

State of miombo woodlands along a disturbance gradient in Hurungwe communal lands, mid-Zambezi Valley, Zimbabwe

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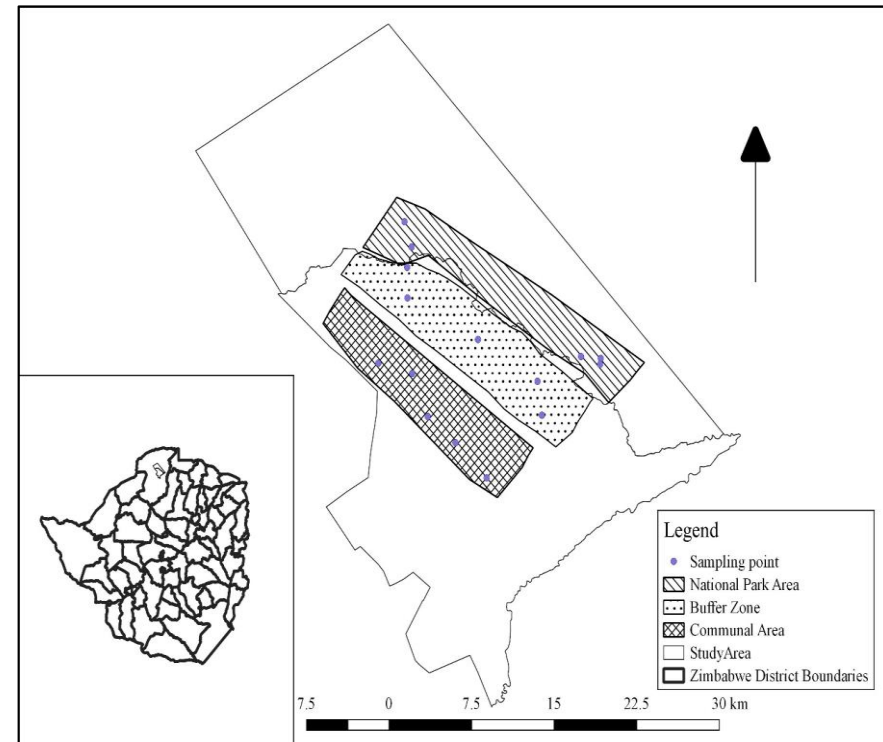
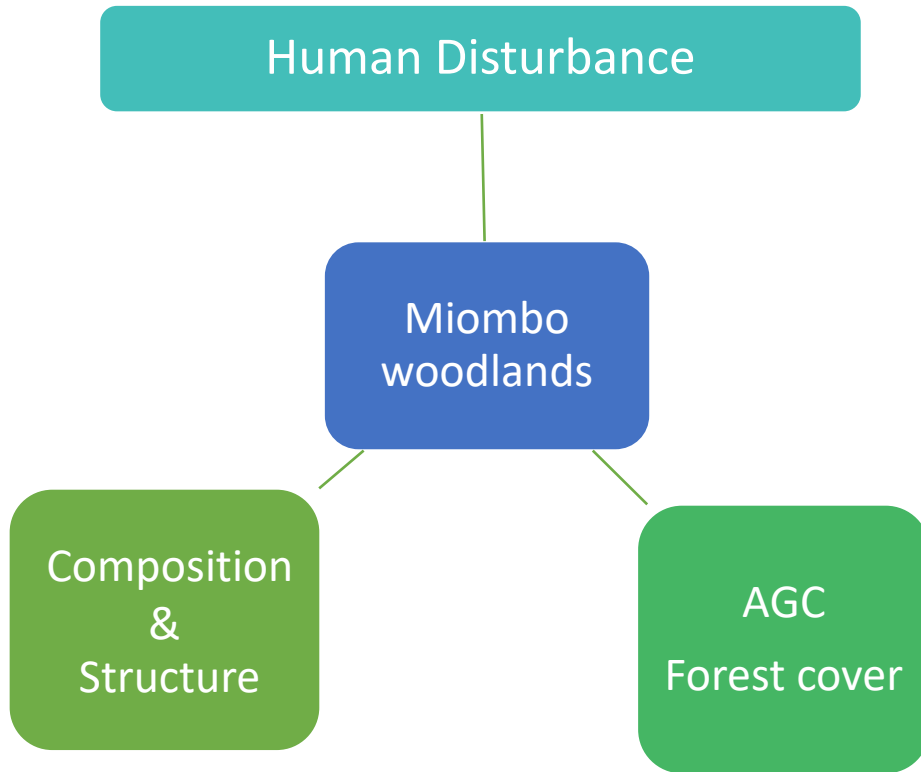
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Reinforcement of Agricultural and Environmental
Research in TFCAs - Zimbabwe



