

Research Article

Woody Species Diversity, Vegetation Structure, and Regeneration Status of the Moist Afromontane Forest of Agama in Southwestern Ethiopia

Abyot Dibaba (),¹ Teshome Soromessa,² Alemayehu Kefalew,³ and Admassu Addi⁴

¹Department of Biology, Debre Berhan University, Debre Berhan, Ethiopia

²Center for Environmental Science, Addis Ababa University, Addis Ababa, Ethiopia
³Department of Biology, Debre Markos University, Debre Berhan, Ethiopia
⁴Holeta Bee Research Center, Holeta, Ethiopia

Correspondence should be addressed to Abyot Dibaba; abyotdibaba77@yahoo.com

Received 29 November 2019; Revised 6 February 2020; Accepted 9 March 2020; Published 30 June 2020

Academic Editor: Panos V. Petrakis

Copyright © 2020 Abyot Dibaba et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This study was conducted in Agama Forest in Kafa Zone, Southwestern Ethiopia, to assess species diversity, vegetation structure, and regeneration status of woody species. A systematic sampling technique was employed to collect vegetation data. Sixty (60) sample plots of $25 \text{ m} \times 25 \text{ m}$ were laid at 300 m intervals all along ten grids interspaced 800 m apart. Sample plots of $25 \text{ m} \times 25 \text{ m} \times 25 \text{ m}$ were used to record DBH and *H* of all woody plant species reaching a DBH >2.5 cm and height >2 m. For the inventory of seedling and sapling, two subplots of $2 \text{ m} \times 5 \text{ m}$ were used at the beginning and the end of the baseline on opposite sides of the main quadrat. Vegetation data such as DBH, height, seedling, and sapling density of woody species were recorded in each plot. Altogether, 72 woody plant species of 65 genera and 35 families were identified. Analysis of selected tree species showed diverse population structures. This study showed that small trees and shrubs dominated the Agama Forest, which revealed its status under a secondary regeneration stage. Study on the structure and regeneration of some woody species indicated that there are species that require urgent conservation measures. Sound management and monitoring, as well as maintenance of biodiversity and cultural and economic values of the forest, require conservation activities that encourage sustainable uses of the forest and its products.

1. Introduction

Ethiopia's highly variable ecology, topography, and climate make it an internationally recognized centre of biodiversity [1]. The country has around 6000 higher plant species of which about 10% are endemic [2, 3]. The vegetation of Ethiopia has been classified into 12 types [4]. The vegetation type at Agama Forest in Southwestern Ethiopia, the subject of this paper, is part of the moist evergreen Afromontane forest that is characterized by one or more closed strata of evergreen trees that may reach heights of 30 to 40 m.

Southwestern Ethiopia best represents remnant natural forests but those are being destroyed at an alarming rate [5]. Human-induced loss of forest cover, structure, and biodiversity is of global concern; in Ethiopia, [6] estimated rates of deforestation and forest degradation at between 150,000 and 200,000 ha/year and this was associated with loss of forest structure, diversity, dynamics, and evolution. New investment opportunities in Southwestern Ethiopia are converting these remnant forests into other land uses such as tea and coffee plantations [7]. New settlers migrating from the northern and central parts of Ethiopia have also contributed to land use changes and forest degradation [8, 9].

The Shannon–Wiener index, H, is the most popular measure of species diversity because it scores for both species richness and evenness and is not affected by sample size [10, 11]. In the analysis of vegetation structure, the growth stages of trees as seedlings, saplings, and mature trees as well as the distribution of size classes within a population can be essential elements of diversity that permit or deny the

likelihood of quick recovery after disturbances [12]. The status and dynamics of woody-tree populations can be examined by conducting a size class distribution and seedling and sapling counts [13, 14]. Healthy natural populations with continuous regeneration exhibit an exponentially decaying size class distribution, whereby trees in smaller size classes are represented in greater numbers than in larger classes. The absence or rarity of seedlings can be considered an indication of a declining population. The population structure of a tree species is indicative of its history of past disturbance and can be used to predict its future status in the forest [13]. This study investigated the woody species diversity, structure, and regeneration status of the Agama Forest in Southwestern Ethiopia. The results will be used to set conservation and management strategies for this forest.

2. Materials and Methods

2.1. Study Area. This study was conducted in Gimbo district of the Kafa Zone in the Southern Nations' Nationalities and Peoples' Regional State (SNNPRS), which is located 500 km from Addis Ababa and 30 km from Bonga (Figure 1). The area is centered at 7.16°N, 36.11°E, the altitudinal range is from 1800 m to 2370 m, and the topography is undulating, with valleys and rolling plateaus [15]. The size of the study forest covers about 1872 hectares (Figure 1).

The climate data between the years 2005 and 2018 recorded by the meteorological station at Bonga that is located 20 km south of the study area was used to describe the climatic condition of the study area. There is a unimodal rainfall pattern with eight months between March and October with rainfall >100 mm/month [16]. The mean annual rainfall is 1830 mm, and the monthly mean maximum and mean minimum temperatures are 29.6°C and 9.5°C, respectively. The mean annual temperature is 19.7°C.

The major soil groups of the study area, according to the FAO/UNESCO legend of soil classification, are Nitisols, Acrisols, and Vertisols [17]. The Nitisols are agriculturally the most important and dominant type of soils in the Kafa Zone. The Nitisols are clay-red in color and have moderate CEC and relatively high organic matter content and total nitrogen.

2.2. Vegetation Sampling. A preliminary survey was made from 30 April 2017 to 15 May 2017 to obtain an impression on the general physiognomy of the vegetation and identify sampling sites in the study area. The actual field study was conducted from 10 December 2017 to 30 April 2018. The systematic sampling design was used to collect vegetation and environmental data [10, 18, 19]. Sixty (60) sample quadrats of 25×25 m were laid at 300 m intervals along ten grids interspaced 800 m apart. Seedling and sapling inventories of all woody-tree and shrub species were recorded in two 2×5 m subquadrats located on opposite sides of each quadrat. For all woody species of height $(H) \ge 2 \text{ m}$ and diameter at breast height (DBH) \geq 2.5 cm, H and DBH were measured using a clinometer and diameter tape, respectively. Regeneration patterns were assessed using the total count of seedlings $(H \le 50 \text{ cm and } \text{DBH} \le 2.5 \text{ cm})$ and saplings (H > 50 cm and

DBH \leq 2.5 cm) within the subquadrats. Geographical coordinates and altitudes were recorded for each quadrat using GPS. Plant specimens were collected, pressed, dried, and brought to the National Herbarium (ETH), Addis Ababa University, for taxonomic identification and nomenclature. These were determined by comparison with authenticated specimens housed at ETH and by referring to published volumes of the Flora of Ethiopia and Eritrea [20–25].

2.3. Data Analysis. Species diversity was calculated using the Shannon–Wiener diversity index, *H*, as

$$H = -\sum_{i=1}^{s} p_i \ln p_i, \qquad (1)$$

where *s* is the number of woody species and p_i is the proportion of individuals or the abundance of the *i*th species expressed as a proportion of the total.

Shannon's evenness, J, was calculated as the ratio of observed diversity, H, to the maximum diversity, H_{max} , using the following equation:

$$J = \frac{H}{\ln(s)} = \frac{H}{H_{\max}},$$
 (2)

where $\ln(s) = H_{\max}$

The structure of the vegetation was described using a frequency distribution of *H*, DBH, and Importance Value Index (IVI). Tree or shrub density and basal area values were calculated on a per-hectare basis. For all species, IVIs were calculated as the sum of their relative density (RD), relative frequency (RF), and relative dominance (RDO) [10] where

$$RD = \frac{\text{the number of all individuals of a species}}{\text{the total number of all individuals}} \times 100,$$
$$RF = \frac{\text{the number of plots where a species occurs}}{\text{the total occurrence of all species in all plots}} \times 100,$$
$$RDO = \frac{\text{the basal area of a species}}{\text{total basal area}} \times 100,$$
(3)

where the basal area of an individual was $\pi d^2/4$ ($\pi = 3.14$; d = DBH).

Five IVI classes were established: I < 1; II = 1-10; $III \ge 10-20$; $IV \ge 20-30$; V > 30.

