute greater than 1% of total carbon stock

Species	AGC	BGC	TC	Percentage	Main habitat
<i>Combretum molle</i>	124.94	24.99	149.93	9.54	CTW
<i>Juniperus procera</i>	114.23	22.85	137.08	8.72	DAF
<i>Ficus vasta</i>	90.17	18.03	108.21	6.88	DAF
<i>Podocarpus falcatus</i>	89.22	17.84	107.07	6.81	DAF
<i>Terminalia brownii</i>	78.33	15.67	94.00	5.98	CTW
<i>Olea europaea</i>	59.54	11.91	71.44	4.55	DAF
<i>Croton macrostachyus</i>	51.17	10.23	61.41	3.91	DAF
<i>Euclea racemosa</i>	47.20	9.44	56.64	3.60	DAF
<i>Tamarindus indica</i>	40.35	8.07	48.42	3.08	CTW + ACB
<i>Syzygium guineense</i>	37.40	7.48	44.89	2.86	ACB
<i>Acacia goetzei</i>	33.45	6.69	40.14	2.55	ACB
<i>Vitex doniana</i>	26.82	5.36	32.18	2.05	DAF
<i>Lannea fruticosa</i>	25.55	5.11	30.66	1.95	ACB
<i>Entada abyssinica</i>	22.37	4.47	26.84	1.71	CTW
<i>Ozoroa insignis</i>	20.08	4.02	24.09	1.53	CTW

<i>Adenium obesum</i>	16.95	3.39	20.34	1.29	ACB
<i>Acacia tortilis</i>	16.85	3.37	20.23	1.29	ACB
<i>Bridelia micrantha</i>	16.51	3.30	19.81	1.26	DAF
<i>Balanites rotundifolia</i>	15.12	3.02	18.14	1.15	CTW
<i>Acacia seyal</i>	14.99	3.00	17.98	1.14	ACB
<i>Cordia sinensis</i>	13.77	2.75	16.53	1.05	CTW
<i>Acacia hockii</i>	13.30	2.66	15.96	1.02	ACB

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon (AGC + BGC)

Dry evergreen Afromontane forest

In Buska Dry evergreen Afromontane forest (DAF) vegetation type, 80 woody species (DBH/DSH \geq 5cm) were identified in the elevation range of 1610 to 2098 m.a.s.l and 632.97 ton ha⁻¹ carbon stock was estimated. *Juniperus procera*, *Podocarpus falcatus* and *Olea europaea*, were woody species that had the highest carbon stock (137.08, 107.07 and 68.18 ton ha⁻¹, respectively)(Table 2).

Table 2. Top woody species in DAF vegetation with higher carbon stock (> 10 ton ha⁻¹)

Species	AGC	BGC	TC
<i>Juniperus procera</i>	114.23	22.85	137.08
<i>Podocarpus falcatus</i>	89.22	17.84	107.07
<i>Olea europaea</i>	56.81	11.36	68.18
<i>Ficus vasta</i>	56.05	11.21	67.25
<i>Croton macrostachyus</i>	23.32	4.66	27.98
<i>Euclea racemosa</i>	21.62	4.32	25.94
<i>Prunus africana</i>	12.04	2.41	14.45
<i>Maytenus senegalensis</i>	11.34	2.27	13.61
<i>Vitex doniana</i>	10.72	2.14	12.87
<i>Bridelia micrantha</i>	10.10	2.02	12.12
<i>Syzygium guineense</i>	8.80	1.76	10.56

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon (AGC + BGC)

***Combretum-Terminalia* woodland and wooded grassland**

Totally in this vegetation type 554.05 ton ha⁻¹ of carbon stock was estimated from 71 woody species. The vegetation was identified in the elevation range of 1402 to 1887 m.a.s.l. Higher carbon stock was recorded for *Combretum molle* followed by *Terminalia brownii* (137.80 and 83.82, respectively). *Combretum molle* and *Terminalia brownii* are the main characteristics species in *Combretum-Terminalia* woodland and wooded grassland (CTW) vegetation and contributed 40% of carbon stock. 78% of carbon stock is produced from only 14 woody species (Table 3).

Table 3. Woody species with higher carbon stock (> 10 ton ha⁻¹) in the CTW vegetation

Species	AGC	BGC	TC
<i>Combretum molle</i>	114.84	22.97	137.80
<i>Terminalia brownie</i>	69.85	13.97	83.82
<i>Ficus vasta</i>	27.14	5.43	32.57
<i>Acacia goetzei</i>	21.50	4.30	25.80
<i>Tamarindus indica</i>	20.70	4.14	24.84
<i>Ozoroa insignis</i>	18.06	3.61	21.67
<i>Croton macrostachyus</i>	13.67	2.73	16.40
<i>Entada abyssinica</i>	11.71	2.34	14.05
<i>Combretum collinum</i>	11.63	2.33	13.95
<i>Euclea racemose</i>	11.07	2.21	13.29
<i>Balanites rotundifolia</i>	10.83	2.17	13.00
<i>Syzygium guineense</i>	10.61	2.12	12.74
<i>Vitex doniana</i>	9.57	1.91	11.49
<i>Lannea fruticosa</i>	8.82	1.76	10.58

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon (AGC + BGC)

Acacia-Commiphora woodland and bushland

In this vegetation, 90 woody species were identified from 845 to 1788 m.a.s.l elevation range and 384.78 ton ha⁻¹ carbon was estimated. Higher carbon stock was recorded for *Tamarindus indica*, *Syzygium guineense* and *Acacia seyal*, 22.17, 21.6 and 17.98 ton ha⁻¹ respectively (Table 4).

