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SURVEY AND GOVERNANCE OF STREET TREES IN DAMATURU, NIGERIA

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ABSTRACT

This study examined the characteristics and management of street trees in Damaturu, the growing capital city of Yobe State, located in the Sudan savanah ecological zone of Nigeria. Enumeration of street trees was carried out in the major roads of Damaturu to identify tree species and determine population of the species. Data on the management of amenity trees in the town were collected through administration of questionnaire to forestry officials in the State's Ministry of Environment. Data collected were analysed with descriptive statistics. The forestry field services and afforestation project units of Yobe State's Forestry Department, in the State's Ministry of Environment are saddled with the responsibility of managing the street trees in the city. The State's Forestry Department has been involved with planting of trees along roads and streets since the State was created in 1991, development and management of nature's parks for recreation since 1994 and the development and management of Greenbelt since 2003.Although there are obsolete laws and regulations guiding the use of amenity trees in Damaturu, there is yet no substantive policy document to direct the management of amenity trees in the state. Funding of street trees management in the State was generally inconsistent and inadequate between 2000 and 2010. Management of amenity trees in Damaturu enjoyed the participation of NGOs such as the Desert Shield and Yobe environmental network. Twenty tree species were identified along the major streets of the town with a total population of 2562 trees. The treescape of Damaturu has very low diversity, with Azadiracta accounting for 94.81% of the population of the street trees. Other notable tree species enumerated in order of prevalence include *Polyalthia longifolia, Tamarindus indica, Piliostigma retuculata, Adansonia digitata, Acacia nilotica, Acacia sieberiana, Phoenix dactylifera, Acacia albida, Khaya senegalensis, Balanitea egyptiaca, Gmelina arborea, Eucalyptus camadulensis, Ficus platyphylla, Mangifera indica, Terminalia catappa, Albezia lebeck, Delonix regia, Ficus polita and Psidium guajava* Effective street trees governance in Damaturu in particular and Yobe State in general will require the establishment of street tree unit in the state's ministry of Environment. This unit in tandem with NGOs and other stakeholders will be responsible for mobilizing funds and members of public as well as spearheading formulation of appropriate requisite law and policy.

INTRODUCTION

Street trees are trees located next to or within a public road. More precisely, street trees are trees located on land forming or adjacent to a 'highway' which affects, in some way, those

using that highway. Street trees occur commonly as individuals but also, of course, in lines or small groups. Indeed trees are integral to the definition of some roads, with the Oxford English Dictionary defining an 'avenue' as "a broad road or street, often with trees at regular intervals along its sides".
Street trees are a distinct component of urban forests providing particular benefits and interacting with people and communities in distinct ways. Street trees provide substantial economic, social and environmental benefits - particularly for urban communities seeking to mitigate the effects of climate change (Dandy, 2010).

Urban street trees create vertical walls framing streets, and a defined edge, helping motorists guide their movement and assess their speed (leading to overall speed reductions). According to Burden (2006), speed differentials of 3 mph to 15 mph have been noted when following motorists along first a treed portion of a street, and then a non- treed portion. Street trees can also enhance traffic calming measures, such as narrower streets, extended curbs, roundabouts, etc. Tall trees give the perception of making a street feel narrower, slowing people down. Closely spaced trees give the perception of speed (they go by very quickly) slowing people down. A treeless street enhances the perception of a street being wide and free of hazard, thereby increasing speeds. Increased speed leads to more accidents. Street trees also forewarn drivers of upcoming curves. If the driver sees tree trunks curving ahead before seeing the road curve, they will slow down and be more cautious when approaching curves.

Street trees create safer walking environments, by serving as a buffer between moving vehicles and pedestrians. They form and frame visual walls and provide distinct edges to sidewalks so that motorists better distinguish between their environment and one shared with people. If a motorist were to significantly err in their urban driving task, street trees can deflect or fully stop a motorist from taking another human life.