Frequency (F) and density (D) were calculated as [26]

$$F = \frac{\text{no. of quadrats in which a species occurs}}{\text{total no. of quadrats examined}} \times 100.$$
(4)

Species were grouped into five frequency classes: A = 0-20%; B = 21-40%; C = 41-60%; D = 61-80%; E = 81-100%:

$$D = \frac{\text{total no. of individuals of a species found}}{\text{total area examined}}.$$
 (5)

Species were classified into six density classes: $A \le 1$; $B \ge 1-10$; $C \ge 10-20$; $D \ge 20-35$; $E \ge 35-50$; $F \ge 50$ individuals per hectare.



FIGURE 1: Map and sample plots of the study area.

The vertical stratification of trees in Agama Forest was examined following the IUFRO classification scheme [27] where three simplified vertical structures are distinguished: the upper (individuals > 2/3 top height), middle (individuals between 1/3 and 2/3 top height), and lower (individuals < 1/3 top height) storey.

To interpret the dynamics of woody species in the forest, the population structures of selected species were expressed as a frequency of individuals against established DBH classes. The emerging patterns of diameter class distribution were also used to interpret the recruitment processes of a given species. Species were divided into seven H and DBH classes. To use the regeneration analysis for priority setting, the species considered in the study area were classified into three groups based on the density of the total regeneration.

3. Results

3.1. Woody Species Diversity. Seventy-two woody plant species belonging to 35 families and 65 genera were recorded (Table 1). Of these, 43 species were trees, 18 were shrubs, and 12 were lianas. Rubiaceae was the most common family with 8 (11.0% contribution) species in 8 (12.3%) genera. Acan-thaceae and Euphorbiaceae were the second most common, each with 5 (6.9%) species in 5 (7.7%) genera. The Rutaceae had 4 species in 4 genera and the Fabaceae 4 species in 3 genera. The Araliaceae, Celastraceae, Dracenaceae, Oleaceae, and Rosaceae contributed 3 species each and the remaining 25 families <3 species each. The Shannon–Wiener diversity index and Shannon's evenness values were 3.25 and 0.78, respectively.

