

Assessing tropical moist forest conditions: the case of Mengo Forests

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Abstract

A total of fourteen forests under government (nature conservation and exploitation), private and communal institutional arrangements used by different local groups living in eight settlements were studied to determine the effect of tree harvesting on the forest conditions. The fieldwork was conducted according to the guidelines of the IFRI research programme. There were significant differences in the occurrence of human consumptive disturbances among forests and institutional arrangements. The distribution of disturbances were also significantly different between two distances (within 30 km and between 30-80 km) from Kampala. However, the regression analysis indicated no significant functional relationship between the distances and the forest variables tested. At both sapling and tree stages, there were significant differences for species richness, the Shannon index, the Simpson index, basal area, and height between forests, as well as institutional arrangements.

Key words: Consumptive disturbances, governance, sustainability

Introduction

Forests in Uganda are an essential foundation for the country's current and future livelihood and growth. Uganda's natural forests are estimated to cover an area of 63,460 km² (FAO, 1993), of which 23.2% are gazetted forest reserves and the remaining 76.8% are under either private or communal ownership. These forests are interspersed among agricultural areas and the rate of deforestation is alarming. For example, FAO (1993) estimated deforestation to be at 650 km² annually. If this rate continues unabated, it would result in most natural forests disappearing within the coming century. The primary causes of deforestation in Uganda are clearing for agriculture, pitsawing and mechanical logging for timber, charcoal burning, cutting for commercial firewood, road building, and urbanisation.

The incentives for individuals and government to earn income from forest resources and turn forested land into commercial, industrial or residential uses are primarily for short-term gain and highly tangible benefits and are strongest in areas near urban centres.

In Uganda, commercial exploitation of natural forests started at the end of the first world war and has continued up to the present times with great intensity. This is because of the high demand for forest products in Kampala City. The mismanagement of public resources in 1970s and early 1980s led to these forests to be used as open access resources. From mid 1980s up to now some management

of these forests especially the reserves is being strengthened in order to reverse the trend.

A study was therefore carried out to generate essential information needed by public officials, researchers and forest users in order to develop policies for sustainable management of forests in Uganda. The specific objective was to determine the health conditions of the forests being used for consumptive purposes, based on the hypothesis that if deforestation processes start with consumptive use of forests, then forests near market centres for forest products are more degraded than those further away.

Methodology

The fieldwork was carried out in Mpigi District, Uganda. Forest data were collected from tropical moist forests (TMFs) of Mengo. They have evergreen closed canopies (Barbour *et al.*, 1987), locally classified as medium-altitude *Piptadeniastrum-Albizia-Celtis*, the three genera being dominant in mature forests (Howard, 1991). The methodology followed was that recommended by the IFRI research programme (Ostrom, 1993). The IFRI definition of a forest as an area of at least 0.5 hectares, containing woody vegetation (trees, bushes, shrubs, etc.) and exploited by at least three households governed by a similar legal structure was adopted. This definition was developed in order to be able to conduct research about landscapes that would be considered as forest in most settings. but

Namungo); grassland forest pockets (Najjakulya, Bukasa, Magezigoomu, and Semalizi); permanent swampy forests (Mugomba); and lakeshore forests (Mukasa). This reduced the the ecological differences. Given the small population in other ecological setting, the test was carried only on riverine forests to establish that the differences in values for number of trees, species richness and mean height were significant and are due to management regimes. At 5% level with 5 df, $p = 0.187$ for the number of trees; 0.382 for species richness; and 0.757 for mean height. This indicate that there are significant differences in the values of number of trees, species richness, and mean height for the riverine forests, implying that there are no differences between government exploitation, government nature and private individual management regimes.

Regression analysis

Regression analysis was carried out (Table 4) to test the

significance of functional relationships between the variables and the distance from Kampala.

Conclusion

The results of the study show that health conditions of the forests may be similar under different institutional arrangements. The major differences occur between forests within an institutional arrangement. However, on the whole forests for consumptive use had a higher occurrence of human consumptive disturbances than those for non-consumptive one. There was more occurrence of disturbances in forests for consumptive use located within 30km from Kampala than those located between 30-80 km. Again considering basal area per plot, non-consumptive forests under both government and communal arrangements had better performance than consumptive forests. The based general professional observation

Table 3. Forest tree values by forests.