General study structure & framework



Results & Discussion: Disturbance

Mean number of stumps and fires frequency in the national park, buffer zone and communal area ($n = 5$ and $\pm =$ standard error).

Disturbance	Site			F	p value
	Nation park	Buffer zone	Communal area		
Number of stumps (ha^{-1})	0.00 ± 0.0^a	89.4 ± 38.7^b	21.1 ± 9.8^b	4.122	0.043
Fire frequency (yr^{-1})	31.1 ± 3.3^a	28.7 ± 3.7^a	19.6 ± 2.1^b	6.761	0.003
Forest area lost (ha yr^{-1})	0.20	11.5	9.20	nd	nd
Total forest area lost (ha)	3.80	195.9	155.8	nd	nd



Results & Discussion: Species Diversity

Mean diversity indices ($n = 5$ and $\pm =$ standard error)

Parameter	Site			F	p value
	Nation park	Buffer zone	Communal area		
Diversity indices					
Dominance	0.42 \pm 0.05	0.35 \pm 0.06	0.30 \pm 0.08	0.930	0.421
Shannon-Weiner (H)	1.19 \pm 0.11	1.40 \pm 0.18	1.55 \pm 0.22	1.106	0.362
Species richness	6.80 \pm 0.73	7.00 \pm 1.22	6.80 \pm 0.97	0.013	0.987
Evenness	0.50 \pm 0.03 ^a	0.63 \pm 0.06 ^{ab}	0.74 \pm 0.08 ^b	4.555	0.034
Equitability	0.62 \pm 0.04	0.74 \pm 0.06	0.82 \pm 0.07	2.796	0.101
Fisher's α	1.98 \pm 0.27	3.03 \pm 0.62	4.22 \pm 1.36	1.636	0.235



Results & Discussion: Species Structure

Mean structural variables ($n = 5$ and $\pm =$ standard error)

Parameter	Site			F	p value
	Nation park	Buffer zone	Communal area		
Structural variables					
Diameter (cm)	6.32 \pm 0.90	7.96 \pm 1.22	6.20 \pm 1.47	0.650	0.540
Height (m)	4.96 \pm 0.38	4.94 \pm 0.51	3.92 \pm 0.33	2.070	0.169
Tree density (ha ⁻¹)	1657.2 \pm 194.4 ^a	757.6 \pm 116.8 ^b	673.6 \pm 135.8 ^b	12.76	0.001
Basal area (m ²)	5.55 \pm 1.11	5.11 \pm 1.17	2.93 \pm 1.04	1.600	0.242
Volume (m ³)	267.4 \pm 31.3 ^a	165.3 \pm 17.0 ^b	94.7 \pm 16.7 ^b	14.62	0.001