TABLE	1:	List	of	woody	7 S	pecies	in	Agama	moist	Afromontane	forest.
						F					

1 Acanthopaie of this germanica Elasermu Acanthaceae Huxo Shrub 2 Alargium chinense (Loark) Harms Alangiaceae Shrub 3 Allorizi gummifreq (J.F. Grub) CA. Sn. Fabaceae Canto Tree 4 Albrizi Schimperiane Oliv. Fabaceae Canto Tree 6 Allophysishine (HChech) Rallk. Sapindaceae Sheeo Tree 7 Apodyts shimiditta E. Mey. ex Arn. Icainaceae Wuodifo Tree 8 Bardma abysinica (HChech) Rallk. Sapindaceae Huxo Shrub 10 Buddifo polystechy Freen. Loganiceae Huxo Shrub 11 Canthian allogan (Bake) Alston Ruizoeae Uiro Shrub 13 Catesiguerae molesima (Bake) Alston Ruizoeae Uiro Tree 14 Catesiguerae molesima (Bake) Alston Ruizoeae Baggo Liana 15 Clefika afrikana Narth Ruizoeae Muoo Tree 14 Catesiguerae molesima (Bake) Ranuncuiaceae Shagge ognibo	No.	Species name	Family	*Local name	Habit
2 Acaratha semirary C.B.Clarke Acanthaceae Pheces Shoto Tree 3 Albicia gunmifera (J.F.Gmel) C.A. Sn. Fabaceae Catto Tree 4 Albicia gunmifera (J.F.Gmel) C.A. Sn. Fabaceae Catto Tree 5 Albicia Schimperiana Oliv. Fabaceae Catto Tree 6 Alophysic allysinica (Fesen. Kattanaceae Wundhio Tree 7 Appodysic alliga polystacking (Fesen. Loganiaceae Huxxo Shrub 10 Brillontisis madegascarinsis T. Anders, et Lindau Canthana digacarinum Hiero Rubiaceae Windhiceae Huxxo 11 Canstean anisata (Wild.) Benth. Rutaceae Huxo Shagge qombo Tree 14 Clausena anisata (Wild.) Benth. Raunculaceae Brigo anisa Liana 17 Coffic arabica L Rubiaceae Dio Tree 18 Combretum peniculatum Vent. Combretum Pen	1	Acanthopale ethio-germanica Ensermu	Acanthaceae	Huxxo	Shrub
Alangium chineme (Lour.) Harms Alangiaceae Shoo Tree 4 Albicia Schimperian Oliv. Fabaceae Catto Tree 5 Albicia Schimperian Oliv. Fabaceae Catto Tree 6 Allophysishicas (Hochs) Radik. Sapindaceae Sheeo Tree 7 Apadytes dimiditat F. Mey. ex Arn. Icacinaceae Wundiffo Tree 9 Berama abyssinica (Hochs) Radik. Acauthaceae Huxos Shrub 10 Budigati madagascariensis T. Anders. ex Lindau Acauthaceae Huxos Shrub 11 Cauthinn allocarapum Hiern Rubiaceae Xisribbo Tree 12 Casigurera malosana (Sikid). Senth. Rutaceae Umaceae Uffo Tree 13 Calentan anisata (Wild). Benth. Rutaceae Bagee opnobo Liana 16 Classigurera anisata (Wild). Benth. Rutaceae Balage Liana 16 Cardin anisata (Wild). Benth. Rutaceae Balage Liana 17 Caffia aribica Lan. Bonglinaceae	2	Acanthus eminens C.B.Clarke	Acanthaceae	Pheecco	Shrub
4 Albitsi gommifra (J.C. Gmcl) C.A. Sm. Fabaceae Catto Tree 5 Albitsi Schimperiana Oliv. Fabaceae Catto Tree 6 Allophylia alyssinica (Hochs.) Rallk. Sapindaceae Sheco Tree 7 Apadots dimilata E. Mey, ex Arn. Icacinaceae Wundhio Tree 8 Beranna abyssinica Fresen. Melianthaceae Boogoo Tree 9 Brillintisis madogascariensis T. Anders, ex Lindu Acanthaceae Huxxo Shrub 10 Buddiga polystachy Fresen. Loganiaceae Wundio Tree 12 Casipourea maisata (Wild.) Benth. Rutaceae Humico Shrub 13 Clematis forgicauda Stud. et A. Rich Ranunculaceae Shaggee qombo Liana 14 Clausena anisata (Wild.) Benth. Ranunculaceae Phiro Qombo Liana 16 Clematis forgicauda Stud. et A. Rich Ranunculaceae Baggee qombo Liana 17 Cafda arabica L. Rubicace Baggo Liana 18 Combretim pariculatum Vent. Combreticaeae Baggo Liana 19 Cardia arabica L. Rubicaeae Winagoo Tree 20 Corotor macorstadyus Del. Euphorbiaceae	3	Alangium chinense (Lour.) Harms	Alangiaceae	Shotto	Tree
5 Albicia Schingerian Oliv. Fabaceae Cacinaceae Cacinaceae Cacinaceae Stere Tree 7 Apooptre simialitate. Mey. ex Arn. Icacinaceae Wundifo Tree 8 Bersman abysinica (Presen. Melianthaceae Boogqoo Tree 9 Brillentsia madagascariensis T. Anders. ex Lindau Acanthaceae Huxo. Shrub 10 Budidio polystechy presen. Loganiaceae Ataro Tree 11 Conthium oligocarpum Hiern Rubiceae Woralo Tree 12 Casispoura anistata (Wild.) Betth. Rutaceae Umaceae Uffo Tree 13 Celins africana Burn. Rubiceae Shagge opnbo Liana 14 Cantaris innersis Fresen. Ramunculaceae Brio Qembo Liana 15 Clentaris innersis Fresen. Ramunculaceae Brio Qembo Liana 16 Corbit adricana Lam. Boraginaceae Dia Or Tree 16 Corbit adricana Lam. Boraginaceae Shagee Liana	4	Albizia gummifera (J.F.Gmel.) C.A. Sm.	Fabaceae	Caatto	Tree
6 Allophylus abyssinics (Hochst.) Radik. Sapindaceae Sheen Tree 7 Apodytes dimidiate E, Moye, ex Arn. Lacinaccae Wundifo Tree 8 Bersama abyssinica Presen. Melianthaceae Booqoqoo Tree 9 Brillantisia madgaesarienisis T. Anders. ex Lindau Acanthaceae Huxxo Shrub 10 Buddleja polystachya Presen. Rubiaceae Xixiibo Tree 11 Caustin anisatu (Wild.) Benth. Rubiaceae Unio Shrub 13 Clematis polycauda Steed. ex A. Rich Raunuculaceae Philo Qombo Liana 16 Clematis polycauda Steed. ex A. Rich Raunuculaceae Bunoo Tree 14 Clausena aniticaliton Vent. Combretaceae Baggo Liana 17 Coffica arbitan Lam. Boraginaceae Dio Tree 18 Combreta africana Hook. Cyathaceae Shawakko Tree 19 Cordia africana P. Santa Draceana agrang (Liana Dia Tree 21 Cyathae manninan Hook.	5	Albizia Schimperiana Oliv.	Fabaceae	Caatto	Tree
7 Apodynes dimidiata E. Mey, ex Arn. Icacinaccae Wundifio Tree 8 Bersana adyssinkar Presen. Melanthaceae Bouxoo Shrub 9 Billantisia madagascarinsis T. Anders. ex Lindau Acanthaceae Huxoo Shrub 10 Buddigi apolystachyn Presen. Loganiaceae Ataaro Tree 11 Carthium oligocarpum Hiern Rubiaceae Woralo Tree 12 Casipour aninata (Willa Benth. Rulaceae Uño Tree 14 Clausera aninata (Willa Benth. Rulaceae Banoo Tree 16 Clematis immenis Fresen. Raunuculaceae Shago Liana 17 Coffsa arabita I. Rubiaceae Baroo Tree 18 Combrotum paniculatum Vent. Combrotum paniculatum Vent. Combrotum paniculatum Vent. Combrotum paniculatum Vent. 20 Cordia africana Lam. Boraginaceae Dio Tree 21 Cyathan mamiana Hook. Cyathaccae Sheshino Tree 22 Danieya lactra Vake Fabaceae Ginitro Liana 23 Domieyo tarada (Treelle) P. Bamps Sterculiaceae Sheshino Tree 24 Datacean a fromontana Mildhr. Draceanaceae <td< td=""><td>6</td><td>Allophylus abyssinicus (Hochst.) Radlk.</td><td>Sapindaceae</td><td>Sheeo</td><td>Tree</td></td<>	6	Allophylus abyssinicus (Hochst.) Radlk.	Sapindaceae	Sheeo	Tree
8 Bersama abysinica Fresen. Melianthaceae Boogqoo Tree 9 Brillantisis anadagascarienisis T. Anders. ex Lindau Acanthaceae Huxxo Shrub 10 Buddleja polystachya Fresen. Rubiaceae Xiaribbo Tree 11 Canthinum objocaripum Hiern Rubiaceae Wiraho Tree 13 Causena anistati (Willd.) Benth. Rutaceae Immico Shrub 14 Clausena anistati (Willd.) Benth. Rutaceae Bunger Ombo Liana 16 Clematis inegricada Steud. Rubiaceae Bungoo Tree 18 Combretam paniculatum Vent. Combretaceae Baggo Liana 19 Cordia africana Lam. Boraginaceae Dio Tree 20 Cotaber materisatifyas Del. Euphorbiaceae Shanuko Tree 21 Coyaline anatinane Hook. Cyatheaceae Simub Tree 23 Dombeya torrida (JF.Gmel.) P. Bamps Sterculiaceae Shanuko Tree 24 Dataceaa afromontana Mildbr. Draceanaceae <td>7</td> <td>Apodytes dimidiata E. Mey. ex Arn.</td> <td>Icacinaceae</td> <td>Wundifo</td> <td>Tree</td>	7	Apodytes dimidiata E. Mey. ex Arn.	Icacinaceae	Wundifo	Tree
9 Brillantiais madagascarinsis T. Anders. ex Lindau Acanthaceae Huxoo Shrub 10 Buildigi apolytadoy Presen. Loganiaceae Attaro Tree 11 Canthium oligocarpum Hiern Rubiaceae Xisiribbo Tree 12 Castopare andissan (Bilder) Alston Riizophoraceae Woralo Tree 13 Celtis africana Burm.f. Ulmaceae Ufno Strub 14 Clausean antisati (Will) Benth. Rutaceae Bunoo Tree 16 Clematis ismenis Fresen. Ranunculaceae Bhano Tree 18 Combretum particulatine Vent. Combretum partisune Vent. Combretum particulatine Ven	8	Bersama abyssinica Fresen.	Melianthaceae	Booqqoo	Tree
10 Buddleja polystachya Fresen. Loganiaceae Ataaro Tree 11 Cansipourea malosana (Baker) Alston Rhizophoraceae Miria Nataro Tree 12 Catsipourea malosana (Baker) Alston Rhizophoraceae Wiralo Tree 13 Celtratis foricana Burn.f. Ulmaceae Hino Shaggee qombo Liana 14 Clanusen anisata (Wild.) Benth. Raunuculaceae Bhio Qombo Liana 16 Clernatis biorgicands Steued. ex A. Rich Raunuculaceae Bhuoo Tree 17 Coffica arbita I. Rubiaceae Bugo Liana 18 Combretum paniculatum Vent. Combretaceae Baggo Liana 19 Cordin africarna Lam. Boraginaceae Magoo Tree 21 Cayathae maninana Hook. Cyathaeceae Sheshino Tree 22 Dabergia lactea Vatke Fabaceae Gamiro Liana 23 Dombrya torida (Jr.Gmel.) P. Bamps Sterculiaceae Yawakko Tree 24 Draceana faggram	9	Brillantaisia madagascariensis T. Anders. ex Lindau	Acanthaceae	Huxxo	Shrub
11 Conthum oligocarpum Hiern Kubicace Natribbo Irrec 12 Casisjourza malosana (Wild) Benth, Rutaceae Woraalo Trec 13 Calius anisata (Wild) Benth, Rutaceae Immico Shrub 15 Clematis immerisi Fresen, Ranunculaceae Phi'o Qombo Liana 16 Catenti simmerisi Fresen, Ranunculaceae Phi'o Qombo Liana 17 Coffoa arabica L Rubiaceae Baggo Liana 18 Combritum paniculatum Vent, Combretaceae Baggo Liana 19 Cordin africana Lam, Boraginaceae Di'o Tree 21 Cyathea manimana Hook, Cyatheaceae Shawako Tree 23 Dombega torida (J-Gimb) P. Bamps Sterculiaceae Sterculiaceae Sterculiaceae Shawako Tree 24 Draceana afgragm (L), Ker Gawl. Draceanaceae Emoo Shrub 25 Draceana afgragm (L), Ker Gawl. Draceanaceae Caginato Tree 26 Draceana fargma (L), Ker	10	Buddleja polystachya Fresen.	Loganiaceae	Ataaro	Tree
