ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2020; 6(8): 344-347
www.allresearchjournal.com
Received: 25-05-2020
Accepted: 10-07-2020

Lamido Auwalu
School of Science and Technology, Abubakar Tatari Ali Polytechnic, Bauchi, Nigeria

Ezra AG
Faculty of Science, Department of Biological Science, ATBU Bauchi, Nigeria

Magnus I Ezihe
School of Science and Technology, Abubakar Tatari Ali Polytechnic, Bauchi, Nigeria

Corresponding Author:
Lamido Auwalu
School of Science and Technology, Abubakar Tatari Ali Polytechnic, Bauchi, Nigeria

The availability of some deadwood in Yankari games reserve of Bauchi state, Nigeria

Lamido Auwalu, Ezra AG and Magnus I Ezihe

Abstract
Deadwood is a habitat of great importance for many species of woodland systems. It is vital, through its influence on biological, physical and chemical process. It also, plays a role in nutrients cycling and soil stability. The amount of deadwood, particularly as coarse woody debris (stumps, snags and fallen logs) in Yankari Game Reserve were examined. Existing levels of deadwood in the reserve were assessed to provide a basis for what might be considered high or low amounts of deadwood. Coarse woody debris drive from line-intersect sampling were collected from six zones of the reserve i.e mixed woodland, Afzelia woodland, combretum woodland, detarium woodland, Gaji River complex and annogeissus woodland. The values obtained of mean volume of coarse woody debris ranged from 32.44m^3/h-110.24m^3/h. The frequencies of coarse woody debris ranged from 10-44. The number of species of coarse woody debris in the sites ranged from 2-35. From the analysis of variance (anova) of abundance of coarse woody debris and the analysis of mean volume of coarse woody debris reveals that there is significant difference (P<0.05) in the means. The results of the research shows availability of deadwood and this will support organisms that depends on deadwood.

Keywords: deadwood, Yankari games, Bauchi state

1. Introduction
Dead wood plays a variety of roles in woodland systems through its influence on biological, physical and chemical processes (Harmon *et al.* 1986) [24]. Deadwood is also an important long-term nutrient Storage (Harmon *et al.*, 1986) [24]. As cited in Fred *et al.*, (2003) [15], large woody material contains very significant store of carbon and energy because carbon is slowly released by deadwood material as it decay in the forest (Stevens, 1997, Karjalainen *et al*, 2002) [30]. It provides a substrate or host for a wide range of organisms, particularly fungi and invertebrates; cavities formed by rot are used as nesting sites or shelter by many vertebrates; and decaying logs may act as safe sites for seedling germination or for the growth of bryophytes away from the competition of the woodland ground flora. Fallen logs may create bare soil patches and crush or shade out the ground vegetation; they may slow soil and water movement on slopes. Soil nutrient levels are likely to be higher around or under dead wood and thus affect the ground flora at that point (Falinski, 1986) [14]. Deadwood is created by tree mortality which in natural forest is caused by fire, wind, snow breakage, drought, competition, insects and pathogens.

Results
Amount and Variability of Coarse Woody Debris
Coarse woody debris (Fallen logs, stumps and snags) were assessed in six different zones of Yankari game reserve. Table 1 shows abundance and total volume of fallen logs, stumps and snags. The values obtained of mean volume of fallen logs ranged from 32.3-110m^3/h, snags ranged from 0.08-017m^3/h. and of stumps ranged from 0.06-0.11m^3/h. the frequencies of fallen logs ranged from 29-44, of snags from 21-26 and of stumps ranged from 10-14
From statistical analysis (ANOVA) the results reveals that:

1. For the sites, the F computed value (1.0041) is less than the F critical value (3.3258) using 0.05 level of significance. Therefore, the null hypothesis is not rejected and concludes that the mean volume of the dead wood is the same for all the sites.

2. While the treatment result reveals that the F computed value (25.0074) is greater than the F critical value (7.56) using 0.01 level of significance. This means that the null hypothesis is rejected and concludes that there is very high significance difference (P<0.01) in the treatment of means in terms of mean volume of fallen log, stumps and snags.

Table 1: Abundance and mean volume of fallen logs, stumps and snags in the site

Site	Fallen Logs		Stumps		Snags		Total
	Freq.	Vol. m^3/h	Freq.	Vol. m^3/h	Freq.	Vol. m^3/h	Vol. m^3/h CWD
Mixed woodland N 09°59ˡ07.7s E 010°20ˡ10.5s	31	35.71	13	0.11	24	0.17	35.99
Afzelia woodland N 09°51ˡ46.3s E 010°24ˡ06.6s	38	42.8	13	0.08	22	0.13	43.01
Combretum woodland N 09°45ˡ42.2s E 010°30ˡ27.8s	36	53.5	14	0.08	26	0.09	53.67
Detarium woodland N09° 59' 44.7s E010°34'25.4s	33	58.0	10	0.06	25	0.10	58.16
Gaji River Complex N 09°46ˡ38.2s E 010°32ˡ11.2s	44	32.3	10	0.06	21	0.08	32.44
Annogeissus woodland N 09°53ˡ19.5s E 010°22ˡ38.8s	29	110	11	0.08	21	0.16	110.24

