Article:
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Tables and Figures

Fig. 1. Study sites with the different forest types in relation to altitude and sample design. Note that all plots (n=24) were established on the windward side of the mountains. There is a small patch of elfin-like forest in Mt Marsabit but it was found to be so fragmented and degraded that it could not be considered an altitudinal vegetation unit in this mountain.

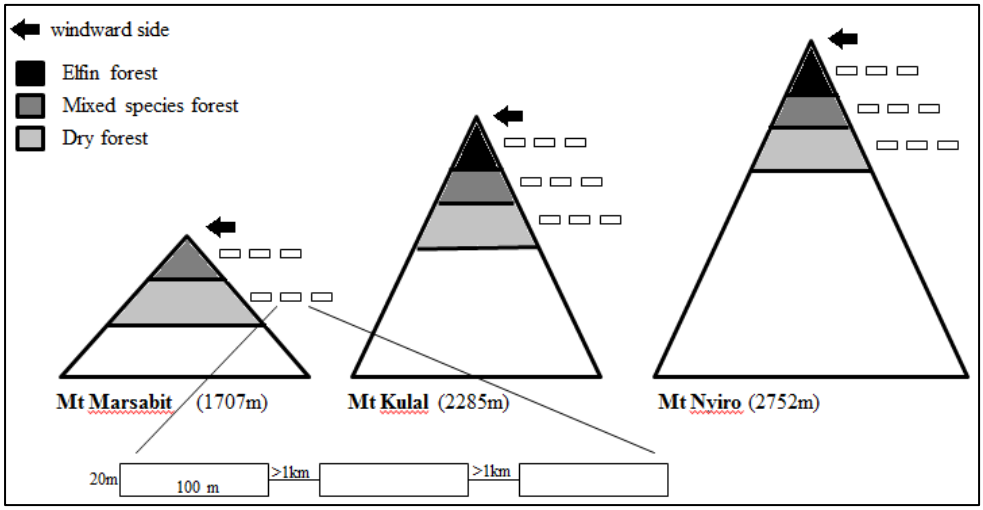

Fig. 2. Height–diameter allometric models for different inventoried forest types in the different mountains.