The asphalt paving on streets contain stone aggregate in an oil binder. Without tree shade, the oil heats up and volatizes, leaving the aggregate unprotected and thereby exposed to devastation by vehicles. Streets should consequently be overlaid or slurry sealed every 7-10 years over a 30-40 year period, after which reconstruction is required. However, because the oil does not dry out as fast on a shaded street as it does on a street with no shade trees, overlaying or slurry sealing of street can be deferred from every 10 years to every 20-25 years for streets with extensive tree canopy cover.

The foregoing no doubt eloquently buttresses the need for street trees particularly in a Sudano-savannah city like Damaturu, where the weather is generally hot for most part of the year. Furthermore, because of inadequate governance structure and knowledge during the time of planting, many of the tree species planted for amenity purposes in most Nigerian cities are inappropriate because of their unsuitable attributes and behaviour. Thus it is not uncommon to

see roots of trees breaking road kerbs and or creating contours on the roads or sometimes affecting the foundation of a nearby building. This study was therefore carried out to identify the species, estimate the population and assess the governance structure of street trees in Damaturu, Yobe State, Nigeria.

METHODOLOGY

Study Area

Damaturu town is the capital of Yobe State, in North-eastern Nigeria. Damaturu became the capital of the newly created Yobe state in 1991. The town lies in a plain region that is covered by savannah and which supports crops such as millet, sorghum, and groundnuts. The town is a market centre on the road between Potiskum and Maiduguri (Encyclopædia Britannica Online, 2010).

The town of Damaturu is on the A3 highway and has an estimated 2010 population of 44,268. Damaturu is the headquarters of the Damaturu Emirate, at one time part of the Ngazaragamo emirate based in Gaidam (Wikipedia 2010).

Damaturu is located between latitude 11^0 47' and 11^0 75'N and between 11^0 57' and $11^0$96'E (Figure 1). The town shares boundaries with Borno State at the east, Gujuba local government area at the south, Fune local government area at the west and Tarmuwa local government at the north.

Damaturu is located between two vegetation zones: Sahel in the north and Sudan savannah in the south, and has hot and dry weather for most part of the year. The hottest months are March, April and May with temperatures ranging from 30^0C to 42^0C. Rainy season in the state varies from place to place, but generally last for about 120 days in the north and more than 140 days in the south. Annual rainfall ranges from 500mm to 1000mm and rainy season is normally from June to September in the north and May to October in the south.