Key:
CWD = Coarse Woody Debris
Freq. = Frequency
Vol. = Volume

Table 2: Abundance of Snags According to Deadwood Plants in the Sites

Species	MW	AFW	CW	DW	GW	AW	TOTAL
Afzelia Africana	8	10	-	-	-	-	18
Burkea Africana	10	-	-	-	-	-	10
Pterocarpus erinaceus	6	4	-	-	-	-	10
Terminalia glausence	-	8	-	-	-	-	8
Combretum gasalensis	-	-	18	-	-	-	18
Combretum molle	-	-	8	-	4	-	12
Nuclear latifolia	-	-	-	17	-	-	17
Acacia seyel	-	-	-	8	-	-	8
Cassia siamea	-	-	-	-	9	6	15
Khaya senegalensis	-	-	-	-	8	-	8
Annogeissus leiocarpus	-	-	-	-	-	7	7
Mitragyna stipulosa	-	-	-	-	-	8	8
Total	24	22	26	25	21	21	139

Keys: Mixed woodland (MW), Afzelia Woodland (AFZ), Combretum Woodland (CW), Detarium Woodland (DW), Gaji River Woodland (GW), Annogeissus Woodland (AW)

Table 3: Abundance of Stumps According to Deadwood Plants in the Site

SPECIES	MW	AFW	CW	DW	GW	AW	TOTAL
Khaya senegalensis	5	-	-	-	-	-	5
Pterocarpus erinaceus	3	-	-	-	-	-	3
Burkea Africana	5	-	-	-	-	-	5
Combretum molle	-	8	-	-	2	4	14
Afzelia Africana	-	5	-	-	-	-	5
Combretum gasalensis	-	-	11	-	-	-	11
Balanite eagyptiaca	-	-	3	-	-	-	3
Combretum glutinosum	-	-	-	4	-	-	4
Cassia areri	-	-	-	3	-	-	3
Detarium microcarpum	-	-	-	3	5	-	8
Lannea acida	-	-	-	-	3	-	3
Acacia seyel	-	-	-	-	-	5	5
Cassia siamea	-	-	-	-	-	2	2
Total	13	13	14	10	10	11	71

Discussion

Coarse woody debris assessed in this study showed availability of deadwood in the reserve and the distribution of coarse woody debris varied from site to site as shown in Table 2, 3 and 4 and this may be attributed to storms, drought and diseases which kill many trees, generating a pulse of large deadwood. This agreed with the findings of which states that within natural forest the distribution of deadwood is usually patchy. The plants species of fallen logs, snags and stumps contribute significant amount of dead woody material to the ecosystem in the reserve.

The total/mean volume of coarse woody debris for mixed woodland was 35.99m^3/h, for *Afzelia* woodland was 43.01m^3/h, for *combretum* woodland was 53.67m^3/h, for *Detarium* woodland was 58.16m^3/h, for Gaji river complex was 32.44m^3/h and for *Annogeissus* woodland was 110.24m^3/h. Comparisons of these figures with other published data in tropical region are not available, However, some estimates are available for the amounts of fallen deadwood from the North American and European old-growth broad-leaved deciduous woodland in temperate zone. *Fagus-Betula* woodland contain 82m^3/h, Harmon *et al* (1986) [24], *Acer-Fagus* woodland 139 m^3/h, *Quercus-Fagus* woodland 66.3m^3/h Quercus-mixed woodland 46 m^3/h Tilio-Carpenetum woodland 75 m^3/h, *Populus Euphratia* woodland 73.7m^3/h.

Conclusion

Deadwood has been recognized as a habitat of great importance for many species of forest ecosystems, it is considered to be a key element of biodiversity in forests. Deadwood is associated with relict, rare and protected species and therefore, it is regarded as a key feature for the preservation of many threatened species. A higher amount of deadwood in forests increase the number and the density of species and hence species richness, because higher deadwood amount means greater surface and area in forests and hence its higher availability for potential users.

The study found that there is much availability of fallen logs stumps and snags and this is attributed to no intense fuelwood, fodder for animals, and raw materials to traditional herbalists collection from the nearby settlers and protection it received from the government.