12 Casspourea malosania (Baker) Alstoin Hinzophoraceae Worado Iree 13 Cellentis dificana Burm.f. Ulmaceae Ulmaceae Hinzophoraceae Ufio Tree 14 Clanusena anisata (Wild.) Benth. Rutucculaceae Shaggee opmbo Liana 16 Clematis bingicauda Steucl. ex A. Rich. Ranunculaceae Bhio Qombo Liana 17 Coffea arabica 1. Rubiaceae Bunoo Tree 18 Combretum paniculatum Vent. Combrateaceae Baggo Liana 19 Cordia africana Lam. Boraginaceae Wagaoo Tree 20 Crotion macrostadryus Del. Euphorbiaceae Gaimoo Tree 21 Cyathea maninana Hook. Cyatheaceae Ghimiro Tree 22 Dabergia lacted Valke Fabaceae Gimiro Tree 23 Dombeya toriad (J:F.Gmel.) P. Bamps Sterculiaceae Mawakko Tree 24 Draceana forganna Mildbr. Draceanaceae Yuddo Tree 25 Draceana forganna frama Meliaceae Ororo Tree 26 Draceana forganna frama Meliaceae Gaimo Tree 27 Elacodentrin buchananii (Des.) Loes. Calastraceae	11	Canthium oligocarpum Hiern	Rubiaceae	Xixiribbo	Tree
13 Cettis girciaria burm.t. Climaccae Units Itera 14 Clausea anisata (Wild). Benth. Rutaceae Immico Shrub 15 Clematis ionesis Fresn. Ranunculaceae Phi'o Qombo Liana 16 Clemati simenis Fresn. Ranunculaceae Phi'o Qombo Liana 17 Coffea arabica L Rubiaceae Bagoo Tree 18 Combretam paniculatum Vent. Combretaceae Baggoo Tree 20 Cordin aricritachyny Del. Euphorbiaceae Wagoo Tree 21 Cyathea maniana Hook. Cyatheaceae Sheshino Tree 23 Dambeya toriad (J.F.Gimel.) P. Bamps Sterculaceae Shawakko Tree 25 Draceana fegrams (L.). Ker Gause. Draceanaceae Fundo Tree 29 Elacoedenton buchanami (Loes) Celastraceae Wagano Tree 20 Ekbergia capensis Sparm Meliaceae Wagano Tree 21 Fagaropsis angolensis (Engl.) Dale Rutaceae	12	Cassipourea malosana (Baker) Alston	Rhizophoraceae	Woraalo	Tree
Indicates Calaisenta anisatal (Wild.) benti. Ruthaccase Immiteo String 15 Clematis simensis Fresen. Ranunculaceae Phi'o Qombo Liana 16 Clematis simensis Fresen. Ranunculaceae Phi'o Qombo Liana 17 Coffa arbical L. Rubiaceae Bagoo Liana 19 Cordia africana Lan. Boraginaceae Di'o Tree 20 Croton macrostadyus Del. Euphorbiaceae Sheshino Tree 21 Cyathaa manniana Hook. Cyathaceae Gimiro Liana 23 Donboya torrida (J.F.Gmel.) P. Bamps Sterculaceae Shawakko Tree 24 Dracaena feromontane Midbr. Dracaenaceae Coginato Tree 25 Dracaena feromontane Fingler Dracaenaceae Yuddo Tree 26 Dracaena seudineri Sparr Meliaceae Ororo Tree 28 Ekebergia capensis Sparr Meliaceae Ororo Tree 29 Elaoadendron buchamanii (Loss) Locs. Celastraceae Bach	13	Cettis africana Burm.r.	Ulmaceae	Uffo	Church
15 Clerinis iongicular structures is Freen. Ratunculace Philo Qombo Liana 16 Clentaris simerisis Freen. Ratunculacee Philo Qombo Tree 18 Combretim paniculatum Vent. Combretaceae Baggo Liana 19 Cordia africana Lam. Boraginaceae Di'o Tree 20 Crotion macrostachysus Del. Euphorbiaceae Waagoo Tree 21 Gyathea mamniana Hook. Cyatheaceae Sheshino Tree 22 Dalbergia lacta Vatke Fabaceae Gamiro Liana 23 Dombeya lactad Vatke Fabaceae Cogimato Tree 24 Dracena fragarost. [] Ker Gawl. Dracenaceae Emoo Shrub 25 Dracaena fragarost. [] Ker Gawl. Dracenaceae Wagamo Tree 26 Dracaena steudneri Engler Dracaena cee Yuddo Tree 27 Ehretia cymosi Sparm Meliscae Ororoo Tree 28 Ekebergia capensis Sparm Meliscae Ororoo Tree 29 Elacodendron buchananii (Loes). Loes. Celastraceae Garboo Tree 20 Ergeropsis angolensis (Engl.) Dale Rutaceae Yanyo Tree	14	Clausena anisata (Willd.) Bentin.	Rutaceae	Immico Shaggaa gamba	Snrub
Ind Clements Intersit. Kaminuance in mit Quinou Lana 17 Coffe article al. Rubiacce Bunoo Tree 18 Combretum paniculatum Vent. Combretaceae Baggo Lian 19 Cordia africana Lan. Boraginaceae D'o Tree 20 Croton macrostachyus Del. Euphorbiaccae Sheshino Tree 21 Cyathea maninama Hook. Cyatheaceae Sheshino Tree 23 Dombeya torrida (J.F.Gmel). P. Bamps Sterculiaccae Sterculiaccae Shawakko Tree 24 Dracaena fumoritana Mildbr. Dracaenaceae Coqimato Tree 25 Dracaena steudineri Engler Dracaenaceae Yuddo Tree 28 Ekbergia capenis Sparrm Meliaccae Ororo Tree 29 Elaeodendron buchananii (Loes) Loes. Celastraceae Washo Tree 30 Erythroccae trichogone (Muell Arg.) Prain Euphorbiaceae Gachoo Tree 31 Eugenoris angolensis (Engl.) Dale Rubaceae <	15	Clematis simansis Erosop	Papunculaceae	Phi'o Oombo	Liana
Construint Difference Number and Participant Land 18 Combretum panicalatum Vent. Combretaceae Baggo Liana 19 Cortia africana Lam. Boraginaceae Dio Tree 20 Crotion macrostachyus Del. Euphorbiaceae Waagoo Tree 21 Cyathea maniana Hook. Cyatheaceae Gimiro Liana 23 Dombeya torrida (J.F.Gmel) P. Bamps Sterculiaceae Stanaceae Emoo 24 Dracena fargarns (J.) Ker Gawl. Dracenaceae Emoo Shrub 26 Dracaena steudneri Engler Dracenaceae Yuddo Tree 27 Ehretia cymos Thonn. Boraginaceae Wagaom Tree 28 Ekebergia capensis Spartm Meliaceae Ororo Tree 29 Elacodendron huchanani (LOes) Loes. Celastraceae Washo Tree 20 Fagaropis angelonis (Engl.) Dale Rutaceae Yaayyo Tree 21 Fagaropis angelonis (Engl.) Dale Rutaceae Qauyoo Tree 23	10	Coffee arabica I	Rubiaceae	Bunoo	Troo
Definition particinary Cells. Construction Digo Tree 19 Cordia africana Lam. Boraginaceae Digo Tree 20 Croton macrostachyus Del. Euphorbiaceae Waagoo Tree 21 Cyathea maninaninar Hook. Cyatheaceae Sheshino Tree 23 Dombeya torrida (J.F.Gmel.) P. Bamps Streculiaceae Shawakko Tree 24 Dracaena afromontana Mildbr. Dracaenaceae Cogimato Tree 25 Dracaena steudorner Engler Dracaenaceae Yuddo Tree 26 Dracaena steudorner Engler Dracaenaceae Wagamo Tree 28 Ekebergia capenasis Sparrm Meliaceae Ororo Tree 29 Elacodendron buchananti (Loes) Loes. Celastraceae Washo Tree 31 Euphorbia anglepitylla Pax Euphorbiaceae Gachoo Tree 33 Ficus sur Forsk. Moraceae Caaro Tree 34 Placourtia nidica (Burrn.I.) Merrill Flacourtriaceae Aama shiko	17	Combretum paniculatum Vent	Combretaceae	Baggo	Liana
Colori macrostachyus Del. Euphorbiaccae Waagoo Tree 20 Croton macrostachyus Del. Euphorbiaccae Waagoo Tree 21 Cyathea manniana Hook. Cyatheaccae Gimiro Liana 23 Dombeya torrida (J.F.Grnel.) P. Bamps Sterculiaceae Shawakko Tree 24 Dracaena fagrams (L.) Ker Gawl. Dracaenaccae Emoo Shrub 26 Dracaena steudneri Engler Dracaenaccae Yuddo Tree 27 Elretia cymosa Thom. Boraginaccae Wagaamo Tree 29 Elacodendron buchananii (Loes.) Loes. Celastraceae Washo Tree 20 Erythroocca trichogyne (Muell Arg.) Prain Euphorbiaccae Gachoo Tree 21 Fagaropis angolensis (Engl.) Dale Rutaceae Yaayyo Tree 23 Fagaropis angolensis (Engl.) Dale Rutaceae Paayoo Tree 23 Fagaropis angolensis (Engl.) Dale Rutaceae Paayoo Tree 24 Flacourtia indica (Burm.f.) Meracaea Pa	10	Cordia africana Lam	Boraginaceae	Diggo	Tree
21 Cyathea manniana Hook. Cyatheaceae Sheshino Tree 22 Dalbergia lacta Valke Fabaceae Gimiro Liana 23 Dombeya torrida (JF, Gmel, P. Bamps Stercullaceae Shawako Tree 24 Dracaena afgromontana Mildbr. Dracaenaceae Cogimato Tree 25 Dracaena fargarons (L), Ker Gawl. Dracaenaceae Wudo Tree 26 Dracaena steudneri Engler Dracaena ceae Wudo Tree 28 Ekchergia capensis Sparrn Meliaceae Ororo Tree 29 Elaeodendron buchananii (Loes), Loes. Celastraceae Washo Tree 31 Euphorbia ampliphylla Pax Euphorbiaceae Gachoo Tree 33 Ficus sur Forsk. Moraceae Caaro Tree 34 Flacourtia indica (Burm.f.) Merrill Flacourtia indica Steapende Tree 35 Galiminer asaxifraga (Hochst). Bridison Rubiaceae Daikoc Tree 36 Jasminum abysishicum Hochst. ex DC. Oleaceae	20	Croton macrostachvus Del	Euphorbiaceae	Waagoo	Tree
22Dalbergia lactea VatkeFabaceaeGiminoLiana23Dombeya torrida (J.F.Gmel, P. BampsSterculiaceaeShawakkoTree24Dracaena afromotana Mildbr.DracaenaceaeCoqinatoTree25Dracaena steudneri EnglerDracaenaceaeEmooShrub26Dracaena steudneri EnglerDracaenaceaeWagaanoTree27Ehretia cymosa Thonn.BoraginaceaeWagaanoTree28Ekebergia capensis SparrmMeliaceaeOroroTree29Elaeodendron buchnannii (Loes), Loes.CelastraceaeWashoTree30Erythrococca trichogyne (Muell Arg.) PrainEuphorbiaceaeBiccre kuccoShrub31Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angelensis (Engl.) DaleRutaceaeYaayoTree34Flacourtia indica (Burm.f.)MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeQawe qomboLiana39Justicia schimperiana (Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nocs).ApocynaceaeSharkharoTree41Lepidotrichila volkensi (Gall), SinEuphorbiaceaeShahkaroTree42Macaranga capenisi (Baill), SinEuphorbiaceaeShakkoShrub44Mayceanis (Galli, Olskos, DC.RubiaceaeShikkoShrub45Millettia ferruginea (Hochs	20	Cvathea manniana Hook	Cyatheaceae	Sheshino	Tree