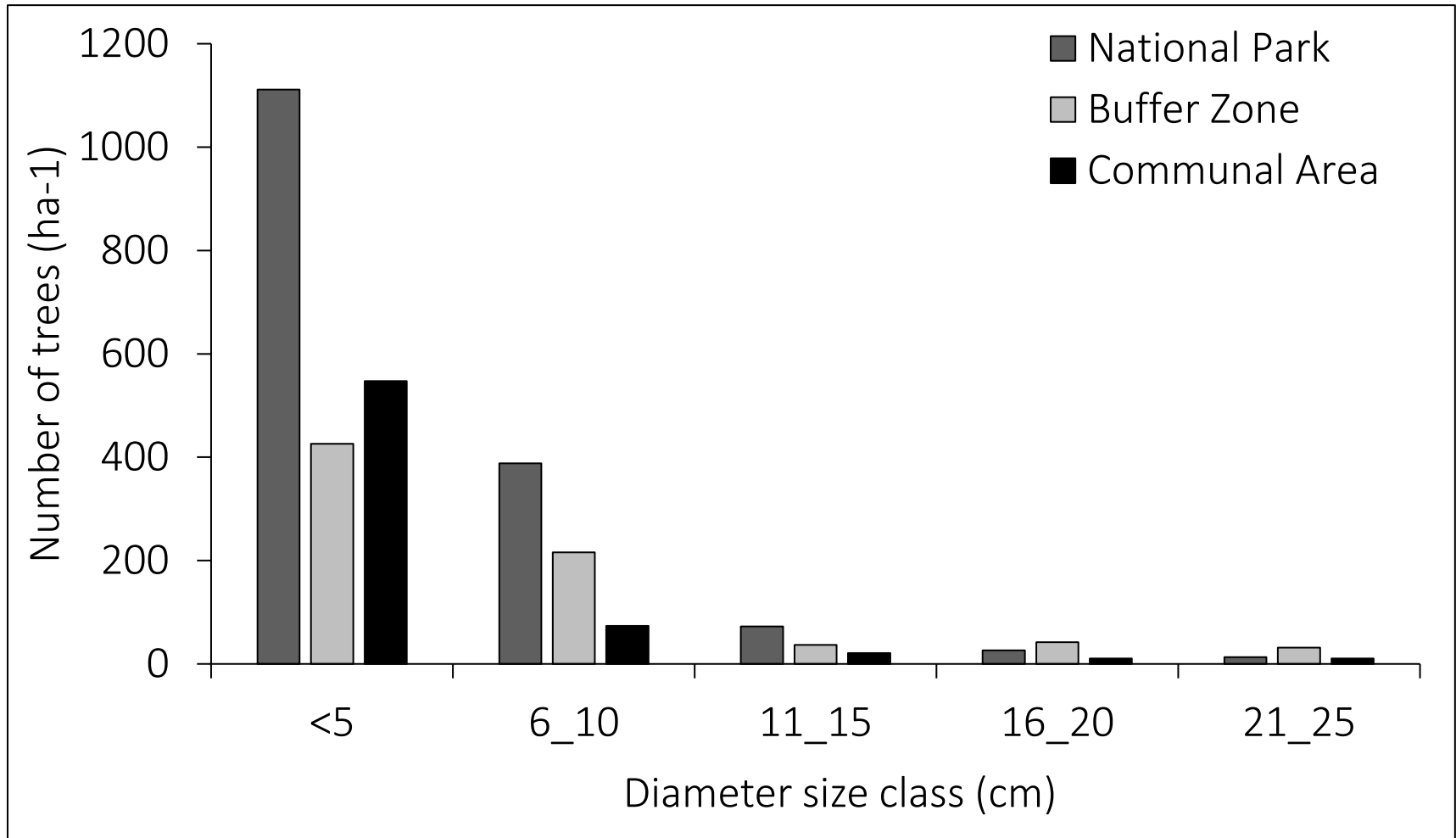
Results & Discussion: Structure

Mean \pm standard error of structural variables for seedlings, saplings and mature trees in the national park, buffer zone and communal area ($n = 5$ in each category).