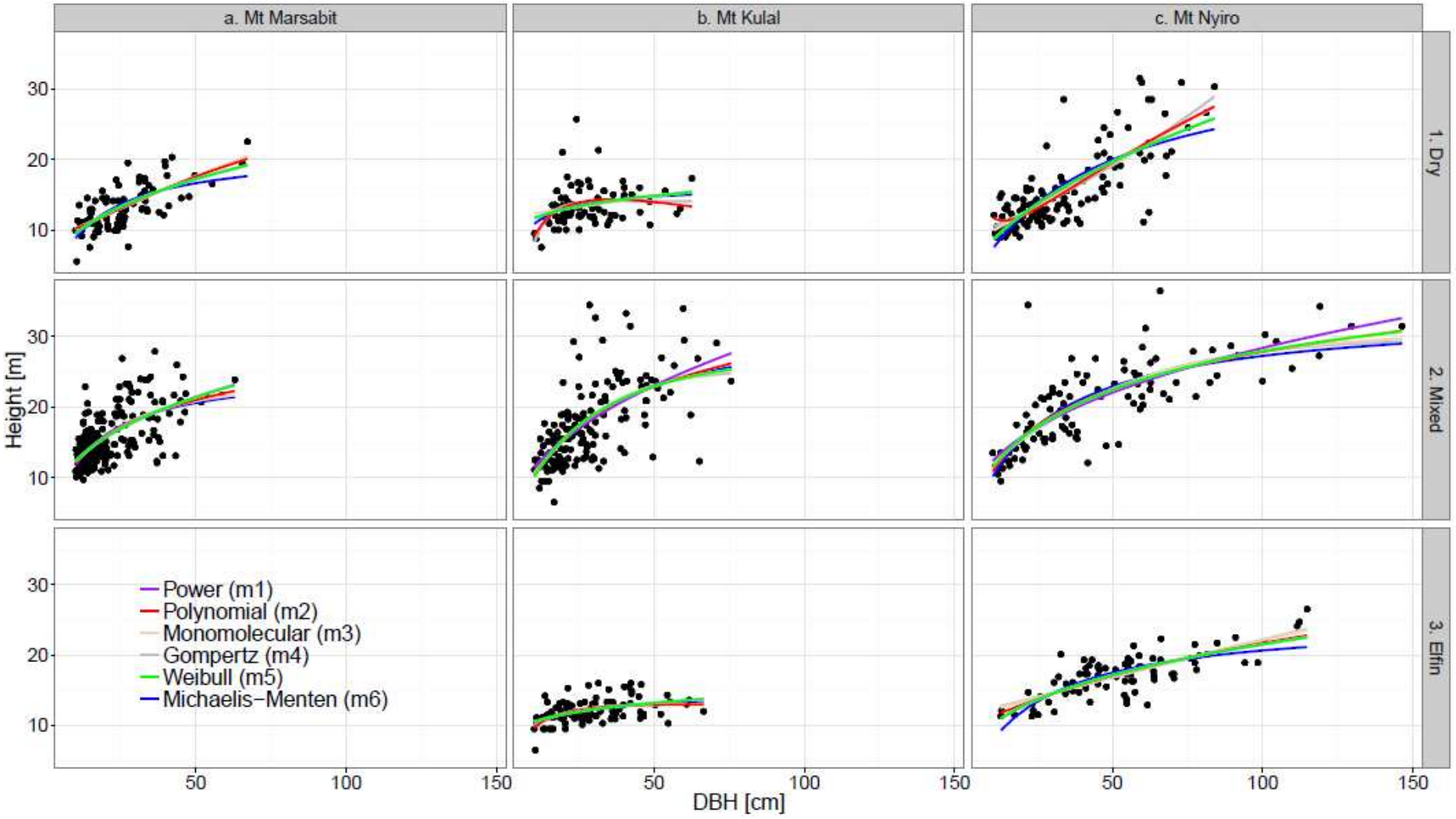

Fig. 3. Above ground biomass (AGB in Mg ha^{-1}) in relation to forest type and mountain (left), and AGB (in Mg ha^{-1}) in relation to altitude (m asl) with regard to forest type (right). Note that the slopes of the regressions (part b) are not significantly different at $p<0.05$.