23 Dombeya torrida (J.F.Gmel.) P. Bamps Sterculiaceae Shawakko Tree 24 Dracaena afgromontana Mildbr. Dracaenaceae Coqimato Tree 25 Dracaena fragrams (L.) Ker Gavl. Dracaenaceae Emoo Shrub 26 Dracaena steudneri Engler Dracaenaceae Yuddo Tree 27 Ehretia cymosa Thom. Boraginaceae Wagaamo Tree 28 Ekebergia capensis Sparm Meliaceae Ororo Tree 29 Elaeodendron buchananii (Locs). Loes. Celastraceae Washo Tree 30 Erythroocca trichogyne (Muell Arg.) Prain Euphorbiaceae Biccre kucco Shrub 31 Euphorbia anglensis (Engl.) Dale Rutaceae Caaro Tree 33 Ficus sur Forssk. Moraceae Caaro Tree 34 Flacourtia indica (Burm.f.) Merrill Flacourtia caeae Anam shiko Tree 35 Galiniera saxifraga (Hochst.) Bridson Rubiaceae Qawe qombo Liana 37 Ilex mitis (L.) Radlk. Aquifoliaceae Sharubo Tree 38 Ja	22	Dalbergia lactea Vatke	Fabaceae	Gimiro	Liana
24 Dracaena afromontana Mildbr. Dracaenaceae Coqimato Tree 25 Dracaena tragaras (L.) Ker Gawl. Dracaenaceae Emoo Shrub 26 Dracaena steudheri Engler Dracaenaceae Wagaamo Tree 27 Ehretia cymosa Thonn. Boraginaceae Wagaamo Tree 28 Ekkebergia capensis Sparrm Meliaceae Ororo Tree 30 Erythroccca trichogyme (Muell Arg.) Prain Euphorbiaceae Biccre kucco Shrub 31 Euphorbia ampliphylla Pax Euphorbiaceae Gachoo Tree 32 Fagaropsis angolensis (Engl.) Dale Rutaceae Yaayyo Tree 33 Ficus sur Forssk. Moraceae Caaro Tree 34 Flacourtia indica (Burm.f.) Merrill Flacourtiaceae Anam shiko Tree 35 Galiniera saxifraga (Hochst.) Bridson Rubiaceae Diidoo Tree 35 Jasminum abysisnicum Hochst. ex DC. Oleaceae Hawute qombo Liana 39 Justica schimperiana (Hochst. ex Nees)T. Ander	23	Dombeva torrida (I.F.Gmel.) P. Bamps	Sterculiaceae	Shawakko	Tree
25 Dracaena frágrans (L.) Ker Gawl. Dracaenaceae Émoo Shrub 26 Dracaena steudneri Engler Dracaenaceae Yuddo Tree 27 Ehretia cymosa Thonn. Boraginaceae Wagaamo Tree 28 Ekebergia capensis Sparm Meliaceae Ororo Tree 29 Elacodendron buchannii (Loes.) Loes. Celastraceae Washo Tree 30 Erythrococca trichogyne (Muell Arg.) Prain Euphorbiaceae Gachoo Tree 31 Euphorbia ampliphylla Pax Euphorbiaceae Gachoo Tree 32 Fagaropsis angolensis (Engl.) Dale Rutaceae Caaroo Tree 34 Flacourtia indica (Burm.f.) Merrill Flacourtiaceae Anam shiko Tree 35 Galiniera saxifraga (Hochst.) Bridson Rubiaceae Qawe qombo Liana 37 Itex mitis (L.) Radlk. Aquifoliaceae Qawe qombo Liana 36 Jasmitiu Abysinicum Hochst. ex DC. Oleaceae Sharsharo Shrub 40 Landolphia buchananii (Hall.f.) Stapf. Apocynaceae Shakkaro Tree 41 </td <td>24</td> <td>Dracaena afromontana Mildbr.</td> <td>Dracaenaceae</td> <td>Cogimato</td> <td>Tree</td>	24	Dracaena afromontana Mildbr.	Dracaenaceae	Cogimato	Tree
26 Dracama steudneri Engler Dracaenaceae Yuddo Tree 27 Ehretia cymosa Thonn. Boraginaceae Wagaamo Tree 28 Ekkebergia capensis Sparrm Meliaceae Ororo Tree 29 Elacodendron buchanani (Loes.) Loes. Celastraceae Washo Tree 30 Erythrococca trichogyne (Muell Arg.) Prain Euphorbiaceae Gachoo Tree 31 Euphorbia ampliphylla Pax Euphorbiaceae Gachoo Tree 31 Ficus sur Forssk. Moraceae Caaro Tree 34 Flacourtia indica (Burm.f.) Merrill Flacourtiaceae Diidoo Tree 35 Galiniera saxifraga (Hochst) Bridson Rubiaceae Qawe qombo Liana 37 Ilex mitis (L.) Radlk. Aquifoliaceae Qateo Tree 38 Jasminum abyssinicum Hochst. ex DC. Oleacareae Hawute qombo Liana 39 Justicia schimperiana (Hochst. ex Nees)T. Anders Apocynaceae Sharihayo Tree 41 Lepidotrichilla volkensii	25	Dracaena fragrans (L.) Ker Gawl.	Dracaenaceae	Emoo	Shrub
27Ehretia cymosa Thonn.BoraginaceaeWagaamoTree28Ekebergia capensis SparmMeliaceaeOroroTree29Elacodendron buchananii (Loes,) Loes.CelastraceaeWashoTree30Erythrococca trichogyne (Muell Arg.) PrainEuphorbiaceaeBiccre kuccoShrub31Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angolensis (Engl.) DaleRutaceaeCaaroTree33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeDiidooTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeQateo onTree36Hippocratea pallens Planch. ex Oliv.CelastraceaeQave qomboLiana39Justicia schimperiana (Hochst. ex Noc.)OleaceaeHawute qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lancelalat Forssk.MyrsinaceaeShakkaroTree44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeShigiyoTree46Ocotae kenyensis L.Olea capensis L.OleaceaeShigiyoTree47Olea welwitschii (Knob.) Gig & Schellenb.OleaceaeShigiyoTree48Olea welwitsc	26	Dracaena steudneri Engler	Dracaenaceae	Yuddo	Tree
28Ekkbergia capensis SparrmMeliaceaeOroroTree29Elacodendron buchananii (Loes, Loes, Loes, CelastraceaeWashoTree30Erythrococca trichogyne (Muell Arg.) PrainEuphorbiaceaeBiccre kuccoShrub31Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angolensis (Engl.) DaleRutaceaeYaayyoTree33Galiniera saxifraga (Hochst.) BridsonRubiaceaeDidooTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDidooTree36Hippocratea pallens Planch. ex Olv.CelastraceaeQevo onTree39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maytenus gracilipes (Weiw, ex Oliv.) ExellCelastraceaeShakkooShrub44Maytenus gracilipes (Weiw, ex Oliv.) ExellCelastraceaeNajoTree45Millettia ferruginae (Hochst.) BakerFabaceaeShikkoShrub46Ocotea kenyenis (Chiov.) Robyns & WilczekLauraceaeNajoTree47Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaa	27	Ehretia cymosa Thonn.	Boraginaceae	Wagaamo	Tree
29Elacodendron buchananii (Loes.) Loes.CelastraceaeWashoTree30Erythroocca trichogyne (Muell Arg.) PrainEuphorbiaceaeBiccre kuccoShrub31Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angolensis (Engl.) DaleRutaceaeYaayyoTree33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeDiidooTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDiidooTree36Hipporatea pallens Planch. ex Oliv.CelastraceaeQave qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQatooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeBiberoTree44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeBiberoTree45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilzekLauraceaeAnbooTree47Olea capensis L.OleaceaeShigiyoTree48Olea vatensis paciosus DC.	28	Ekebergia capensis Sparrm	Meliaceae	Ororo	Tree
50Erythrococca trichogyme (Muell Arg.) PrainEuphorbiaceaeBiccre kuccoShrub31Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angolensis (Eng.) DaleRutaceaeYaayyoTree33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifyaga (Hochst.) BridsonRubiaceaeDiidooTree36Hippocratea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYaaw qomboLiana41Lepidotrichila volkensi (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Mayterus gracilipes (Welv. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeShigiyoTree47Olea capensis L.OleaceaeShigiyoTree48Olea wel	29	Elaeodendron buchananii (Loes.) Loes.	Celastraceae	Washo	Tree
11Euphorbia ampliphylla PaxEuphorbiaceaeGachooTree32Fagaropsis angolensis (Engl.) DaleRutaceaeYaayyoTree33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDiidooTree36Hipportatea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree43Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeCaggoShrub45Millettin ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea velwitschii (Knobl.) Gilg & Schellenb.OleaceaeShigiyoTree50Pavetta abysinica Freen.RubiaceaeMabooShrub51Phoenix reclinata Ja	30	Erythrococca trichogyne (Muell Arg.) Prain	Euphorbiaceae	Biccre kucco	Shrub
32Fagaropsis angolensis (Engl.) DaleRutaceaeYaayyoTree33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm, f.) MerrillFlacourtia caeaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDiidooTree36Hipportatea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Magea lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeBiberoTree45Millettia ferruginea (Hochst.) BakerFabaccaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeYaabooTree48Olea vathus specious DC.RubiaceaeOpharoShrub50Pavetta abyssinica Fresen.RubiaceaeAplatocaeTree52Pitosporum viridifforum Sims<	31	Euphorbia ampliphylla Pax	Euphorbiaceae	Gachoo	Tree
33Ficus sur Forssk.MoraceaeCaaroTree34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaccaeDildooTree36Hippocratea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaccaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Masea lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeBiberoTree45Millettia ferruginea (Hochst). BakerFabaccaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis LOleaceaeYaabooTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaabooTree52Protenix reclinata Jacq.AraliaceaeMaybooTree53Potteria adolfi-friederici (Engl.)BaehniSapotaceaeShollooShrub54Polysci	32	Fagaropsis angolensis (Engl.) Dale	Rutaceae	Yaayyo	Tree
34Flacourtia indica (Burm.f.) MerrillFlacourtiaceaeAnam shikoTree35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDiidooTree36Hippocratea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasninum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree50Pavetta abyssinica Fresen.Rubiaceae-Shrub51Phoenix reclinata Jacq.AraliaceaeYaahooTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulv	33	Ficus sur Forssk.	Moraceae	Caaro	Tree