Table 4. Woody species with higher carbon stock (> 10 ton ha⁻¹) in the ACB vegetation

Species	AGC	BGC	TC
<i>Tamarindus indica</i>	18.48	3.70	22.17
<i>Syzygium guineense</i>	17.99	3.59	21.60
<i>Acacia seyal</i>	14.99	3.00	17.98
<i>Euclea racemosa</i>	14.50	2.90	17.41
<i>Croton macrostachyus</i>	14.18	2.84	17.02
<i>Acacia tortilis</i>	13.33	2.67	15.99
<i>Acacia mellifera</i>	12.57	2.51	15.09
<i>Lannea fruticosa</i>	12.39	2.48	14.87
<i>Adenium obesum</i>	12.07	2.41	14.48
<i>Albizia anthelmintica</i>	10.76	2.15	12.91
<i>Stereospermum kunthianum</i>	9.93	1.99	11.91
<i>Acacia hockii</i>	9.31	1.86	11.17
<i>Acacia goetzei</i>	8.41	1.68	10.10

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon (AGC + BGC)

Carbon stock variation across vegetation types

The mean total carbon stock in DAF, CTW and ACB vegetation types were 21.1 ± 15.5 , 18.74 ± 15.8 and 12.02 ± 5.7 ton ha⁻¹ respectively. The maximum woody carbon stock of DAF was 59.85 ton ha⁻¹, CTW 57.25 ton ha⁻¹ and ACB 24.76 ton ha⁻¹. The minimum woody carbon stock estimated for DAF was 1.88, CTW 2.07 and ACB 3.96 ton ha⁻¹. The carbon stock variations of these vegetation types were significantly

different at $P < 0.03$. The carbon stocks of DAF and ACB significantly varied ($P = 0.02$) whereas the carbon stock variations of CTW with DAF and ACB were not significant ($P \leq 0.05$ (Fig. 2)).

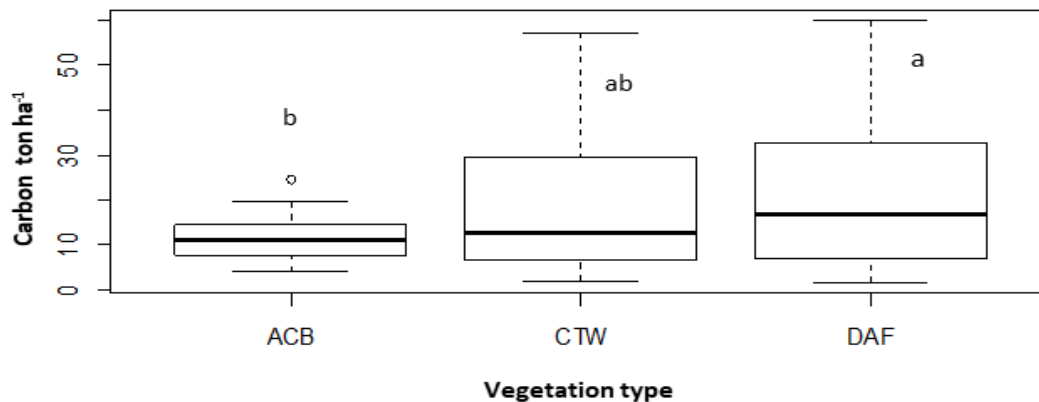


Figure 2. Carbon stock (AGC + BGC) variation across different vegetation types. Box plots with a different letter show significant carbon stock variation of vegetation types ($P < 0.05$).

Effects of altitude, species richness, abundance and basal area on carbon stock

In Buska Dry evergreen Afromontane forest and adjacent vegetations, the estimated carbon stock of woody species was not significantly correlated with altitude, species richness and abundance. However, the carbon stock was specific to the species and basal area of individuals ($R^2 = 0.87$)(Fig.3).