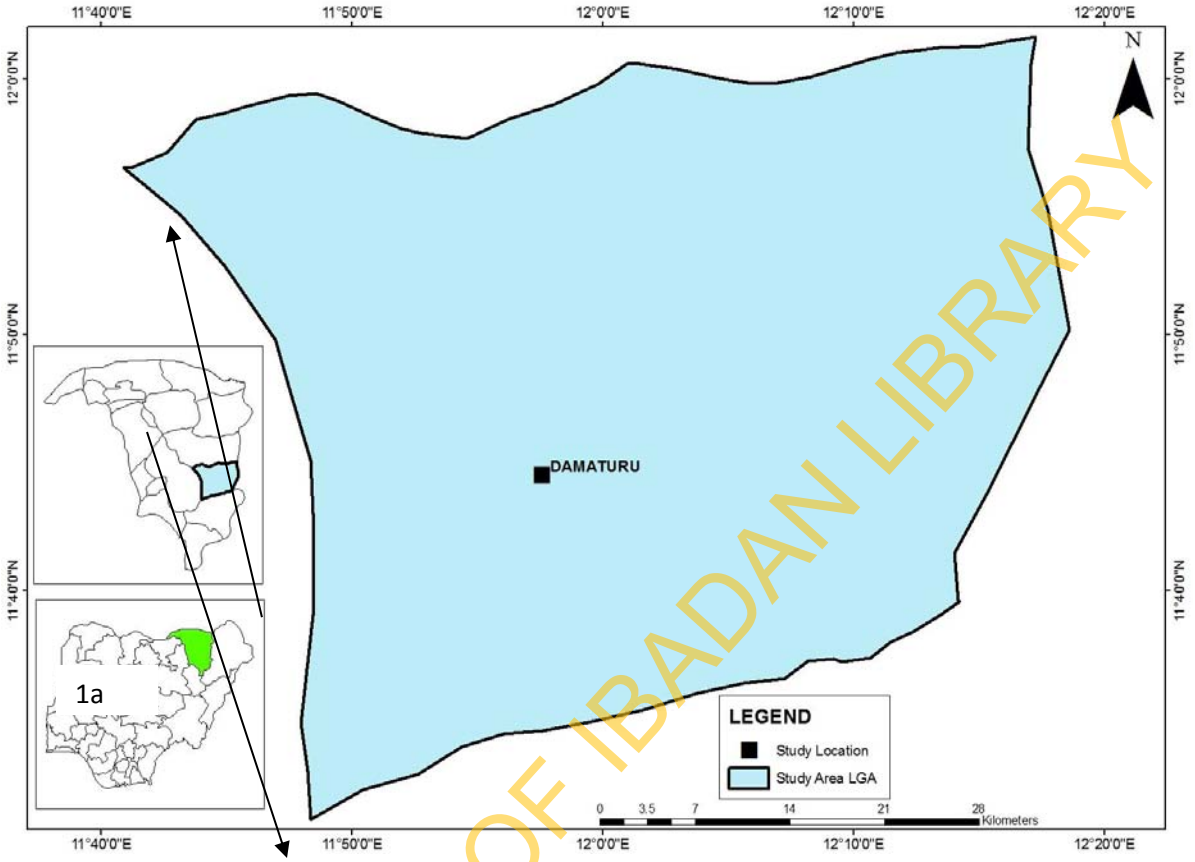

Figure 1: Map of Damaturu LGA showing the Study Location.

1a-M 1b f Yobe State showing Damaturu LGA 1b- Map of Nigeria showing Yobe State

Data Collection and Analysis

Survey of trees was carried out on the major roads of Damaturu to identify the species and determine population of species. Major road networks where the survey was carried out were Maiduguri road, Potiskum road, Gashua road, Gujba road, Commissioner's quarter's road and state secretariat road in Damaturu.

Furthermore, data on the management of the street trees in the study area were collected by administration of questionnaire to forestry officials in the State's Ministry of Environment.

Data collected were analysed with descriptive statistics such as percentages and frequency distribution.

RESULTS AND DISCUSSION

Survey of Street Trees in Damaturu

The species and the population of street trees in each of the surveyed major roads in Damaturu are presented in Tables 1-10. Neem tree (*Azadirachta indica*) had a lion share of the distribution ranging from 80.25% in Potiskum Road -Toll Gate to 100% in Commissioners Quarter's Road (Figure 2).

Table 1: Trees Species along Gashua Road from Roundabout at the Centre of the Town to the Federal Secretariat.

S/N	Common Name	Scientific Name	Numbers of Species
1.	Neem trees	*Azadirachta indica*	247
2.	Guava tree	*Psidium guajava*	1
3.	Date palm	*Phoenix dactylifera*	3
4.	Almond tree	*Terminalia catappa*	2
5.	Eucalyptus	*Eucalyptus camadulensis*	2
6.	Gutta-percha tree	*Ficus platphylla*	1
7.	Gmelina	*Gmelina arborea*	1
8.	Durumi (Hausa)	*Ficus polita*	1
Total			263

Source: Field Survey 2010.

Table 2: Trees Species along Potiskum Road from Roundabout to Toll Gate

S/N	Common Name	Scientific Name	Number of Species
1.	Kargo	*Piliostigma retuculata*	15
2.	Tamarind	*Tamarindus indica*	11
3.	Baobab tree	*Adansonia digitata*	3
4.	Egyptian mimosa	*Acacia nilotica*	4
5	Desert Date	*Balanitesa egyptica*	2
6	White Thorn	*Acacia sieberiana*	2
7	Winter Thorn	*Acacia albida*	2
8	Hutta-perechtre	*Ficus platyphylla*	1
9	Mango tree	*Mangifera indica*	1
10	Neem trees	*Azadirachta indica*	195
11	Masquerade tree	*Polyalthia longifolia*	7
Total			243

Source: Field survey 2010.