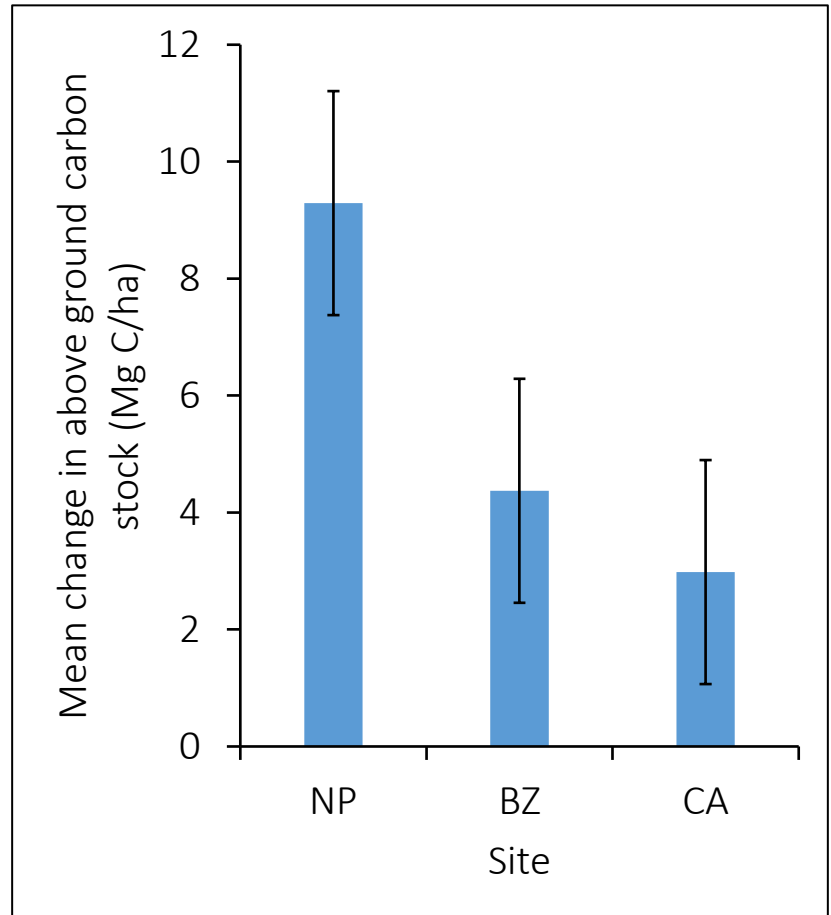
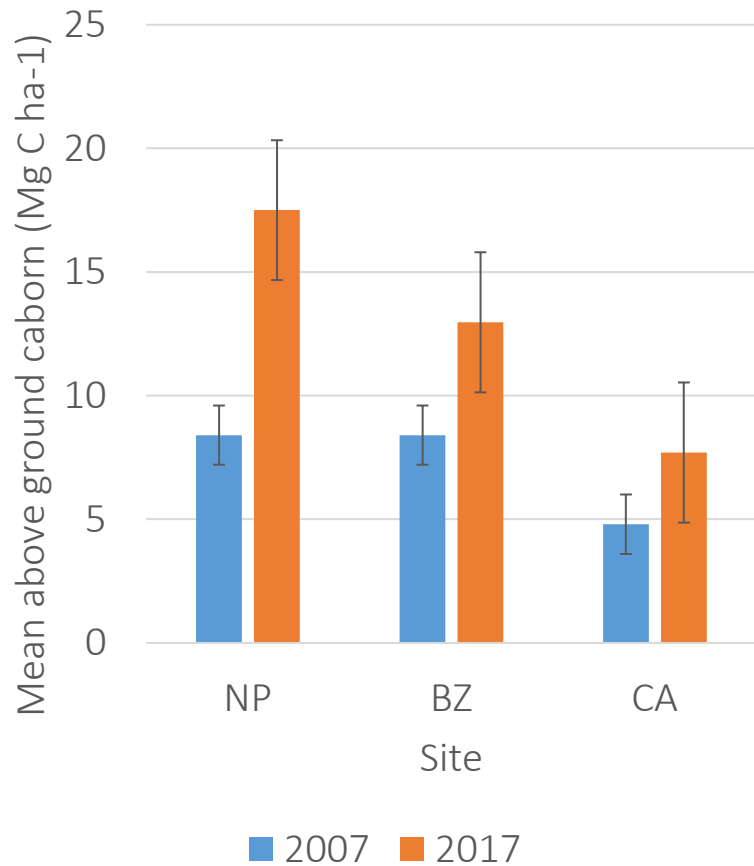
Significant p values appear in bold.