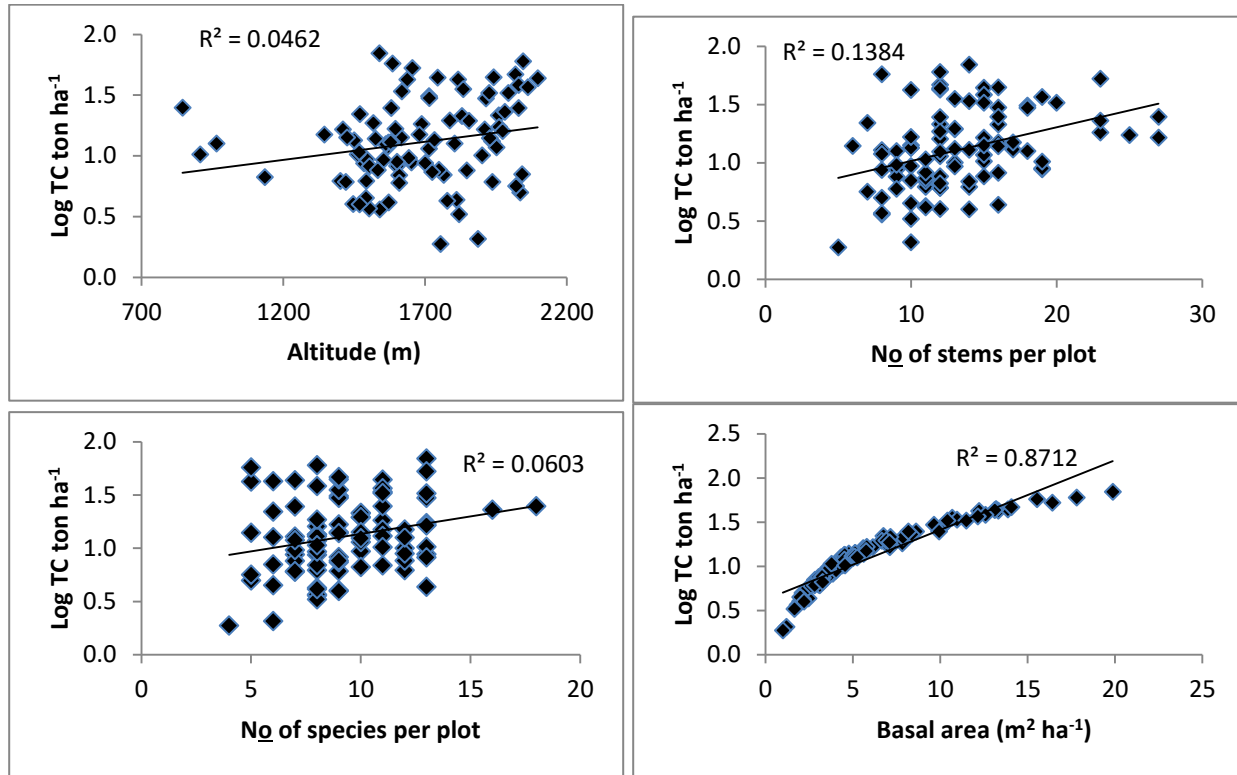


Figure 3. Correlation between carbon stock and altitude, species richness, abundance and basal area in the study area (TC = total carbon or AGC + BGC)

DISCUSSION

In the study area, Buska natural forest, higher woody species (≥ 5 cm DBH/DSH) richness was recorded (113 species). Its wide-ranging altitude (845– 2098 m), comprising three vegetation types, diverse topography, lower disturbance and suitable environments (*i.e.* rainfall, temperature and moisture) could be reasons for the high species richness (Homeier et al., 2010 and Song et al., 2021). Altitudinal gradients are major factor for changing environmental conditions and subsequent species richness and turnovers. The mid altitude is known with higher species richness and diversity due to the environmental suitability for floral diversity (Acharya et al., 2011 and Xu et al., 2017). The study area covers from lower to typically mid altitudinal gradients with mountainous, plateau, plain, hilly, valley and riverine topography and bimodal rainfall pattern (mean annual precipitation 757 mm) and intermediate temperature (mean annual temperature 22.7°C). The higher species richness and different vegetation types in Buska natural forest

highlight the potential of the forest for biodiversity conservation and provide multiple ecosystem services. The invasive alien species, *Prosopis juliflora* appearance in the study area indicated that the vegetation particularly in *Acacia-Commiphora* woodland and bushland (ACB) vegetation type needs urgent conservation priority. Hence the species is known for its fast growth, invasiveness, reproduction, and adaptive characteristics; it must be controlled before intensive expansion in ACB and other adjacent vegetation.

The estimated carbon stock of woody species in Buska natural forest (total 1571.8 ton ha⁻¹ average 17.08 ton ha⁻¹), is higher than different natural forests in Ethiopia. For example, carbon stock estimated in Sirso moist evergreen Afromontane forest (Mewded and Lemessa, 2020), as well as that of temperate forest on Mt. Changbai, China and Miombo Woodland Landscape of Mozambique (Zhu et al., 2010 and Ryan et al., 2011). More than half of woody species recorded in Buska natural forest were trees in habit (58) and this might be the reason for the higher woody carbon stock estimated in the studied forest because tree-dominated forests are typical for higher carbon sequestration (Dimobe et al., 2019). The study indicated that Buska natural forest is one of the potential forests that contribute to climate change mitigation through sequestering atmospheric carbon. The top woody species that had higher carbon stock such as *Combretum molle*, *Juniperus procera*, *Ficus vasta* and *Podocarpus falcatus* are characterized by bigger in size and thereby contributing to higher carbon stock.

Our study revealed differences in carbon stock of three vegetation types of Buska natural forest. Carbon stock in studied vegetation types ranges from an average of 12.02 ton ha⁻¹ in ACB to 21.1 ton ha⁻¹ in Dry evergreen Afromontane forest and grassland complex (DAF). The estimated carbon stock in DAF vegetation is significantly higher than ACB ($P = 0.02$) but not *Combretum-Terminalia* woodland and wooded grassland (CTW) ($P \leq 0.05$). This result is attributed to the relative distribution of bigger size tree species among vegetation types. DAF vegetation is dominated by *Juniperus procera* and *Podocarpus*

falcatus species, which are known for their bigger size individuals. However, the species richness in ACB is comparatively higher than in the other two vegetation types. This indicated the species richness is not a significant factor for the carbon stock variation between vegetation types rather carbon density is controlled by species composition. The insignificant correlation between carbon storage and species richness might be due to Buska natural forest/ecosystems may have reached climax species richness. Several studies reported that altitude, species richness and abundance are the major factors for the carbon stock variations within and/or among forests, vegetation types and land uses (Sintayehu et al., 2020; Salunkhe et al., 2018; Tetemke et al., 2021).

Contradictorily, in our study, these factors are not significant for the carbon stock variation between DAF, CTW and ACB vegetation types. However, the carbon stock is positively and highly correlates with basal areas of the individual species. The similar report was provided for higher carbon stock value independent to stand density and species richness of the forest rather than determined by the diameter of individuals of trees (Pradhan et al., 2019 and Zhu et al., 2010). The carbon stock dependent on the basal area of the species recorded in the study is that basal area is mainly dependent on the diameter of individuals (Gandhi and Sundarapandian, 2017). The insignificant relationship between species richness and woody carbon stock is revealed that the conservation of vegetation should be prioritized specific to the objectives of climate change mitigation as well as biodiversity conservation.

CONCLUSION

The findings from Buska Natural Forest offer critical, site-specific insights for Ethiopia's national forest monitoring and REDD+ implementation strategies. While confirming the forest's significant carbon storage potential overall, the study identifies key ecological drivers that must inform management priorities. The pronounced variation in carbon stocks among vegetation types—with Dry Evergreen Afromontane Forest (DAF) storing substantially more carbon than Combretum-Terminalia Woodland (CTW) or Acacia-Commiphora Bushland (ACB)—provides a actionable framework for prioritizing

conservation and restoration interventions within national REDD+ action plans. Crucially, the finding that basal area, not altitude or species richness, is the primary determinant of carbon stock offers a vital operational metric for carbon stock modeling and monitoring at the project level. This enables more efficient, targeted forest inventories. To maximize climate mitigation benefits, national programs should prioritize the protection and sustainable management of high-carbon density vegetation types like DAF. This targeted approach aligns directly with REDD+ objectives by ensuring that conservation efforts deliver verifiable and additional carbon benefits, thereby strengthening Ethiopia's case for results-based climate finance.