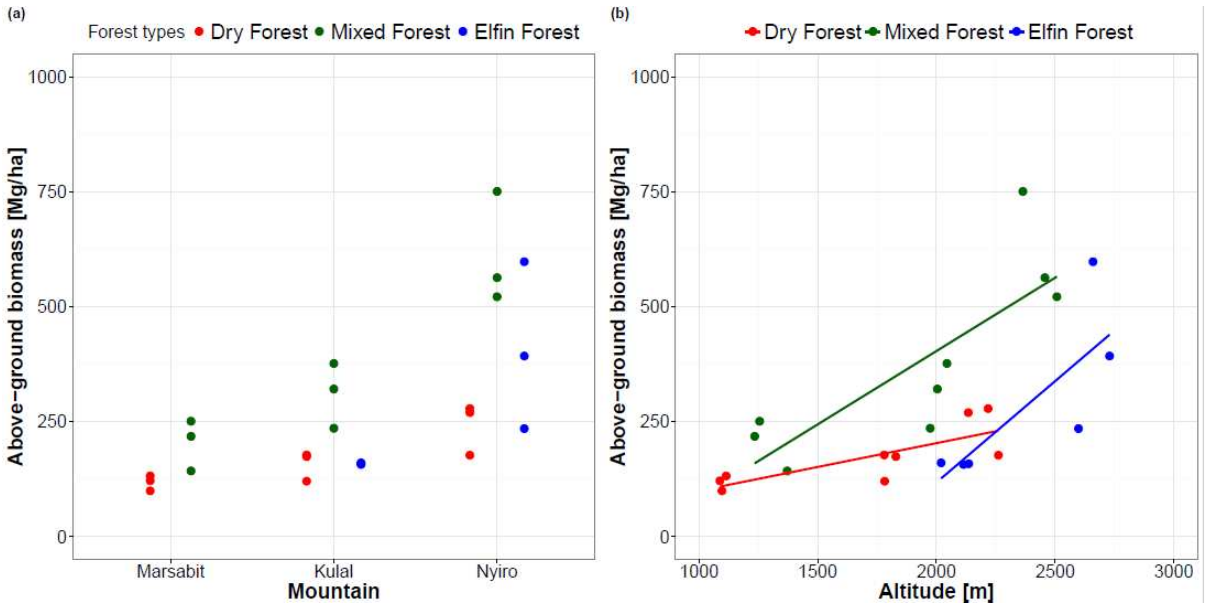

Fig. 4. Similarity between forests studied with regard to the Bray-Curtis index of dissimilarity. Note that species were more similar when comparing different forest types in one mountain as opposed to comparing one forest type across mountains.

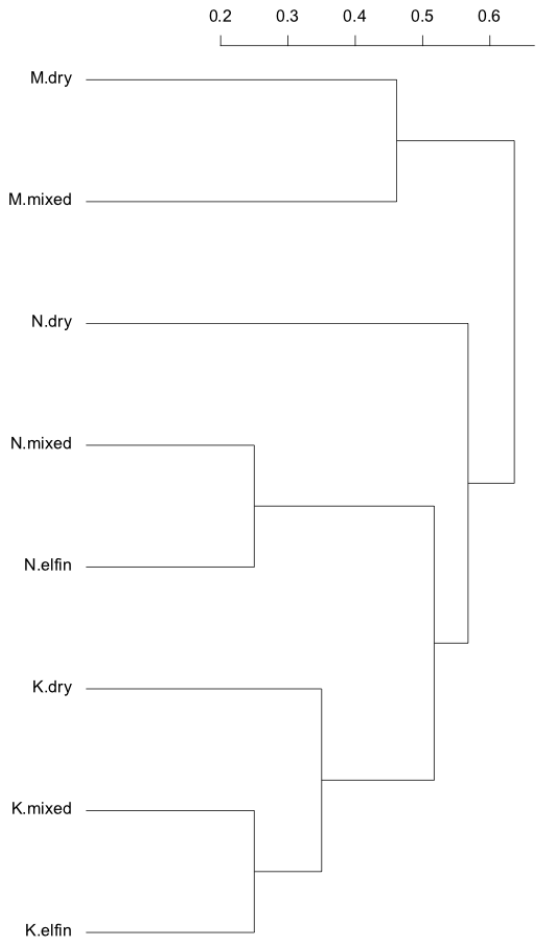

Fig. 5. Above ground biomass (AGB in Mg ha^{-1}), in relation to basal area (BA in m^2 ha^{-1}), mean tree height (H_{mean} in m), the Shannon index of diversity (H') and the Pielou's evenness index (J'). Note that red dots refer to dry forest, green dots: mixed forest, blue dots: elfin forest. Lines indicate significant correlations (Pearson r^2=0.96 and 0.61 for AGB~BA and AGB~Hmean respectively, p<0.01).