Parameter	Site			F	p value
	Nation park	Buffer zone	Communal area		
Seedlings					
Tree density (ha ⁻¹)	12728 \pm 2846 ^{ab}	21479 \pm 4878 ^a	7637 \pm 1926 ^b	4.130	0.040
Saplings					
Diameter (m)	4.34 \pm 0.30 ^a	5.64 \pm 0.48 ^b	4.26 \pm 0.21 ^a	4.908	0.027
Height (m)	3.84 \pm 0.12	3.54 \pm 0.26	3.12 \pm 0.17	3.548	0.067
Tree density (ha ⁻¹)	936.5 \pm 339.6	457.7 \pm 150.6	589.3 \pm 149.1	1.145	0.351
Basal area (m ²)	1.39 \pm 0.40	1.00 \pm 0.18	1.00 \pm 0.37	0.451	0.647
Volume (m ³)	95.3 \pm 21.0	46.8 \pm 9.17	53.4 \pm 19.5	2.301	0.143
Mature trees					
Diameter (m)	6.84 \pm 1.90 ^a	16.87 \pm 2.75 ^b	17.30 \pm 4.02 ^b	8.364	0.014
Height (m)	5.04 \pm 1.27	7.47 \pm 0.48	7.90 \pm 1.80	1.780	0.237
Tree density (ha ⁻¹)	720.8 \pm 198.5 ^a	299.9 \pm 58.5 ^{ab}	84.2 \pm 34.7 ^b	7.139	0.009
Basal area (m ²)	5.00 \pm 1.65	5.68 \pm 1.19	4.59 \pm 1.20	0.083	0.922
Volume (m ³)	210.3 \pm 60.6	133.9 \pm 22.9	88.0 \pm 21.3	1.087	0.388