35Galiniera saxifraga (Hochst.) BridsonRubiaceaeDiidooTree36Hippocratea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeCaggoShrub43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShaiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeShalbooTree50Pavetta abyssinica Fresen.Rubiaceae-Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeQararoTree54Poluscia adolf-friederici (Eng	34	Flacourtia indica (Burm.f.) Merrill	Flacourtiaceae	Anam shiko	Tree
36Hippocratea pallens Planch. ex Oliv.CelastraceaeQawe qomboLiana37Ilex mitis (L.) Radlk.AquifoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall,f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis L.OleaceaeShigiyoTree48Olea capensis L.OleaceaeShigiyoTree49Oxyanthus speciosus DC.RubiaceaeMaudooShrub50Pavetta abyssinica Fresen.RubiaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQaurooTree55Prunus africana (Hook,f.) Kalkm.RosaceaeQaurooTree56Prunus africana (Hook,f.) Kalkm.Rosaceae </td <td>35</td> <td>Galiniera saxifraga (Hochst.) Bridson</td> <td>Rubiaceae</td> <td>Diidoo</td> <td>Tree</td>	35	Galiniera saxifraga (Hochst.) Bridson	Rubiaceae	Diidoo	Tree
37Ilex mitis (L.) Radik.AquitoliaceaeQetooTree38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShakkaroTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeYaahooTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeOpharoShrub50Pavetta abyssinica Fresen.RubiaceaeQopharoShrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeQararoTree54Pouteria adolfi-friederici (Engl.)VerbenaceaeQuaroShrub55Prenna schimperi Engl.VerbenaceaeQararoTree56Prunus africana (Hook.f.) Kalkm.Ros	36	Hippocratea pallens Planch. ex Oliv.	Celastraceae	Qawe qombo	Liana
38Jasminum abyssinicum Hochst. ex DC.OleaceaeHawute qomboLiana39Justicia schimperiana (Hochst. ex Nees)T. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeBiberoTree45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNaijoTree47Olea capensis L.OleaceaeShrubTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.RubiaceaeOpharoShrub51Phoenix reclinata Jacq.AraliaceaeMaraboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeQararoTree54Pouteria adolfi-friederici (Engl.)BaehniSapotaceaeQararoTree55Prenna schimperi Engl.VerbenaceaeAa'imaatoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeAa'imaatoShrub58Rhammus prinoides L'He	37	Ilex mitis (L.) Radlk.	Aquifoliaceae	Qetoo	Tree
39Justicia schimperiana (Hochst. ex Nees) I. AndersAcanthaceaeSharsharoShrub40Landolphia buchananii (Hall.f.) Stapf.ApocynaceaeYame qomboLiana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferrugina (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeSholooShrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQuararoTree55Prema schimperi Engl.VerbenaceaeMonoShrub56Prunus africana (Hook,f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceae <td>38</td> <td>Jasminum abyssinicum Hochst. ex DC.</td> <td>Oleaceae</td> <td>Hawute qombo</td> <td>Liana</td>	38	Jasminum abyssinicum Hochst. ex DC.	Oleaceae	Hawute qombo	Liana
40Lanaoipiia buchanani (Hall.I.) stapi.ApocynaceaeYame qomboLana41Lepidotrichilia volkensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferrugina (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYahooTree49Oxyanthus speciosus DC.Rubiaceae—Shrub50Pavetta abysinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQmooShrub55Premna schimperi Engl.VerbenaceaeAuimatoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree58Rhamus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmania urcelliformis (Hiern) RobynsRubiaceaeDiboTree	39	Justicia schimperiana (Hochst. ex Nees) 1. Anders	Acanthaceae	Sharsharo	Shrub
41Lepiaoiricinita voikensii (Gurke) LeroyMeliaceaeShahiyoTree42Macaranga capensis (Baill.) SimEuphorbiaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Prenna schimperi Engl.VerbenaceaeAa'imaatoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana <td>40</td> <td>Landolphia buchananii (Hall.I.) Stapi.</td> <td>Apocynaceae</td> <td>Yame qombo</td> <td>Liana</td>	40	Landolphia buchananii (Hall.I.) Stapi.	Apocynaceae	Yame qombo	Liana
42Macaranga capensis (balli,) simEuphorbaceaeShakkaroTree43Maesa lanceolata Forssk.MyrsinaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.Rubiaceae—Shrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeQararooTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQuarooShrub55Premna schimperi Engl.VerbenaceaeAumooShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeGarooLiana60Rubus apetalus Poir.RosaceaeGarooLiana	41	Lepiaotricnilia volkensii (Gurke) Leroy	Furthershipsee	Shahlyo	Tree
45Matsa lanceolad Forski.MyshiaceaeCaggoShrub44Maytenus gracilipes (Welw. ex Oliv.) ExellCelastraceaeShikkoShrub45Millettia ferruginea (Hochst.) BakerFabaceaeBiberoTree46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNajjoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.Rubiaceae—Shrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeQararoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeAa'imaatoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmanus prinoides L'Herit.RosaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	42	Macara langaolata Formaly	Mursing coop	блаккаго	Shrub
44Industrial gradulpes (Welw, Cr. Oliv.) Exchange (General Control Parential General Control Parential General Control Parential Control Control Parential Control Pare	45 44	Maesa lanceolala FOISSK. Maytenus gracilipes (Wely, ex Oliy) Exell	Celastraceae	Caggo Shikko	Shrub
45Interfut perfugine (flochs), bachFabaccacInduct46Ocotea kenyensis (Chiov.) Robyns & WilczekLauraceaeNaijoTree47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.RubiaceaeOpharoShrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	44	Millettia farruginea (Hochst) Baker	Fabaceae	Bibero	Tree
47Olea capensis L.OleaceaeShigiyoTree48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.RubiaceaeOpharoShrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	46	Ocatea kenvensis (Chioy) Robyns & Wilczek	Lauraceae	Naijo	Tree
17Olea walpensis E.Olea constructionOngry orInter48Olea welwitschii (Knobl.) Gilg & Schellenb.OleaceaeYaahooTree49Oxyanthus speciosus DC.RubiaceaeOpharoShrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeGeeshooShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	40	Olea capensis I	Oleaceae	Shigiyo	Tree
10Organ Humberlin (Hieren), ong et obtenent.FinancialFinancial49Oxyanthus speciosus DC.RubiaceaeOpharoShrub50Pavetta abyssinica Fresen.Rubiaceae—Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeGeeshooShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeGarooLiana60Rubus apetalus Poir.RosaceaeGarooLiana	48	Olea welwitschii (Knohl) Gila & Schellenh	Oleaceae	Yaahoo	Tree
50Pavetta abysinica Fresen.Rubiaceae-Shrub51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeGeeshooShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeGarooLiana60Rubus apetalus Poir.RosaceaeGarooLiana	49	Oxvanthus speciosus DC	Rubiaceae	Opharo	Shrub
51Phoenix reclinata Jacq.AraliaceaeYabboTree52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	50	Pavetta abvssinica Fresen	Rubiaceae		Shrub
52Pittosporum viridiflorum SimsPittosporaceaeShollooShrub53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	51	Phoenix reclinata Jacq.	Araliaceae	Yabbo	Tree
53Polyscias fulva (Hiern) HarmsAraliaceaeKarashoTree54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	52	Pittosporum viridiflorum Sims	Pittosporaceae	Sholloo	Shrub
54Pouteria adolfi-friederici (Engl.) BaehniSapotaceaeQararoTree55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	53	Polyscias fulva (Hiern) Harms	Araliaceae	Karasho	Tree
55Premna schimperi Engl.VerbenaceaeXumoShrub56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	54	Pouteria adolfi-friederici (Engl.) Baehni	Sapotaceae	Qararo	Tree
56Prunus africana (Hook.f.) Kalkm.RosaceaeOmoTree57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	55	Premna schimperi Engl.	Verbenaceae	Xumo	Shrub
57Psychotria orophila PetitRubiaceaeAa'imaatoShrub58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	56	Prunus africana (Hook.f.) Kalkm.	Rosaceae	Omo	Tree
58Rhamnus prinoides L'Herit.RhamnaceaeGeeshooShrub59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	57	Psychotria orophila Petit	Rubiaceae	Aa'imaato	Shrub
59Rothmannia urcelliformis (Hiern) RobynsRubiaceaeDiboTree60Rubus apetalus Poir.RosaceaeGarooLiana	58	Rhamnus prinoides L'Herit.	Rhamnaceae	Geeshoo	Shrub
60Rubus apetalus Poir.RosaceaeGarooLiana	59	Rothmannia urcelliformis (Hiern) Robyns	Rubiaceae	Dibo	Tree
	60	Rubus apetalus Poir.	Rosaceae	Garoo	Liana