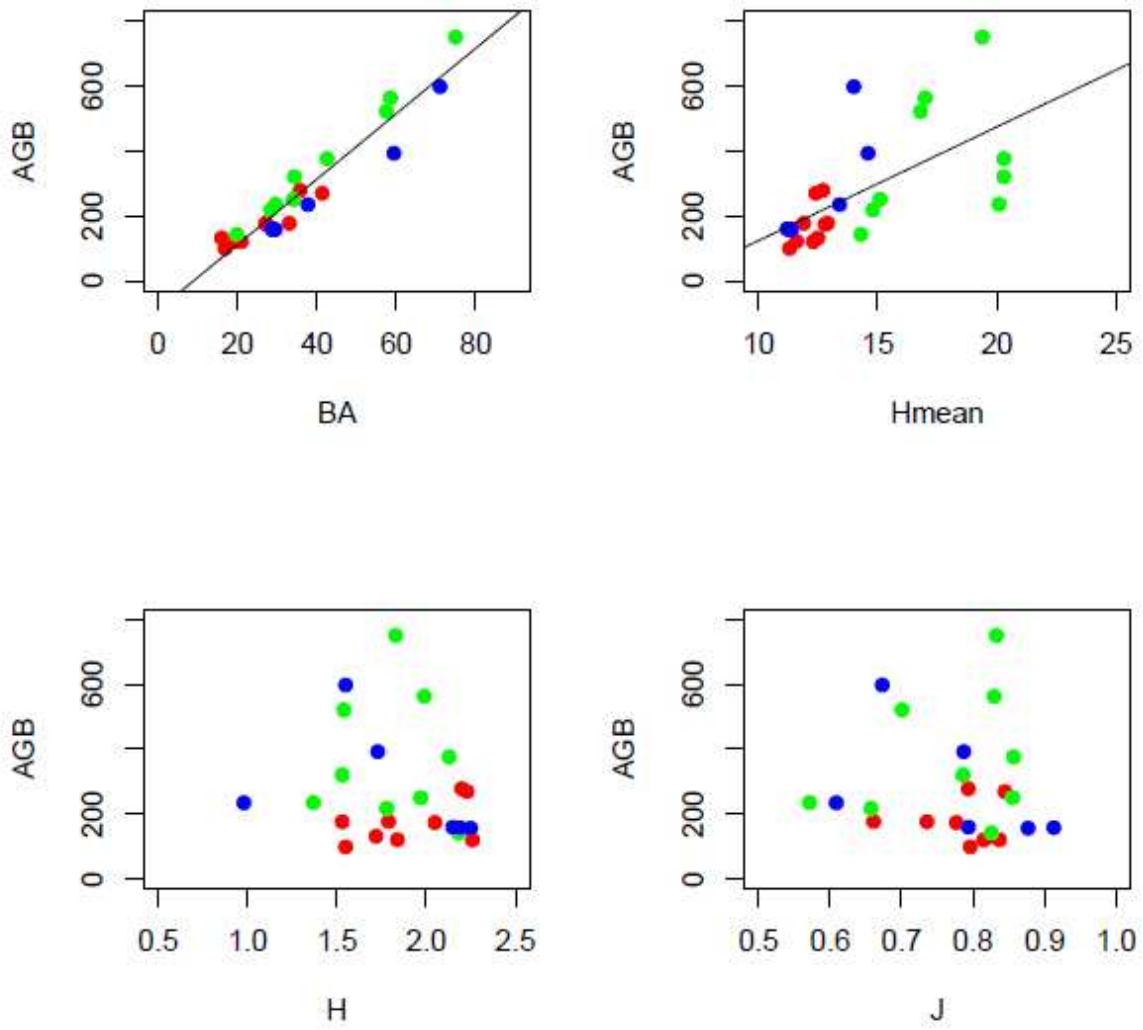

Table 1 Local site specific equations relating height (in m) to diameter (in cm) for each forest type and mountain, and 'all sites' combined. The Akaike Information Criteria (AIC), the Root Mean Squared Error (RMSE) and parameter estimates.