Table 3: Trees Species along Maiduguri Road from Roundabout to Dabo Aliyu Quarters

S/N	English names	Scientific names	Number of species
1	Flamboyant tree	*Delonix regia*	1
2	Albezia	*Albezia lebeck*	1
3	Gmelina tree	*Gmelina arborea*	1
4	Desert Date	*Balanitea egyptica*	1
5	Mahogany tree	*Khaya senegalensis*	8
6	Mango tree	*Mangifera indica*	1
7	Winter thorn	*Acacia albida*	2
8	Egyptian mimosa	*Acacia nilotica*	7
9	Masquerade	*Polyalthia longifolia*	11
10	Date palm	*Phoenix dactylyfera*	7
11	Neem tree	*Azadirachta indica*	358
Total			398

Source: Field survey 2010.

Table 4: Trees Species along Gujba Road from Roundabout to Yobe State Ministry of Environment

S/N	English name	Scientific name	Number of species
1	Desert date	*Balanitesa egyptica*	2
2	Gmelina tree	*Gmelina aborea*	1
3	Tamarind	*Tamarindus indica*	1
4	Winter thorn	*Acacia albida*	1
5	Baobab tree	*Adansonia digitata*	1
6	White thorn	*Acacia sieberiana*	8
7	Neem tree	*Azadirachta indica*	271
Total			319

Source: Field survey 2010.

Table 5: Newly Planted Trees Species along State Secretariat Road

S/N	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	135
Total			135

Source: Field survey 2010.

Table 6: Trees Species along Commissioners Quarter's Road

S/N	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	246
2	Baobab tree	*Adansonia digitata*	1
3	Winter thorn	*Acacia albida*	1
Total			248

Source: Field survey 2010.

Table 7: Newly Planted Trees Species along Maiduguri - Gashua Bypass Road

S/N	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	336
2	Tamarind	*Tamarindus indica*	1
3	Baobab tree	*Adansonia digitata*	1
Total			338

Source: Field survey 2010.

Table 8: Newly Planted Trees Species along Potiskum - Gujba Bypass Road

S/N	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	153
2	Baobab trees	*Adansonia digitata*	2
3	Tamarind	*Tamarindus indica*	2
Total			157

Source: Field survey 2010.

Table 9: Trees Species along Potiskum -Gashua Bypass Road

S/N	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	182
2	Winter thorn trees	*Acacia albida*	2
3	Baobab trees	*Adansonia digitata*	3
4	Desert Date	*Balanitesaegyptica*	2
Total			189

Source: Field survey 2010.

Table 10: Trees Species along Gashua - Maiduguri Bypass Road

	English Name	Scientific Name	Number of Species
1	Neem trees	*Azadirachta indica*	306
2	Baobab	*Adansonia digitata*	3
3	Tamarind	*Tamarindus indica*	2
Total			312

Source: Field survey 2010.