No.	Species name	Family	*Local name	Habit
61	Rubus steudneri Schweinf.	Rosaceae	Garoo	Liana
62	Rytigynia neglecta (Hirn) Robyns	Rubiaceae	Naxaacho	Shrub
63	Sapium ellipticum (Krauss) Pax	Euphorbiaceae	Shaddo	Tree
64	Schefflera abyssinica (Hochst. ex A. Rich.) Harms	Âraliaceae	Buto	Tree
65	Sericostachys Scandens Gilg &Lopr.	Amaranthaceae	Shuddii	Liana
66	Syzygium guineense (Willd.) DC.	Myrtaceae	Yinoo	Tree
67	Teclea nobilis Del.	Rutaceae	Shangaro	Tree
68	Tiliacora troupinii Cuf.	Menispermaceae	Caamee qombo	Liana
69	Trema orientalis (L.) Bl.	Ulmaceae	Ufo	Tree
70	Vepris dainellii (Pic. Serm.) Kokwaro	Rutaceae	Mangirexxo	Tree
71	Vernonia amygdalina Del.	Asteraceae	Giraawwoo	Tree
72	Vernonia auriculifera Hiern	Asteraceae	Dangaretto	Shrub

TABLE 1: Continued.

*Local name = Kafinono

3.2. Density of Woody Species. The density, *D*, of trees and shrubs with H > 2 m and DBH > 2.5 cm was 1446 individuals per hectare. Twelve species were in density class *A* and 20, 10, 10, 3, and 7 species in classes *B*, *C*, *D*, *E*, and *F*, respectively. The seven most abundant species in the density class *F* (D > 50 ha⁻¹) were *Coffea arabica*, *Elaeodendron buchananii*, *Millettia ferruginea*, *Olea capensis*, *Oxyanthus speciosus*, *Syzygium guineense*, and *Vepris dainellii*.

The *D* of trees and shrubs with DBH 10-20 cm and DBH > 20 cm were, respectively, 556 and 281 individuals per hectare. Accordingly, the ratio of individuals with DBH 10-20 cm (a) to DBH > 20 cm (b) was 2.0.

Comparison of trees and shrub densities with DBH 10-20 cm (a), DBH > 20 cm (b), and the ratio (a/b) for Agama Forest with 5 other forests in Ethiopia is given in Table 2.

3.3. Frequency. Twenty-seven, 17, 8, 4, and 6 species were recorded in frequency classes *A*, *B*, *C*, D, and *E*, respectively. The six most frequently occurring species in class E were Elaeodendron buchananii, Olea capensis, Olea welwitschii, Oxyanthus speciosus, Syzygium guineense, and Vepris dainellii.

3.4. Basal Area. The total basal area was $80.8 \text{ m}^2/\text{ha}$. The highest (33.3%) and the lowest (0.001%) BA ha⁻¹ were contributed by Olea welwitschii and Pavetta abyssinica, respectively. Elaeodendron buchananii, Olea welwitschii, Sapium ellipticum, Schefflera abyssinica, and Syzygium guineense covered 71.4% of the total basal area.

3.5. Important Value Index (IVI). Ten species contributed 59.9% of the IVI. These were in decreasing order: Olea welwitschii, Elaeodendron buchananii, Olea capensis, Syzygium guineense, Schefflera abyssinica, Vepris dainellii, Oxyanthus speciosus, Millettia ferruginea, Sapium ellipticum, and Coffea arabica. About 39% of the IVI was contributed by the remaining 52 species. Percentage values in the five IVI classes, I to V, were 2.5%, 43%, 18.9%, 21.9%, and 13.7%, respectively. Most species were in classes I and II.

3.6. Vertical Stratification. The tallest tree was an individual of Olea welwitschii with H = 46 m. The lower storey

TABLE 2: Comparisons of tree and shrub densities with DBH 10-20 cm (a) and tree density with DBH > 20 cm (b) from Agama Forest with 5 other moist Afromontane forests in Ethiopia.

Ecresta	Der	nsity	Ratio	Sourcoo
Forests	(a)	(b)	a/b	Sources
Belete	305.1	149.0	2.04	[28]
Gelesha	315.4	244.6	1.29	[29]
Komto	330.0	215.0	1.53	[30]
Masha	633.0	286.0	2.21	[31]
Menna Angetu	292.0	139.0	2.10	[32]
Agama	556.3	280.9	1.98	Present study

contained the highest number of species, 60, and stem density, 1309/ha, and the upper the lowest, 7 and 17/ha, respectively; the middle storey was intermediate, 26 and 11/ ha, respectively (Table 3).