	Power (m1)		Polynomial (m2)			Monomolecular (m3)			Gompertz (m4)			Weibull (m5)			Michaelis-Menten (m6)		
	AIC	**RMSE**	**AIC**	**RMSE**		**AIC**	**RMSE**		**AIC**	**RMSE**		**AIC**	**RMSE**		**AIC**	**RMSE**	
Marsabit.dry	408.68	2.21	409.26	2.19		409.01	2.19		409.06	2.19		410.69	2.21		414.90	2.29	
Kulal.dry	418.82	2.60	414.38	2.50		423.54	2.64		412.86	2.48		420.78	2.59		415.94	2.55	
Nyiro.dry	684.89	3.43	679.06	3.33		679.77	3.34		678.32	3.32		686.93	3.43		696.25	3.59	
Marsabit.mixed	1028.98	2.86	1030.00	2.86		1030.06	2.86		1030.15	2.86		1030.79	2.86		1028.61	2.86	
Kulal.mixed	890.61	4.28	890.75	4.25		889.84	4.24		889.53	4.23		890.04	4.24		888.26	4.24	
Nyiro.mixed	586.00	3.64	585.69	3.60		588.00	3.64		589.47	3.66		586.33	3.61		585.92	3.64	
Kulal.elfin	389.65	1.43	388.36	1.41		388.76	1.41		388.86	1.41		391.59	1.43		386.84	1.41	
Nyiro.elfin	348.76	1.96	350.50	1.95		350.16	1.95		350.57	1.95		350.78	1.96		357.60	2.06	
all sites	5334.586	3.84	5332.43	3.83		5331.77	3.83		5333.27	3.83		5336.67	3.84		5384.25	3.94	
	a	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**	**a**	**b**	**c**
Marsabit.dry	4.0282	0.3709	-	18.6455	-8.4966	2.0998	62.8535	54.7979	0.00381	32.0235	1.3533	0.0163	1249.8140	0.0032	0.3729	21.3807	14.3334	-
Kulal.dry	8.2386	0.1502	-	27.4234	23.3027	3.2537	1198.4240	1210.1830	0.00005	14.0629	6.1331	0.2408	100.2738	0.0847	0.1625	16.2047	5.0221	-
Nyiro.dry	2.5262	0.5246	-	45.6940	26.1748	4.9808	1865.2450	1857.8130	0.00013	182.2200	3.0375	0.0060	2032.1940	0.0012	0.5267	35.7650	39.6722	-
Marsabit.mixed	5.6568	0.3407	-	-1.2274	5.8030	0.0296	22.8512	16.3162	0.04232	22.0900	1.0481	0.0573	98.2432	0.0566	0.3752	25.4405	11.7110	-
Kulal.mixed	4.1367	0.4392	-	-8.8301	8.2495	0.0354	26.6800	23.6639	0.03723	25.4430	1.5066	0.0546	27.3726	0.0645	0.8542	33.6567	23.3894	-
Nyiro.mixed	5.3007	0.3645	-	-4.7340	6.3393	0.1599	30.8793	23.3743	0.02073	29.8532	1.1743	0.0287	37.7530	0.0949	0.5764	33.6789	23.4729	-
Kulal.elfin	7.5772	0.1418	-	-3.9500	8.2249	0.9987	13.0655	7.3826	0.08419	13.0593	0.6639	0.0892	84.0855	0.0935	0.1538	14.1639	4.2590	-
Nyiro.elfin	4.7537	0.3278	-	15.6831	-5.0506	1.3801	67.5843	56.6210	0.00219	43.0557	1.3330	0.0070	1385.7170	0.0034	0.3298	25.1837	22.0438	-
all sites	4.8568	0.3517	17.2015	-6.4781	1.7849	40.63	30.99	0.00728	33.1203	1.1901	0.0154	1620.0000	0.0030	0.3535	25.7687	16.5688		

Table 2 Mean above ground biomass (AGB in Mg ha^{-1}) per forest type and mountain calculated using site specific second-order polynomial model (m2), 'all sites' combined Monomolecular model (m3), and percentage of change. Note that these AGB values are not significantly different at $p<0.05$ (paired t-test).