References

1. Abdullahi MB. An investigation into the Herbaceous Plant Formations of Yankari Game Reserve Bauchi, Nigeria. Botany Research Journal. 2011; 4(3):29-34.
2. Bull EL, Parks CG, Torgersen TR. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. U.S. Dept. of Agriculture, Forest Service, pacific Northwest Research Station, 1997, 55.
3. Butler SR. Deadwood in managed forests. How much and how much is enough? Development of a snag quantification method by remove sensing and GIS and
4. Snag targets based on three-toed woodpeckers Habitat requirement. PhD. Thesis, Lausanne EPFL. 2003; 184:20-01-2010. Available from http//biblion.ep.f/ch/EPFL/ Theses/2003 /2761/EPFL-TH2761.pdf.
5. Caza CL. Woody debris in the Forests of British Columbia. A review of the Literature and current research, and Management Handbook 78. Ministry of
6. Forests. Victoria, 1993, 99.
7. Churchill GB, John HH, Duncan DP, Hodson AC. Long-term effects of defoliation of aspen by the forest tent caterpillar. Ecology. 1964; 45:630-633.
8. Craig, Vanessa J. Relationship between Shrews (Sorex Spp.) and downed wood in the Vancouver watersheds, BC ;Vancouver ;BC University of British Columbia M.Sc. Thesis, 1995, 88.
9. Embaye K. Bamboo forests in Ethiopia: preservation, sustainable use and management strategy to improve seedling performance. Unpublished thesis submitted to department of short rotation forestry, Swedish university of Agricultural sciences, Uppsala, Sweden, 2001, 5.
10. Eugene EE. Threats to Sustainable Forestry Development in Oyo State, Nigeria. A Thesis submitted to Department of South Swedish Forest Research Centre Alnarp. Swedish University of Agricultural Sciences, 2004. Retrieved on 12/05/2014 at http://ex-epsilon.slu.se:8080/archive/00001073/01/Ezebilo_threats.pdf
11. Everett R, Lehmkuhl J, Schellhaas R, Chlson P, Keenum D, Riesterer H *et al*. Snag dynamics in a chronosequence of 26 wildfires on the east slope of the cascade range in Washington state U.S.A. International journal of wildland fire. 1999; 9:223-234.
12. Eyre FH, Longwood FR. Reducing mortality in old-growth northern hardwoods through partial cutting. USDA For, 1951. Ser..stn.pap.25.Lake states For.Exp.stn.,st. paul Minnesota
13. Falinski JB. Uprooted trees,their distribution and influence in the primeval forest biotope. Vegetation. 1978; 38:175-183.
14. Falinski JB. Vegetation dynamics in temperate low-land primeval forest.Ecological studies in Bialowieza forest.Geobotany. 1986; 8:1-537.
15. Fred LB, Isabelle H, Barb J, Elke W. How dead trees sustain live organisms n Western Forests, 2003, 292-301.
16. Fridman J, Walheim M. Amount, structure and dynamics of deadwood on managed forest land in Sweden. Forest Ecology and Management. 2000; 13:23-36.
17. Geerling C. The vegetation of Yankari Game Reserve: Its utilization and Condition. Department of Forestry, University of Ibadan, Nigeria. 1973; 3:49.
18. Geerling C. Birds in Yankari Game Reserve. Nigerian Field. 1976; 412:64-78.
19. Green AA, Amanche MS. Management Plan for the Yankari Game Reserve, Bauchi State, Nigeria, WWF Project 3632, NCF Technical Report 2, Lagos, 1987, 22.
20. Greene SE. Forest Structure and Dynamics in an Oregon Coast Tsuga heterophylla-picea. Sitchensis. Forests. 1984; 65:207.
21. Guby BNA, Dobbertin M. Quantitative estimates of Coarse woody debris and standing dead trees in selected Swiss forests. Forest. 1996; 5:327-341.
22. Hansson. L. Biodiversity Indicators In terrestrial environments, 2000, 27p.
23. In Larsson TB, Esteban JA. Editors. Cost effective indicators to assess biological diversity in the framework of the convention on biological diversity

(CBO). Sweedish Environmental Protection Agency, Stockhom, Sweeden and Ministry of Environment, Government of Catalonia, Barcelona, Spain.
24. Harrmon ME, Franklin JF, Swanson FJ, Sollins P, Gregory SV, Lattin JD *et al*. Ecology of Coarse Woody debris in Temperate Ecosystems. Advances in ecological Research. 1986; 15:133-302.
25. Harmon ME, J Sexton. Guidelines for measurements of woody detritus in forest ecosystem. Publication No.20.U.S.LTER Network office, University of Washington, Seattle, WA, USA, 1996, 73.
26. Hodge SJ, Peterken GF. Deadwood in British forests priorities and strategy. Forestry. 1998; 71(2):99-112.
27. Humprey J, Bailey S. Managing deadwood in forests and woodland practice Guide. Forestry commission, Edingburgh, 2012, 1-32.
28. IUCN. The I.U.C.N. Protected area Management Categories, 2003. Retrieved at http://www.iucn.org/abaut/union/commission/wepa/wcpa wpf/index.cfn on 23/3/2013
29. Jonsson M, Edman M, Jonssen B. Colonization and extinction patterns of wood-decaying fungi in a boreal old growth picea abies forest. Ecology, 2008, 96:1065-1075.
30. Karjalainen L, Kuuluvainen T, Korpilanti E. Amount and diversity of coarse woody debris within a boreal forest. Landscape dominated by pinus Sylvestris in Vienansolo wilderness, eastern Fennoscandia. *Silva fennica*. 2002; 36:147-167.