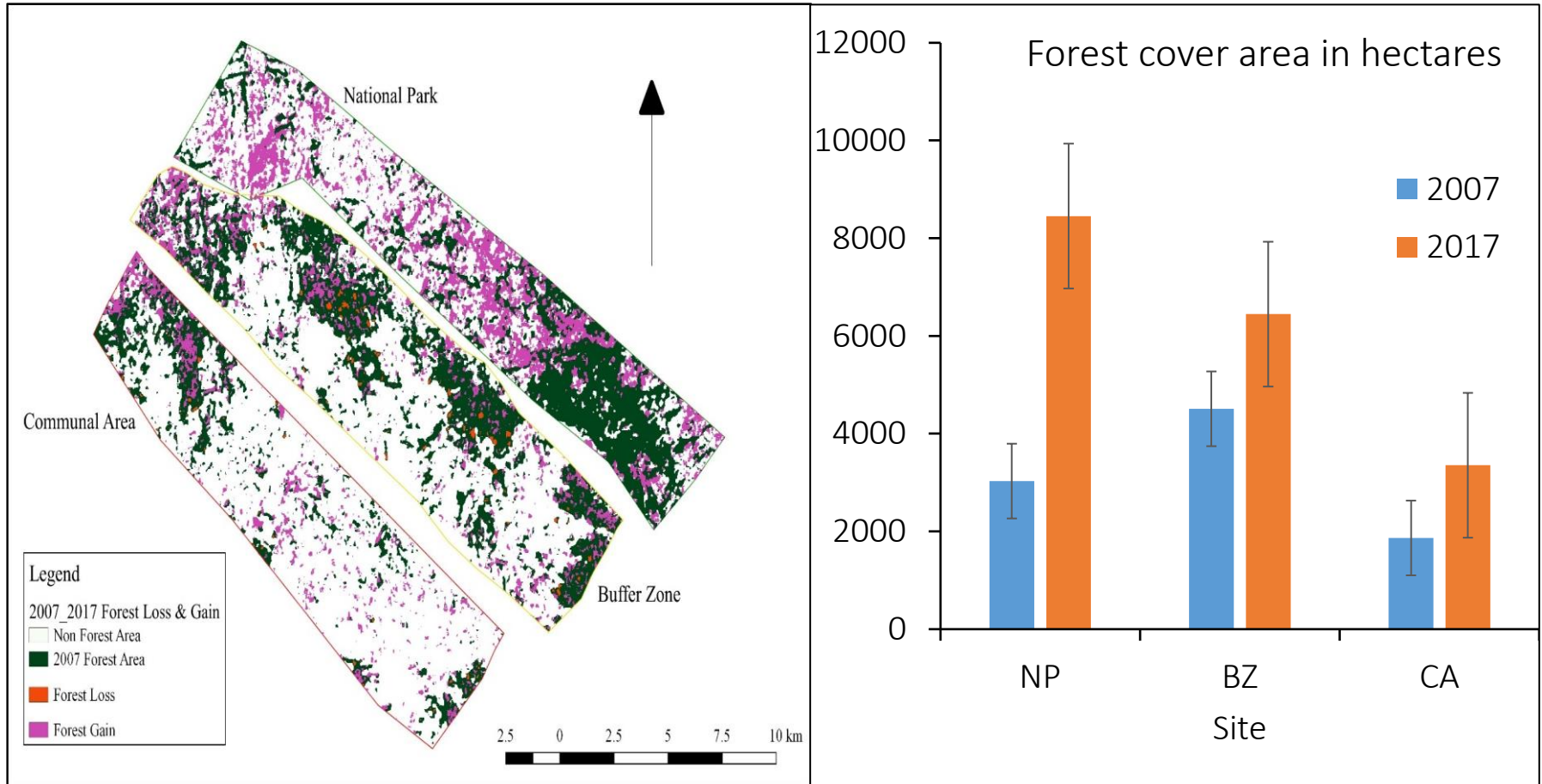
Results & Discussion: Structure



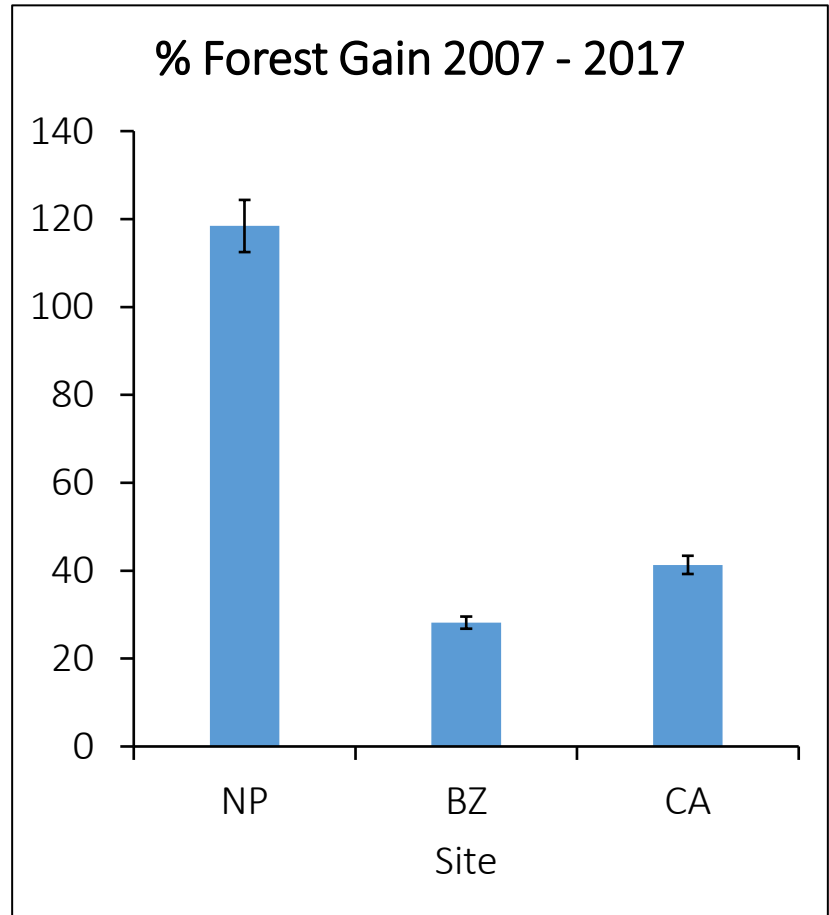
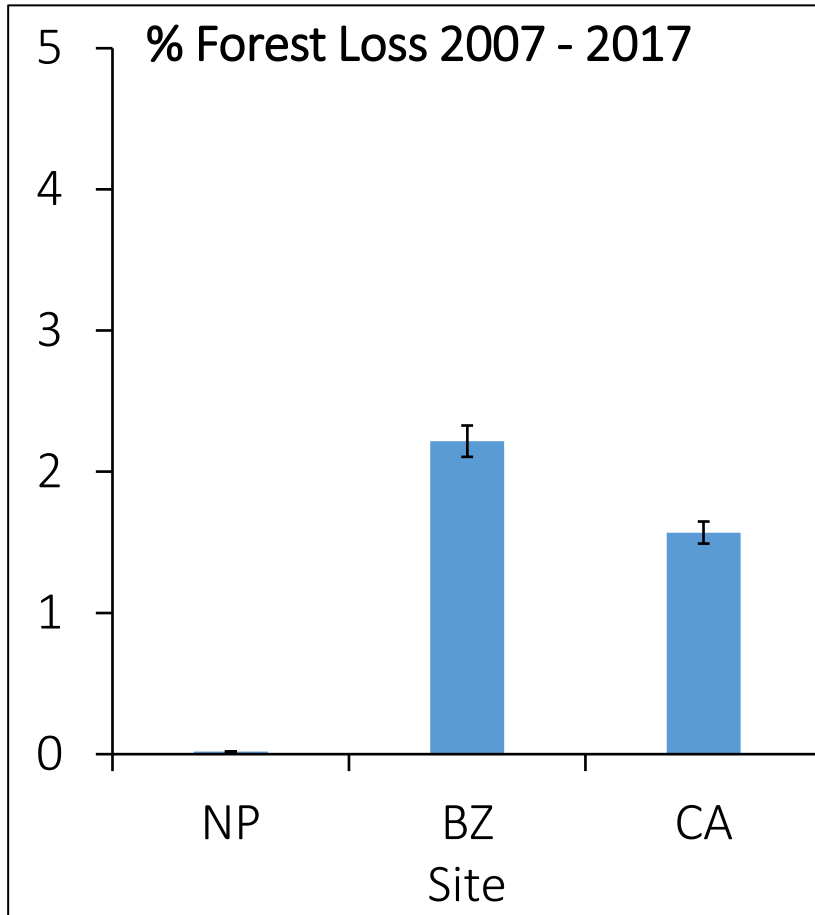
Results & Discussion AGC



Results & Discussion Forest cover



Results & Discussion forest cover



Conclusion

- Results indicate a typical stable population of miombo woodland dominated by *Brachystegia boehmii*, depicted by an inverse-J size class distribution at all sites.
- Miombo woodlands of the area are generally resilient to disturbance, maintaining a similar species composition and structure at varying levels of disturbance.
- Nonetheless, the results show that disturbance affected aboveground carbon stocks and forest cover, hence continued monitoring of disturbance levels are recommended for sustainability of the miombo resource.



Prospects of Research in Zimbabwe

- FC – expansion of permanent plots network outside gazetted forests
- Re-measurement of permanent plots in gazette forests
- Taking advantage of projects GEF 6 & GEF 7
- Systematic evidence evaluation (Restoration)

THANK YOU