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Appendix 1. Overall woody species carbon stock in Buska forest and adjacent vegetation types

Species	Family	AGC (ton ha ⁻¹)	BGC (ton ha ⁻¹) 1)	TC	Percentage (%)
<i>Combretum molle</i>	Combretaceae	124.94	24.99	149.93	9.54
<i>Juniperus procera</i>	Cupressaceae	114.23	22.85	137.08	8.72
<i>Ficus vasta</i>	Moraceae	90.17	18.03	108.21	6.88
<i>Podocarpus falcatus</i>	Podocarpaceae	89.22	17.84	107.07	6.81
<i>Terminalia brownie</i>	Combretaceae	78.33	15.67	94.00	5.98
<i>Olea europaea</i>	Oleaceae	59.54	11.91	71.44	4.55
<i>Croton macrostachyus</i>	Euphorbiaceae	51.17	10.23	61.41	3.91
<i>Euclea racemose</i>	Ebenaceae	47.20	9.44	56.64	3.60
<i>Tamarindus indica</i>	Fabaceae	40.35	8.07	48.42	3.08
<i>Syzygium guineense</i>	Myrtaceae	37.40	7.48	44.89	2.86
<i>Acacia goetzei</i>	Fabaceae	33.45	6.69	40.14	2.55
<i>Vitex doniana</i>	Lamiaceae	26.82	5.36	32.18	2.05
<i>Lannea fruticosa</i>	Anacardiaceae	25.55	5.11	30.66	1.95
<i>Entada abyssinica</i>	Fabaceae	22.37	4.47	26.84	1.71
<i>Ozoroa insignis</i>	Anacardiaceae	20.08	4.02	24.09	1.53
<i>Adenium obesum</i>	Apocynaceae	16.95	3.39	20.34	1.29
<i>Acacia tortilis</i>	Fabaceae	16.85	3.37	20.23	1.29
<i>Bridelia micrantha</i>	Euphorbiaceae	16.51	3.30	19.81	1.26
<i>Balanites rotundifolia</i>	Balanitaceae	15.12	3.02	18.14	1.15
<i>Acacia seyal</i>	Fabaceae	14.99	3.00	17.98	1.14
<i>Cordia sinensis</i>	Boraginaceae	13.77	2.75	16.53	1.05
<i>Acacia hockii</i>	Fabaceae	13.30	2.66	15.96	1.02
<i>Ehretia cymosa</i>	Boraginaceae	13.09	2.62	15.71	1.00
<i>Maytenus</i>	Celastraceae	12.76	2.55	15.31	0.97
<i>Acacia mellifera</i>	Fabaceae	12.57	2.51	15.09	0.96
<i>Sterculia africana</i>	Sterculiaceae	12.30	2.42	14.53	0.92
<i>Prunus africana</i>	Rosaceae	12.04	2.41	14.45	0.92
<i>Erythrina brucei</i>	Fabaceae	11.67	2.33	14.01	0.89
<i>Combretum collinum</i>	Combretaceae	11.63	2.33	13.95	0.89
<i>Albizia anthelmintica</i>	Fabaceae	11.00	2.20	13.20	0.84
<i>Balanites aegyptiaca</i>	Balanitaceae	10.70	2.14	12.84	0.82
<i>Stereospermum</i>	Bignoniaceae	10.44	2.09	12.53	0.80
<i>Dombeya torrida</i>	Sterculiaceae	10.28	2.06	12.33	0.78
<i>Acacia nilotica</i>	Fabaceae	10.16	2.03	12.19	0.78
<i>Maytenus undata</i>	Celastraceae	9.29	1.86	11.15	0.71