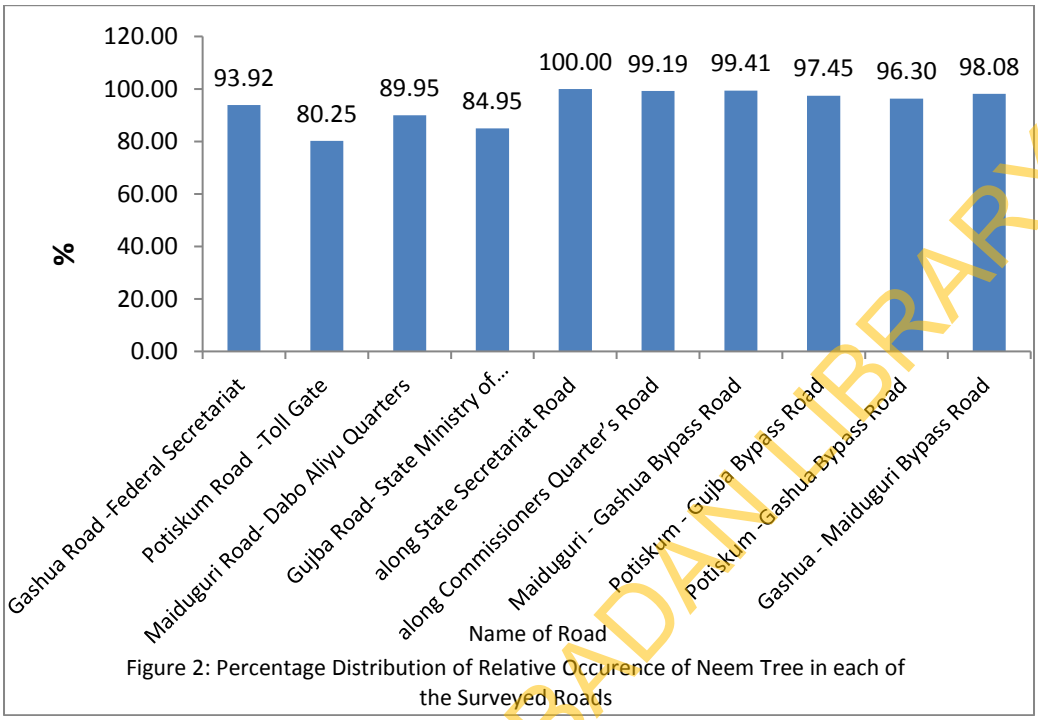

Figure 2: Percentage Distribution of Relative Occurence of Neem Tree in each of the Surveyed Roads