Forest	Trees (No)	Species richness	Shannon index	Simpson index	Basal area (cm ²) per plot	Mean height (m)
Kizzikibi	367	54	3.15	0.07	0.78	12.7
Kyambogo	454	68	3.48	0.04	1.06	12.9
Lwamunda	732	101	3.93	0.02	0.78	14.0
Mugomba	139	37	2.99	0.06	0.33	09.8
Buttobuvuma	314	64	3.57	0.03	0.57	13.4
Mpanga	385	70	3.55	0.04	0.96	15.8
Lukambagire	247	44	3.02	0.08	0.40	10.4
Mugalu	299	50	3.40	0.04	0.81	10.1
Najjakulya	237	43	2.97	0.08	0.32	08.8
Namungo	351	66	3.71	0.03	0.85	17.5
Bukasa	59	7	0.75	0.68	1.27	08.2
Magezigoomu	293	41	3.22	0.04	0.57	10.8
Mukasa	101	24	2.76	0.07	1.11	14.4
Semalizi	86	18	2.18	0.16	1.43	10.8

Table 4. Coefficients of variables from the relationships with distances

Variables	Regression Equation	R-sq (adj) value %	p value
Number of trees	No of Trees = 10.7 + 0.0014 Distance (D)	0.0	0.902
Basal area per tree	Basal area / tree = 0.0739 - 0.000155 D	0.1	0.245
Basal area per plot	Basal area/ plot = 0.781 - 0.00141 D	0.0	0.316
Species richness	Species richness = 7.39 - 0.0118 D	0.5	0.087
Shannon index	Shannon index = 1.69 - 0.00071 D	0.0	0.566
Number of saplings	No of saplings = 3.53 + 0.0293 D	2.8	0.001***
Species richness saplings (SRS)	SRS = 2.21 + 0.0190 D	4.8	0.001***
Shannon index saplings (SIS)	SIS = 0.611 + 0.00610 D	5.2	0.001***

*** significant at the 0.1% level.

forests under the government institutional arrangement was better than those under private institutional arrangement. This suggests that natural forests could be better managed under government institutional arrangements. But with one single study it was difficult to come to a decisive conclusion, therefore I would be able recommend on which the institutional arrangement best governs the natural forests after completing the same study in other areas of the country.

References

- Barbour, M.G., Burke, J.H. and Pitts, W.D., 1987. *Terrestrial Plant Ecology*. Benjamin/Cummings Publishing Co. Menlo Park, California, USA: 553 pp.
- Becker, C.D., Banana, A.Y., and Gombya-Ssembajjwe, W.S., 1995. Early Detection of Tropical Forest Degradation: An IFRI Pilot Study in Uganda. *Environmental Conservation*, 22:31-38.
- FAO, 1993. Forest Resources Assessment, 1990, Tropical countries. *FAO Forestry Paper 112*, FAO, Rome, Italy: 97pp.
- Gombya-Ssembajjwe, W.S., 1995. Sacred Forests in Modern Ganda Society. *Uganda Journal*, 42: 32-44.
- Howard, P.C., 1991. *Nature Conservation in Uganda's Tropical Forest Reserves*. IUCN, Gland, Switzerland:313pp.
- Magurran, A.E., 1988. *Ecological Diversity and Its Measurement*. Croom Helm, London, UK: 179pp.
- Margalef, R., 1972. Homage to Evelyn Hutchinson, or why is there an upper limit to diversity. *Trans. Connect. Academic Science*, 44: 211 -235.
- Ostrom, E., 1993. *IFRI Data Collection Manual*. Workshop in Political Theory and Policy Analysis, Bloomington, Indiana, USA: 400 pp.
- Pielou, E.C., 1975. *Ecological Diversity*. Wiley-Interscience, London, UK: 165 pp.
- Philip, M.S. 1983. *Measuring Trees and Forests*, Dar es Salaam: University of Dar es Salaam.
- Shannon, C.E., 1948. A mathematical theory of communication. *Bell System Tech. Journal*, 27: 379-423.
- Simpson, E.H. 1949. Measurement of diversity. *Nature*, 163: 688.