<i>Ximenia americana</i>	Olacaceae	8.98	1.80	10.78	0.69
<i>Phoenix reclinata</i>	Arecaceae	8.59	1.72	10.31	0.66
<i>Cordia africana</i>	Boraginaceae	8.03	1.61	9.64	0.61
<i>Acacia senegal</i>	Fabaceae	7.38	1.48	8.86	0.56
<i>Teclea nobilis</i>	Rutaceae	7.10	1.42	8.52	0.54
<i>Maytenus arbutifolia</i>	Celastraceae	7.05	1.41	8.45	0.54
<i>Dodonea angustifolia</i>	Sapindaceae	6.77	1.35	8.13	0.52
<i>Brucea</i>	Simaroubaceae	6.66	1.33	8.00	0.51
<i>Gardenia ternifolia</i>	Rubiaceae	5.86	1.17	7.04	0.45
<i>Carissa spinarum</i>	Apocynaceae	5.72	1.14	6.87	0.44
<i>Ziziphus mucronata</i>	Rhamnaceae	5.61	1.12	6.73	0.43
<i>Heteromorpha</i>	Apiaceae	5.54	1.11	6.64	0.42
<i>Acacia bussei</i>	Fabaceae	5.46	1.09	6.55	0.42
<i>Commiphora</i>	Burseraceae	5.41	1.08	6.49	0.41
<i>Piliostigma thonningii</i>	Fabaceae	5.29	1.06	6.35	0.40
<i>Maesa lanceolata</i>	Myrsinaceae	5.14	1.03	6.17	0.39
<i>Grewia velutina</i>	Tiliaceae	5.11	1.02	6.13	0.39
<i>Sterculia</i>	Sterculiaceae	4.81	0.96	5.77	0.37
<i>Dichrostachys cinerea</i>	Fabaceae	4.77	0.95	5.73	0.36
<i>Maerua angolensis</i>	Capparidaceae	3.93	0.79	4.72	0.30
<i>Millettia ferruginea</i>	Fabaceae	3.83	0.77	4.60	0.29
<i>Rhus vulgaris</i>	Anacardiaceae	3.71	0.74	4.45	0.28
<i>Ficus sycomorus</i>	Moraceae	3.69	0.74	4.43	0.28
<i>Calpurnia aurea</i>	Fabaceae	3.68	0.74	4.42	0.28
<i>Combretum</i>	Combretaceae	3.50	0.70	4.20	0.27
<i>Dalbergia lactea</i>	Fabaceae	3.45	0.69	4.14	0.26
<i>Euphorbia</i>	Euphorbiaceae	3.18	0.64	3.81	0.24
<i>Caesalpinia</i>	Fabaceae	3.17	0.63	3.81	0.24
<i>Celtis africana</i>	Ulmaceae	3.04	0.61	3.65	0.23
<i>Diospyros abyssinica</i>	Ebenaceae	2.55	0.51	3.06	0.19
<i>Celtis toka</i>	Ulmaceae	2.51	0.50	3.01	0.19
<i>Ricinus communis</i>	Euphorbiaceae	2.27	0.45	2.73	0.17
<i>Vepris dainellii</i>	Rutaceae	2.06	0.41	2.47	0.16
<i>Grewia trichocarpa</i>	Tiliaceae	1.91	0.38	2.29	0.15
<i>Combretum</i>	Combretaceae	1.86	0.37	2.24	0.14
<i>Galiniara saxifraga</i>	Rubiaceae	1.86	0.37	2.23	0.14
<i>Protea gagedi</i>	Proteaceae	1.83	0.37	2.19	0.14
<i>Boswellia neglecta</i>	Burseraceae	1.65	0.33	1.98	0.13
<i>Euphorbia tirucalli</i>	Euphorbiaceae	1.32	0.26	1.59	0.10

<i>Commiphora tenuis</i>	Burseraceae	1.28	0.26	1.54	0.10
<i>Vernonia amygdalina</i>	Asteraceae	1.22	0.24	1.46	0.09
<i>Pterolobium stellatum</i>	Fabaceae	1.19	0.24	1.43	0.09
<i>Rhus natalensis</i>	Anacardiaceae	1.12	0.22	1.34	0.09
<i>Dracaena steudneri</i>	Dracaenaceae	1.06	0.21	1.28	0.08
<i>Buddleja polystachya</i>	Loganiaceae	1.06	0.21	1.27	0.08
<i>Vangueria</i>	Rubiaceae	0.91	0.18	1.09	0.07
<i>Lannea schimperi</i>	Anacardiaceae	0.87	0.17	1.05	0.07
<i>Pavetta abyssinica</i>	Rubiaceae	0.83	0.17	1.00	0.06
<i>Albizia schimperiana</i>	Fabaceae	0.81	0.16	0.97	0.06
<i>Teclea borenensis</i>	Rutaceae	0.80	0.16	0.96	0.06
<i>Phytolacca</i>	Phytolaccaceae	0.77	0.15	0.93	0.06
<i>Capparis tomentosa</i>	Capparidaceae	0.76	0.15	0.92	0.06
<i>Myrsine africana</i>	Myrsinaceae	0.60	0.12	0.72	0.05
<i>Osyris quadripartita</i>	Santalaceae	0.59	0.12	0.71	0.04
<i>Ziziphus spina-christi</i>	Rhamnaceae	0.52	0.10	0.62	0.04
<i>Vepris glomerata</i>	Rutaceae	0.49	0.10	0.58	0.04
<i>Canthium setiflorum</i>	Rubiaceae	0.47	0.09	0.57	0.04
<i>Grewia ferruginea</i>	Tiliaceae	0.45	0.09	0.54	0.03
<i>Grewia villosa</i>	Tiliaceae	0.44	0.09	0.52	0.03
<i>Prosopis juliflora</i>	Fabaceae	0.30	0.06	0.36	0.02
<i>Diospyros scabra</i>	Ebenaceae	0.27	0.05	0.33	0.02
<i>Nuxia congesta</i>	Loganiaceae	0.26	0.05	0.31	0.02
<i>Clutia lanceolata</i>	Euphorbiaceae	0.26	0.05	0.31	0.02
<i>Nuxia oppositifolia</i>	Loganiaceae	0.24	0.05	0.29	0.02
<i>Pavetta gardeniifolia</i>	Rubiaceae	0.19	0.04	0.23	0.01
<i>Capparis fascicularis</i>	Capparidaceae	0.15	0.03	0.18	0.01
<i>Grewia bicolor</i>	Tiliaceae	0.13	0.03	0.16	0.01
<i>Salvadora persica</i>	Salvadoraceae	0.13	0.03	0.16	0.01
<i>Rosa abyssinica</i>	Rosaceae	0.13	0.03	0.16	0.01
<i>Vernonia rueppellii</i>	Asteraceae	0.13	0.03	0.16	0.01
<i>Premna schimperi</i>	Lamiaceae	0.13	0.03	0.16	0.01
<i>Zanthoxylum</i>	Rutaceae	0.13	0.03	0.16	0.01
<i>Senna didymobotrya</i>	Fabaceae	0.13	0.03	0.16	0.01
<i>Vernonia auriculifera</i>	Asteraceae	0.13	0.03	0.16	0.01
<i>Canthium</i>	Rubiaceae	0.13	0.03	0.16	0.01
<i>Securidaca</i>	Polygalaceae	0.13	0.03	0.15	0.01
<i>Rhus tenuinervis</i>	Anacardiaceae	0.12	0.02	0.15	0.01
<i>Clutia abyssinica</i>	Euphorbiaceae	0.12	0.02	0.15	0.01