Mountain	Forest types	AGB site specific	AGB all sites	% change
Marsabit	**dry**	117.5	122.2	4.0
	mixed	203.8	196	-3.8
Kulal	**dry**	157.2	168.4	7.1
	mixed	310.9	292.7	-5.9
	elfin	158.5	176.1	11.1
Nyiro	**dry**	241.6	251.4	4.1
	mixed	611.8	587.4	-4.0
	elfin	408.4	423.7	3.7

Table 3 Above ground biomass (AGB in Mg ha^{-1} calculated using site specific second-order polynomial model m2), mean height (mean height of all trees in the plot, H_{mean}), mean diameter (mean diameter of all trees in the plot, D_{mean}), maximum height (height of the tallest tree, H_{max}), basal area (BA in m^2 ha^{-1}), stem density (SD in number stems ha^{-1}), stem density of large trees (with diameter >50cm, SD_{50} in number stems ha^{-1}), wood mass density weighted by BA (WMD_{BA}), species richness (No spp), the rarefied species richness per 50 individuals (named Rsp), Shannon index (H') and the Pielou's evenness index (J') per forest type per mountain. Different letters within columns mark significant differences at $p<0.01$.

Mountain	Forest types	AGB		H_{mean}		D_{mean}		BA		SD_{50}		SD		WMD_{BA}		No spp		Rsp		H'		J'	
Marsabit				11.8 ±		19.8 ±		17.4 ±		1.7 ±		441.6 ±		0.664 ±				7.3 ±		1.7 ±		0.82 ±	
	dry	117.5 ± 16.6	a	0.6	a	2.7	a	1.8	a	1.5	a	186.4	a	0.034	a	8 ± 1	a	1.1	a	0.1	a	0.02	a
				14.7 ±		18.3 ±		27.4 ±		1.3 ±				0.630 ±		13 ±		8.6 ±		1.9 ±		0.77 ±	
	mixed	203.8 ± 55.4	ab	0.4	c	0.7	a	7.1	a	0.6	a	785 ± 138.1	b	0.045	a	2.6	a	2.5	a	0.2	a	0.1	a
Kulal				12.6 ±		19.6 ±		25.1 ±		2.3 ±				0.669 ±				8.6 ±		2.0 ±		0.75 ±	
	dry	157.2 ± 31.9	a	0.3	ab	0.6	a	3.6	a	0.6	a	685 ± 67.2	ab	0.016	a	15 ± 1	a	0.6	a	0.3	a	0.08	a
				20.2 ±		24.6 ±		35.5 ±		8.0 ±		521.6 ±		0.620 ±		10 ±		7.0 ±		1.6 ±		0.73 ±	
	mixed	310.9 ± 71.1	ab	0.1	d	1.7	ab	6.5	a	1.0	a	108.6	ab	0.020	a	2.6	a	1.0	a	0.4	a	0.14	a
				11.3 ±		19.9 ±				3.0 ±		733.3 ±		0.644 ±				9.3 ±		2.2 ±		0.86 ±	
	elfin	158.5 ± 1.73	a	0.1	a	0.3	a	29 ± 0.4	a	1.0	a	11.54	ab	0.014	a	13 ± 2	a	2.0	a	0.1	a	0.06	a
Nyiro				12.3 ±		22.2 ±		36.7 ±		7.6 ±				0.587 ±		12.6 ±		8.3 ±		1.9 ±		0.79 ±	
	dry	241.6 ± 56.2	ab	0.4	a	1.9	a	4.2	a	4.9	a	705 ± 115	ab	0.025	a	4	a	3.0	a	0.4	a	0.05	a
		611.8 ±		17.7 ±		29.9 ±		63.6 ±		19.3 ±		483.3 ±		0.605 ±		9.6 ±		8.0 ±		1.8 ±		0.78 ±	
	mixed	122.1	c	1.4	e	2.7	b	9.7	b	4.0	b	92.9	a	0.015	a	1	a	1.0	a	0.2	a	0.07	a
		408.4 ±		14.0 ±		29.9 ±		56.1 ±		17.0 ±		456.6 ±		0.579 ±		8 ±		7.0 ±		1.4 ±		0.68 ±	
	elfin	182.0	b	0.6	b	4.7	b	16.9	b	5.3	b	7.63	a	0.044	a	2.6	a	1.7	a	0.4	a	0.09	a