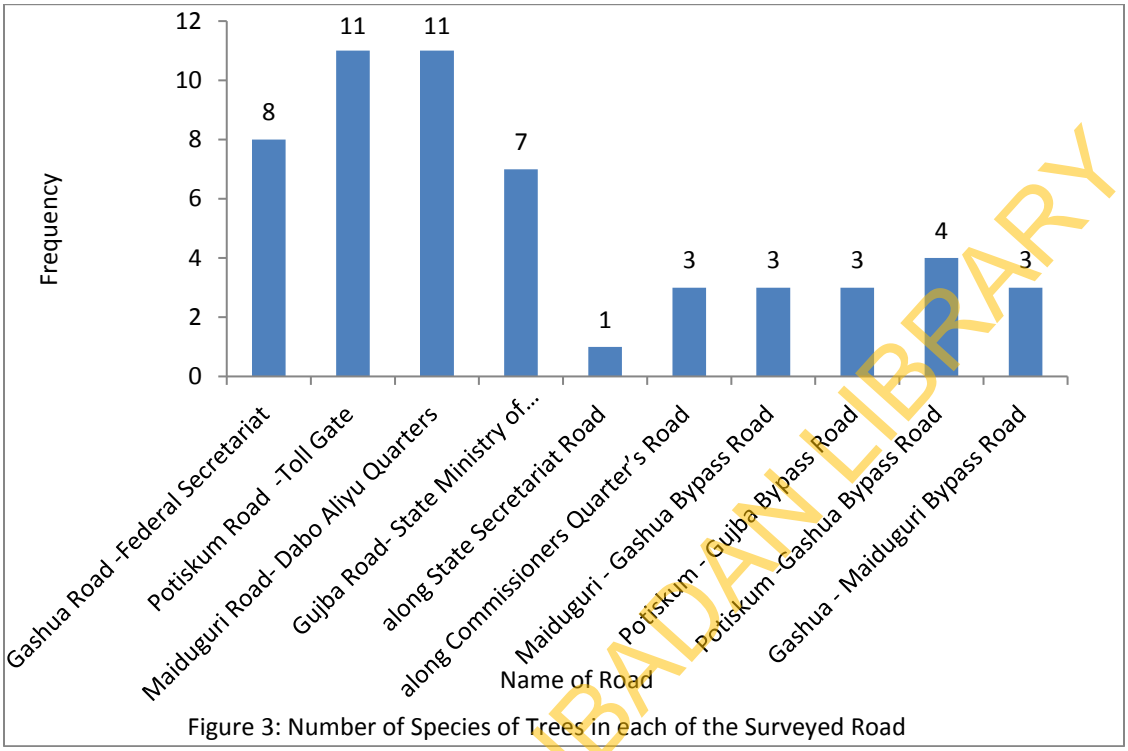

Figure 3: Number of Species of Trees in each of the Surveyed Road

Table 11: Summary of Tree Distribution in the Major Streets of Damaturu

S/N	Tree Species	Frequency	Percentage (%)
1	*Azadirachta indica*	2429	94.80874
2	*Polyalthia longifolia*	18	0.702576
3	*Tamarindus indica*	17	0.663544
4	*Piliostigma retuculata*	15	0.58548
5	*Adansonia digitata*	14	0.546448
6	*Acacia nilotica*	11	0.429352
7	*Acacia sieberiana*	10	0.39032
8	*Phoenix dactylifera*	10	0.39032
9	*Acacia albida*	8	0.312256
10	*Khaya senegalensis*	8	0.312256
11	*Balanitea egyptiaca*	7	0.273224
12	*Gmelina arborea*	3	0.117096
13	*Eucalyptus Camadulensis*	2	0.078064
14	*Ficus platyphylla*	2	0.078064
15	*Mangifer aindica*	2	0.078064
16	*Terminalia catappa*	2	0.078064
17	*Albezia lebeck*	1	0.039032
18	*Delonix regia*	1	0.039032
19	*Ficus polita*	1	0.039032
20	*Psidium guajava*	1	0.039032
Total		2562	100

The summary of the distribution of trees in the major streets of Damaturu as obtained from Tables 1-10 is presented in Table 11. From the Table, it can be observed that 20 tree species were identified along the major streets of the town. *Azadirachta indica* accounted for 94.81% of all the trees counted. Plates 1-4 which are photographs taken at different locations of the city, present clear evidence of the dominance of *Azadirachta indica* in the"treescape" of Damaturu. No other tree species accounted for up to 1% of the population of the trees in the town, while only four species namely: *Polyalthia longifolia* (0.70%), *Tamarindus indica* (0.66%), *Piliostigma retuculata* (0.59%) and *Adansonia digitata* (0.55%) accounted for more than 0.5%. Furthermore, the species richness even in each of the surveyed road is very low as can be observed from Figure 3. Only two roads had 11 species while one of the roads had only one species which is Neem tree. Most of the roads had three species.

Plate 1: Neem Trees (*Azadirachta indica*) along Gujuba Road, Damaturu

Plate 2: Neem Trees *(Azadirachta indica*) along Potiskum Road, Damaturu

Plate 3: Young Street Trees *(Azadirachta indica*) Planted along Gashua to Maiduguri Bypass Road, Damaturu.

Plate 4: Newly Planted Trees Protected from Vandals and Animals along Potiskum to Gujba Bypass Road, Damaturu

Governance Structure of Street Trees in Damaturu

Issues that border on the management of street trees in Damaturu are handled by the Department of Forestry in the State's Ministry of Environment. The statutory functions of the Forestry Department include safeguarding the State's forest resources and making forest policies and programmes that are geared toward regulation of the use of forest and its resources. The Department of Forestry is made up of three units namely: forestry field services, wildlife and afforestation. The forestry field services and afforestation project units are saddled with the responsibility of managing the amenity trees in the city. These responsibilities include: planting trees along streets and roads, development and management of nature's parks for recreation, development and management of botanical gardens, development and management of Greenbelt and protection and management of wetlands.

The State's Forestry Department has been involved with planting of trees along roads and streets since the State was created in 1991, development and management of nature's parks for recreation since 1994 and the development and management of Greenbelt since 2003. Investigation from the Ministry official revealed that even though there are laws and regulations guiding the use of amenity trees in Damaturu, which are obsolete and should be reviewed to conform to present realities, there is yet no substantive policy document to direct the management of amenity trees in the state.