Grand Total	1310.01	261.96	1571.80	100.00
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Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon or AGC + BGC

Appendix 2: Woody species carbon stock in Buska Dry evergreen Afromontane forest

Species	AGC (ton ha ⁻¹)	BGC (ton ha ⁻¹)	TC
<i>Juniperus procera</i>	114.23	22.85	137.08
<i>Podocarpus falcatus</i>	89.22	17.84	107.07
<i>Olea europaea</i>	56.81	11.36	68.18
<i>Ficus vasta</i>	56.05	11.21	67.25
<i>Croton macrostachyus</i>	23.32	4.66	27.98
<i>Euclea racemosa</i>	21.62	4.32	25.94
<i>Prunus africana</i>	12.04	2.41	14.45
<i>Maytenus senegalensis</i>	11.34	2.27	13.61
<i>Vitex doniana</i>	10.72	2.14	12.87
<i>Bridelia micrantha</i>	10.10	2.02	12.12
<i>Syzygium guineense</i>	8.80	1.76	10.56
<i>Entada abyssinica</i>	7.10	1.42	8.52
<i>Erythrina brucei</i>	6.97	1.39	8.36
<i>Sterculia africana</i>	6.32	1.26	7.58
<i>Cordia sinensis</i>	5.88	1.18	7.06
<i>Phoenix reclinata</i>	5.29	1.06	6.35
<i>Dombeya torrida</i>	4.90	0.98	5.88
<i>Brucea antidysenterica</i>	4.43	0.89	5.31
<i>Lannea fruticosa</i>	4.35	0.87	5.22
<i>Grewia velutina</i>	3.69	0.74	4.43
<i>Ficus sycomorus</i>	3.69	0.74	4.43
<i>Heteromorpha</i>	3.65	0.73	4.39
<i>Acacia goetzei</i>	3.54	0.71	4.25
<i>Acacia tortilis</i>	3.53	0.71	4.23
<i>Ziziphus mucronata</i>	3.15	0.63	3.78
<i>Euphorbia ampliphylla</i>	2.99	0.60	3.59
<i>Ehretia cymosa</i>	2.56	0.51	3.07
<i>Teclea nobilis</i>	2.20	0.44	2.64
<i>Combretum molle</i>	2.14	0.43	2.57
<i>Ricinus communis</i>	2.14	0.43	2.57
<i>Dodonea angustifolia</i>	2.01	0.40	2.42
<i>Cordia africana</i>	1.95	0.39	2.33
<i>Acacia nilotica</i>	1.91	0.38	2.29
<i>Diospyros abyssinica</i>	1.78	0.36	2.13

<i>Balanites rotundifolia</i>	1.63	0.33	1.96
<i>Calpurnia aurea</i>	1.55	0.31	1.86
<i>Millettia ferruginea</i>	1.49	0.30	1.79
<i>Acacia hockii</i>	1.49	0.30	1.79
<i>Terminalia brownii</i>	1.25	0.25	1.50
<i>Celtis toka</i>	1.18	0.24	1.41
<i>Tamarindus indica</i>	1.17	0.23	1.41
<i>Ozoroa insignis</i>	1.10	0.22	1.32
<i>Draceana steudneri</i>	1.06	0.21	1.28
<i>Maesa lanceolata</i>	1.02	0.20	1.22
<i>Maytenus undata</i>	1.02	0.20	1.22
<i>Vepris dainellii</i>	0.88	0.18	1.05
<i>Commiphora</i>	0.86	0.17	1.03
<i>Albizia schimperiana</i>	0.81	0.16	0.97
<i>Caesalpinia decapetala</i>	0.76	0.15	0.91
<i>Gardenia ternifolia</i>	0.65	0.13	0.78
<i>Carissa spinarum</i>	0.64	0.13	0.76
<i>Capparis tomentosa</i>	0.63	0.13	0.76
<i>Maytenus arbutifolia</i>	0.59	0.12	0.71
<i>Vangueria</i>	0.53	0.11	0.64
<i>Acacia bussei</i>	0.51	0.10	0.61
<i>Stereospermum</i>	0.51	0.10	0.61
<i>Phytolacca dodecandra</i>	0.51	0.10	0.61
<i>Myrsine africana</i>	0.43	0.09	0.52
<i>Vernonia amygdalina</i>	0.41	0.08	0.49
<i>Adenium obesum</i>	0.41	0.08	0.49
<i>Celtis africana</i>	0.41	0.08	0.49
<i>Teclea borenensis</i>	0.39	0.08	0.47
<i>Rhus vulgaris</i>	0.30	0.06	0.36
<i>Buddleja polystachya</i>	0.29	0.06	0.35
<i>Diospyros scabra</i>	0.27	0.05	0.33
<i>Clusia lanceolata</i>	0.26	0.05	0.31
<i>Albizia anthelmintica</i>	0.25	0.05	0.30
<i>Balanites aegyptiaca</i>	0.19	0.04	0.23
<i>Dalbergia lactea</i>	0.18	0.04	0.21
<i>Pterolobium stellatum</i>	0.15	0.03	0.18
<i>Rhus natalensis</i>	0.13	0.03	0.16
<i>Rosa abyssinica</i>	0.13	0.03	0.16
<i>Galiniera saxifraga</i>	0.13	0.03	0.16

<i>Pavetta abyssinica</i>	0.13	0.03	0.16
<i>Vernonia auriculifera</i>	0.13	0.03	0.16
<i>Vernonia rueppellii</i>	0.13	0.03	0.16
<i>Nuxia congesta</i>	0.13	0.03	0.16
<i>Premna schimperii</i>	0.13	0.03	0.16
<i>Maerua angolensis</i>	0.13	0.03	0.15
<i>Grewia trichocarpa</i>	0.12	0.02	0.15
Grand Total	527.47	105.49	632.97