Table 4 Correlation between above ground biomass (AGB in Mg ha-1), and other forest attributes including: mean height (mean height of all trees in the plot, H_{mean}), mean diameter (mean diameter of all trees in the plot, D_{mean}), maximum height (height of the tallest tree, Hmax), basal area (BA in m2 ha-1), stem density (SD in number stems ha-1), stem density of large trees (with diameter >50cm, SD_{50} in number stems ha-1), wood mass density weighted by BA (WMD_{BA}), species richness (No spp), Shannon index (H') and the Pielou's evenness index (J'). Significant correlations at $p<0.01$ are highlighted as **.

	AGB	
BA	0.96	**
SD_{50}	0.87	**
D_{mean}	0.88	**
H_{mean}	0.61	**
SD	-0.38	
WMD_{BA}	-0.37	
No spp	-0.22	
H'	-0.17	
J'	-0.08	

Table 5 Literature-derived estimates of aboveground biomass (AGB, in Mg ha^{-1}) for African tropical montane forests. SD - stem density (in number stems ha^{-1}), BA - basal area (in m^2 ha^{-1}), DBH - minimum tree diameter included in the study, Equation used - model used to estimate AGB in the respective study

Location	forest type	AGB	SD	BA	DBH	Equation used
Mt Kilimanjaro[1]	lower montane	355	-	-	>10 cm	Chave et al. 2005 (wet forest)
	montane (Ocotea)	274	-	-		
	upper montane (Podocarpus)	364	-	-		
Udzungwa and Usambara[2]	transition	400	-	-	>10 cm	Chave et al. 2005 (moist forest)
	afromontane	360	-	-		
Hanang Forest [3]	low altitude	140	-	-	>10 cm	tree volumes
	mid altitude	100	-	-		
	high altitude	25	-	-		
Hanang Forest[4]	mean all forest	50	722	-	>5 cm	Chave et al. 2005 (moist forest)
Kitonga Forest [5]	1300m miombo	48	335	10.4	>10 cm	mean different models including height
	1500m miombo	28	281	6.2		
East Usambaras[6]	mean all forest	461	-	47.3	>10cm	local equation including height
West Usambara[7]	mean all forest	872	980	52	>6 cm	tree volumes
Ulguru[7]	mean all forest	648	1161	42	>6 cm	tree volumes
Udzungwa [8]	1000-1500m	-	400-500	40-50	> 3 cm	na
Taita Hills[9]	mean all forest	600-760	600-1300	53-69	>5 cm	Chave et al. 2005 (moist forest)*
Mau Forest [10]	mean dense forest	265	-	-	>5 cm[a]	Bradley 1988 including height
Mt Elgon[11]	mean all forest	-	300-800	21-43	>5cm	na
Nyungwe NP[12]	mean late successional	387	478	36.2	>10cm	Chave et al. 2014 including height

[1]Ensslin et al. 2015, [2]Marshall et al. 2012, [3]Swai et al. 2014, [4]Shirima et al. 2016, [5] Shirima et al. 2011, [6]Hansen et al. 2015, [7]Munishi and Shear 2004, [8]Lovett et al. 2006, [9]Omoro et al. 2013, [10]Kinyanjui et al. 2014,[11]Sassen and Sheil 2013, [12] Nyirambangutse et al. 2016. Note that studies 1-8 are located in Tanzania, 9-10 in Kenya and 11 in Kenya-Uganda border (the Ugandan side being the one sampled), 12 Rwanda. * refers to equation without tree height, [a] includes also saplings defined as diameter <5cm and height >1.5m, na to non-available. Empty cells (-) refer to no information available on that variable in that study.