Funding Framework for Management of Amenity Trees in Damaturu

Sources of funds for management of amenity trees in Damaturu include the State Government, Federal Government, Local Government and the International Bank for Reconstruction and Development (IBRD). The State Government usually makes statutory budgetary provision for the State Forestry Department in the State's annual budget. Part of this provision goes into the

management of amenity trees. However the process of accessing the State's budgetary provision is cumbersome and fraught with inconsistent government policies and bureaucratic bottlenecks which often result in delay in the release of funds. Table 12 shows the trend in the release of funds for urban tree planting in the State between 2000 and 2010.

Table 12: Funding of Urban Tree Planting in Yobe State between 2000 and 2010

Year	Budgeted Fund for Urban Tree Planting (₦)	Target for Urban Tree Planting	Fund Actually Released	Percentage of Budgeted Fund Actually Released	Achievement in Urban Tree Planting
2010	10million	100 Million	5 million	50%	80%
2009	10million	100 million	5 million	50%	40%
2008	8 million	80 million	--	0%	--
2007	6 million	70 million	--	0%	--
2006	5 million	60 million	5 million	100%	60%
2005	5 million	50 million	5 million	100%	70%
2004	5 million	50 million	5 million	100%	82%
2003	5 million	50 million	4 million	80%	60%
2002	5 million	50 million	3 million	60%	40%
2001	5 million	50 million	3 million	60%	40%
2000	5 million	50 million	3 million	60%	40%

Source: Yobe State Ministry of Environment (2010)

The results in Table 12 show that State Government released 100% of budgeted fund for urban tree planting between year 2004 and 2006, 80% in year 2003, 60% between year 2000 and 2002, 50% between year 2009 and 2010 while no fund was released for 2007 and 2008. It can be observed that the State government released 100% of the budgeted fund for only three years out of the 11 year period under consideration and there were years when no fund was released. The State's government failure to release the full budgetary provision and the presumably delay in the release of funds are partly responsible for the level of achievement in urban tree planting by the State Forestry Department. Delay in release of funds for management of amenity trees is usually a major constraint since the activities involved in the management of these trees are time bound.

Participatory Management of Amenity Trees in Damaturu

Participatory management of amenity trees involves the elicitation of the support of community members, corporate organizations, Community Based Organisations (CBOs) and Non-Governmental Organisations (NGOs) in the planning, planting, management and utilization of amenity trees' resources. Participatory management has the advantage of reducing the cost of establishment and management of the trees as well as ensuring the protection of the trees from wilful or otherwise vandals and animals. Investigations revealed that management of amenity trees in Damaturu has enjoyed the participation of NGOs such as the Desert Shield and Yobe Environmental Network. The involvement of these NGOs has

positively and significantly rubbed on the officials of the State Forestry Department who have acquired more experience and skills as a result of the interaction with the NGOs. The members of the community have also been involved in tree planting operations during the tree planting campaigns, even though the level of participation was reportedly low due to purportedly low levels of awareness of the importance of street trees in the environment.

CONCLUSION

The findings of this study reveal among other things low species richness, inconsistent and inadequate funding, low public participation, obsolete laws and regulations as well as lack of policy document to direct and enhance sustainable management of street trees as the main bane of effective street tree governance in Damaturu in particular and Yobe State by extension in general.To overcome these challenges, there is a need for the establishment of a unit in the State's Ministry of Environment that will cater solely for the management of street trees in the state. This unit should be replicated in the local government councils for effective and widespread management of the resource. The unit will be saddled with the overall responsibility of looking for funds even beyond the conventional state government budgetary allocation to the governance of street trees in the State. The unit in tandem with NGOs will also be responsible for mobilising the public vis a vis incentive and awareness programmes for effective participatory street trees management; as well as spearhead the review and formulation of laws, regulations and policy requisite for effective street trees governance in the state. Finally, the duo of forestry professionals and NGOs in the state also has serious roles to play in increasing the diversity of amenity tree species in the urban centres in the state. Other tree species that can thrive well in the environment and be of various social, economic, physiological and cultural benefits to the people should be incorporated into the treescape of cities in the state.

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