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon or AGC + BGC

Appendix 3: Carbon stock of woody species recorded in the CTW vegetation of study area

Species	AGC (ton ha ⁻¹)	BGC (ton ha ⁻¹)	TC
<i>Combretum molle</i>	114.84	22.97	137.80
<i>Terminalia brownii</i>	69.85	13.97	83.82
<i>Ficus vasta</i>	27.14	5.43	32.57
<i>Acacia goetzei</i>	21.50	4.30	25.80
<i>Tamarindus indica</i>	20.70	4.14	24.84
<i>Ozoroa insignis</i>	18.06	3.61	21.67
<i>Croton macrostachyus</i>	13.67	2.73	16.40
<i>Entada abyssinica</i>	11.71	2.34	14.05
<i>Combretum collinum</i>	11.63	2.33	13.95
<i>Euclea racemosa</i>	11.07	2.21	13.29
<i>Balanites rotundifolia</i>	10.83	2.17	13.00
<i>Syzygium guineense</i>	10.61	2.12	12.74
<i>Vitex doniana</i>	9.57	1.91	11.49
<i>Lannea fruticosa</i>	8.82	1.76	10.58
<i>Maytenus undata</i>	7.87	1.57	9.44
<i>Ehretia cymosa</i>	7.33	1.47	8.80
<i>Cordia sinensis</i>	6.99	1.40	8.39
<i>Cordia africana</i>	4.48	0.90	5.38
<i>Adenium obesum</i>	4.47	0.89	5.37
<i>Ximenia americana</i>	3.61	0.72	4.33
<i>Maesa lanceolata</i>	3.54	0.71	4.25
<i>Teclea nobilis</i>	3.54	0.71	4.25
<i>Maytenus arbutifolia</i>	3.26	0.65	3.91
<i>Combretum aculeatum</i>	3.19	0.64	3.82
<i>Rhus vulgaris</i>	3.16	0.63	3.79
<i>Dodonea angustifolia</i>	2.91	0.58	3.50

<i>Carissa spinarum</i>	2.89	0.58	3.47
<i>Maerua angolensis</i>	2.65	0.53	3.18
<i>Celtis africana</i>	2.64	0.53	3.16
<i>Balanites aegyptiaca</i>	2.53	0.51	3.03
<i>Acacia hockii</i>	2.50	0.50	3.00
<i>Acacia nilotica</i>	2.37	0.47	2.84
<i>Dombeya torrida</i>	2.37	0.47	2.84
<i>Phoenix reclinata</i>	1.90	0.38	2.28
<i>Combretum</i>	1.86	0.37	2.24
<i>Calpurnia aurea</i>	1.86	0.37	2.23
<i>Millettia ferruginea</i>	1.83	0.37	2.20
<i>Olea europaea</i>	1.80	0.36	2.16
<i>Bridelia micrantha</i>	1.71	0.34	2.05
<i>Piliostigma thonningii</i>	1.70	0.34	2.04
<i>Dalbergia lactea</i>	1.45	0.29	1.74
<i>Celtis toka</i>	1.33	0.27	1.60
<i>Commiphora</i>	1.28	0.26	1.54
<i>Vepris dainellii</i>	1.18	0.24	1.41
<i>Heteromorpha</i>	1.10	0.22	1.32
<i>Gardenia ternifolia</i>	1.04	0.21	1.25
<i>Protea gaguedi</i>	0.95	0.19	1.14
<i>Dichrostachys cinerea</i>	0.77	0.15	0.93
<i>Rhus natalensis</i>	0.72	0.14	0.86
<i>Ziziphus mucronata</i>	0.66	0.13	0.80
<i>Buddleja polystachya</i>	0.63	0.13	0.76
<i>Galiniera saxifraga</i>	0.63	0.13	0.76
<i>Lannea schimperi</i>	0.63	0.13	0.76
<i>Sterculia africana</i>	0.51	0.10	0.61
<i>Canthium setiflorum</i>	0.47	0.09	0.57
<i>Teclea borenensis</i>	0.41	0.08	0.49
<i>Pterolobium stellatum</i>	0.38	0.08	0.45
<i>Osyris quadripartita</i>	0.34	0.07	0.40
<i>Vernonia amygdalina</i>	0.31	0.06	0.38
<i>Grewia velutina</i>	0.30	0.06	0.36
<i>Vangueria</i>	0.25	0.05	0.31
<i>Vepris glomerata</i>	0.24	0.05	0.29
<i>Capparis fascicularis</i>	0.15	0.03	0.18
<i>Grewia villosa</i>	0.13	0.03	0.16
<i>Maytenus senegalensis</i>	0.13	0.03	0.16

<i>Phytolacca dodecandra</i>	0.13	0.03	0.16
<i>Brucea antidysenterica</i>	0.13	0.03	0.15
<i>Capparis tomentosa</i>	0.13	0.03	0.15
<i>Clusia abyssinica</i>	0.12	0.02	0.15
<i>Pavetta abyssinica</i>	0.12	0.02	0.15
<i>Rhus tenuinervis</i>	0.12	0.02	0.15
Grand Total	461.71	92.34	554.05

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon or AGC + BGC

Appendix 4: Woody species carbon stock in the ACB vegetation of study area

Species	AGC (ton ha ⁻¹)	BGC (ton ha ⁻¹)	TC
<i>Tamarindus indica</i>	18.48	3.70	22.17
<i>Syzygium guineense</i>	17.99	3.59	21.60
<i>Acacia seyal</i>	14.99	3.00	17.98
<i>Euclea racemosa</i>	14.50	2.90	17.41
<i>Croton macrostachyus</i>	14.18	2.84	17.02
<i>Acacia tortilis</i>	13.33	2.67	15.99
<i>Acacia mellifera</i>	12.57	2.51	15.09
<i>Lannea fruticosa</i>	12.39	2.48	14.87
<i>Adenium obesum</i>	12.07	2.41	14.48
<i>Albizia anthelmintica</i>	10.76	2.15	12.91
<i>Stereospermum kunthianum</i>	9.93	1.99	11.91
<i>Acacia hockii</i>	9.31	1.86	11.17
<i>Acacia goetzei</i>	8.41	1.68	10.10
<i>Balanites aegyptiaca</i>	7.98	1.60	9.58
<i>Combretum molle</i>	7.97	1.59	9.56
<i>Acacia senegal</i>	7.38	1.48	8.86
<i>Terminalia brownii</i>	7.24	1.45	8.68
<i>Ficus vasta</i>	6.99	1.40	8.39
<i>Vitex doniana</i>	6.52	1.30	7.83
<i>Acacia nilotica</i>	5.89	1.18	7.06
<i>Ximenia americana</i>	5.37	1.07	6.44
<i>Sterculia africana</i>	5.29	1.05	6.34
<i>Acacia bussei</i>	4.95	0.99	5.94
<i>Sterculia rhynchocarpa</i>	4.81	0.96	5.77
<i>Bridelia micrantha</i>	4.70	0.94	5.64
<i>Erythrina brucei</i>	4.70	0.94	5.64
<i>Gardenia ternifolia</i>	4.17	0.83	5.01
<i>Dichrostachys cinerea</i>	4.00	0.80	4.80
<i>Piliostigma thonningii</i>	3.59	0.72	4.31
<i>Entada abyssinica</i>	3.57	0.71	4.28
<i>Commiphora habessinica</i>	3.27	0.65	3.92

<i>Ehretia cymosa</i>	3.20	0.64	3.84
<i>Maytenus arbutifolia</i>	3.20	0.64	3.84
<i>Dombeya torrida</i>	3.02	0.60	3.62
<i>Balanites rotundifolia</i>	2.66	0.53	3.19
<i>Caesalpinia decapetala</i>	2.42	0.48	2.90
<i>Carissa spinarum</i>	2.19	0.44	2.63
<i>Brucea antidysenterica</i>	2.11	0.42	2.53
<i>Dodonea angustifolia</i>	1.85	0.37	2.21
<i>Dalbergia lactea</i>	1.82	0.36	2.19
<i>Ziziphus mucronata</i>	1.80	0.36	2.15
<i>Grewia trichocarpa</i>	1.79	0.36	2.14
<i>Boswellia neglecta</i>	1.65	0.33	1.98
<i>Cordia africana</i>	1.61	0.32	1.93
<i>Phoenix reclinata</i>	1.40	0.28	1.69
<i>Teclea nobilis</i>	1.36	0.27	1.63
<i>Euphorbia tirucalli</i>	1.32	0.26	1.59
<i>Commiphora tenuis</i>	1.28	0.26	1.54
<i>Maytenus senegalensis</i>	1.28	0.26	1.54
<i>Maerua angolensis</i>	1.16	0.23	1.39
<i>Grewia velutina</i>	1.12	0.22	1.34
<i>Galiniera saxifraga</i>	1.09	0.22	1.31
<i>Olea europaea</i>	0.93	0.19	1.11
<i>Ozoroa insignis</i>	0.92	0.18	1.10
<i>Cordia sinensis</i>	0.90	0.18	1.08
<i>Protea gagedi</i>	0.88	0.18	1.05
<i>Heteromorpha arborescens</i>	0.78	0.16	0.94
<i>Diospyros abyssinica</i>	0.77	0.15	0.93
<i>Pterolobium stellatum</i>	0.66	0.13	0.79
<i>Maesa lanceolata</i>	0.58	0.12	0.69
<i>Pavetta abyssinica</i>	0.58	0.12	0.69
<i>Ziziphus spina-christi</i>	0.52	0.10	0.62
<i>Millettia ferruginea</i>	0.51	0.10	0.61
<i>Vernonia amygdalina</i>	0.49	0.10	0.59
<i>Grewia ferruginea</i>	0.45	0.09	0.54
<i>Maytenus undata</i>	0.41	0.08	0.49
<i>Combretum aculeatum</i>	0.31	0.06	0.38
<i>Grewia villosa</i>	0.30	0.06	0.36
<i>Prosopis juliflora</i>	0.30	0.06	0.36
<i>Calpurnia aurea</i>	0.27	0.05	0.32
<i>Rhus natalensis</i>	0.27	0.05	0.32
<i>Osyris quadripartita</i>	0.25	0.05	0.30
<i>Rhus vulgaris</i>	0.25	0.05	0.30
<i>Vepris glomerata</i>	0.25	0.05	0.30
<i>Lannea schimperi</i>	0.24	0.05	0.29

<i>Nuxia oppositifolia</i>	0.24	0.05	0.29
<i>Euphorbia ampliphylla</i>	0.19	0.04	0.23
<i>Pavetta gardeniifolia</i>	0.19	0.04	0.23
<i>Myrsine africana</i>	0.17	0.03	0.20
<i>Buddleja polystachya</i>	0.13	0.03	0.16
<i>Grewia bicolor</i>	0.13	0.03	0.16
<i>Phytolacca dodecandra</i>	0.13	0.03	0.16
<i>Ricinus communis</i>	0.13	0.03	0.16
<i>Salvadora persica</i>	0.13	0.03	0.16
<i>Canthium pseudosetiflorum</i>	0.13	0.03	0.16
<i>Nuxia congesta</i>	0.13	0.03	0.16
<i>Senna didymobotrya</i>	0.13	0.03	0.16
<i>Zanthoxylum chalybeum</i>	0.13	0.03	0.16
<i>Securidaca longepedunculata</i>	0.13	0.03	0.15
<i>Vangueria madagascariensis</i>	0.12	0.02	0.15
Grand Total	320.64	64.11	384.79

Note: AGC = above ground carbon, BGC = below ground carbon, TC = total carbon or AGC + BGC