The seven tree species that occupied the upper storey were Apodytes dimidiata, Olea welwitschii, Pouteria adolfi-friederici, Prunus africana, Sapium ellipticum, Schefflera abyssinica, and Syzygium guineense, and the 11 in the middle storey were Albizia gummifera, Croton macrostachyus, Elaeodendron buchananii, Fagaropsis angolensis, Ficus sur, Ilex mitis, Macaranga capensis, Millettia ferruginea, Ocotea kenyensis, Phoenix reclinata, and Polyscias fulva. The main species in the lower storey, shrubs and small trees, were Allophylus abyssinica, Coffea arabica, Cyathea manniana, Clausena anisata, Dombeya torrida, Dracaena afromontana, Ehretia cymosa, Erythrococca trichogyne, Maesa lanceolata, Maytenus gracilipes, Olea capensis, Oxyanthus speciosus, Rothmannia urcelliformis, Rytigynia neglecta, Teclea nobilis, and Vepris dainellii.

3.7. Height and DBH Class Distribution. The H and DBH class distributions of all individuals in the different size classes were an inverted J shape. Thus the majority of species had the greatest number of individuals with relatively low H and DBH with a gradual decrease in numbers of both with increasing H and DBH. About 63% of individuals were found in the first height class (2.5–5 m); only a few individuals, about 1%, attained heights > 30 m. DBH distribution showed that about 81% of individuals were in the DBH class <20 cm, and a very small proportion (1.2%) reached DBH > 110 cm.

TABLE 3: Density and number of woody species by storey in Agama Forest.

Storey	Height (m)	Density (no. of stems/ha)	Percentage	Species number
Lower	2-15	1309.3	87.88	60
Middle	15-30	163.74	10.99	26
Upper	>30	16.8	1.33	7

3.8. Population Structure of Agama Forest. There were four main patterns of population structure (Figures 2(a)-2(d)). The first was a bell-shaped distribution, in which the number of individuals in the middle diameter classes is highest, e.g., Olea welwitschii and Syzygium guineense. The second was a J-shaped distribution, in which the number of individuals increases with diameter class, e.g., Schefflera abyssinica, Cyathea manniana, and Rytigynia neglecta. The third was formed with species showing an inverted J shape, a pattern where the highest frequency is in the lower diameter classes and it decreases towards the higher diameter classes, e.g., Elaeodendron Buchananii, Olea capensis, Vepris dainellii, Oxyanthus speciosus, and Teclea nobilis. The fourth pattern had no individual in DBH class one, an abrupt increase from DBH class two to the middle classes, and an abrupt decrease from the middle to the higher classes, e.g., Sapium ellipticum, Croton macrostachyus, and Poliscas fulva (Figure 2(d)).

3.9. Regeneration Status of Agama Forest. Total density of seedling, sapling, and tree/shrubs was 3378 ha^{-1} , 1888 ha^{-1} , and 1486 ha^{-1} , respectively. Out of 54 trees and shrubs of DBH > 2.5 cm, 6 were not represented as seedlings and 11 not represented as saplings. Nine species, *Coffea arabica, Elaeo-dendron buchananii, Galiniera saxifraga, Maytenus gracilipes, Millettia ferruginea, Olea capensis, Oxyanthus speciosus, Phoenix reclinata,* and *Vepris dainellii,* contributed 54.3% and 55.2% of the total seedling and sapling count, respectively.

Regeneration status was represented by five distribution patterns (Figure 3): (I) seedling > sapling > tree/shrub, a pattern exhibited by Albizia gummifera, Bersama abyssinica, Canthium oligocarpum, Coffea arabica, and Millettia fer*ruginea* (Figure 3(a)); (II) seedling > sapling < tree/shrub by Elaeodendron buchananii, Oxyanthus speciosus, Erythrococca trichogyne, and Vepris dainellii (Figure 3(b)); (III) seedling < sapling < tree/shrub by Dracaena afromontana, Ficus sur, Ocotea kenyensis, Olea welwitschii, and Sapium *ellipticum* (Figure 3(c)); (IV) no individual in either seedling or sapling stages but many trees/shrubs by Buddleja polystachya, Euphorbia ampliphylla, Fagaropsis angolensis, Flacourtia indica, Premna schimperi, Rhamnus prinoides, and Trema orientalis (Figures 3(d) and 3(e)); (V) with no individual in seedling and sapling stages but relatively many individuals in tree/shrub stage, e.g., Alangium chinense, Cordia africana, Cyathea manniana, Ekebergia capensis, and Schefflera abyssinica (Figure 3(f)).

Three priority classes based on the total density of seedlings and saplings were established for conservation: class 1 with no seedling or sapling, class 2 with density of seedlings and saplings >0 but <50 individuals ha^{-1} , and class 3 with density of seedlings and saplings >50 individuals ha^{-1} (Table 4).

4. Discussion

4.1. Floristic Diversity. Seventy-two (72) species of shrubs, lianas, or trees were recorded. Among the tree species, two, *Vepris dainellii* and *Millettia ferruginea*, are endemic to Ethiopia. The Shannon–Weiner diversity and evenness indexes were 3.25 and 0.78, respectively. Thus, the species mix at Agama is representative of a forest with high species diversity [10] and the species are well represented across the extent of the forest.

4.2. Vegetation Structure. The ratio of DBH > 10 cm to DBH > 20 cm (a/b ratio) was 2.0 and indicative of the predominance of small-sized individuals in the forest. This was largely due to the high density of *Olea capensis* and *Vepris dainellii*. This ratio can also be used as a measure of size class distribution [33] and shows that, in Ethiopia, Agama Forest is comparable to moist Afromontane forests at Belete, Masha, and Menna Angetu, but with a greater predominance of small-sized individuals than those at Gelesha and Komto. That the proportion of individuals of DBH between 2.5 and ≤ 10 cm was 42.1% suggests that Agama Forest is in a secondary stage of development.

Frequency provides an approximate indication of the homogeneity of a stand [10]. High values in higher frequency classes (D and E) and low values in lower frequency classes (A and b) indicate constant or similar species composition. On the other hand, high values in lower frequency classes and low values in higher frequency classes indicate a high degree of floristic heterogeneity [27]. In this study, high values were obtained in lower frequency classes, which showed the existence of high degree of floristic heterogeneity in Agama Forest.

Elaeodendron buchananii, Olea welwitschii, Sapium ellipticum, Schefflera abyssinica, and Syzygium guineense occupied >70% of the total basal area and can be considered the most important species in Agama Forest. A basal area provides a better measure of the relative importance of the species than simple stem count [34]. Thus, species with the largest contribution in a basal area can be considered the most important woody species in the study area.

Important Value Index (IVI) permits a comparison of species in a given forest type and depicts the sociological structure of a population in its totality in the community. It often reflects the extent of dominance, occurrence, and abundance of a given species in relation to other associated species in an area [10]. It is also important to compare the ecological significance of a given species. Therefore, it is a good index for summarizing vegetation characteristics and ranking species for management and conservation practices. Important Value Index combines data for three parameters



FIGURE 2: (a–d) Pattern of frequency distribution of selected tree species over DBH classes (DBH classes: 1 = 2.5-10 cm; 2 = 10.01-20 cm; 3 = 20.01-50 cm; 4 = 50.01-80 cm; 5 = 80.01-110 cm; 6 = 110.01-140 cm; $7 \ge 140 \text{ cm}$). (a) Olea welwitschii. (b) Schefflera abyssinica. (c) Elaeodendron Buchananii. (d) Sapium ellipticum.



FIGURE 3: (a-f) Seedlings, saplings, and tree/shrub distribution of some selected species occurring in Agama Forest. (a) *Coffea arabica*. (b) *Vepris dainellii*. (c) *Ficus sur*. (d) *Flacourtia indica*. (e) *Buddleja polystachya*. (f) *Schefflera abyssinica*.

Priority class 1	Priority class 2	Priority	class 3
Alangium chinense	Cassipourea malosana	Albizia gummifera	Maesa lanceolata
Buddleja polystachya	Ĉeltis africana	Allophylus abyssinica	Maytenus gracilipes
Cordia africana	Dombeya torrida	Apodytes dimidiata	Millettia ferruginea
Cyathea manniana	Ehretia cymosa	Bersama abyssinica	Olea capensis
Ekebergia capensis	Erythrococca trichogyne	Canthium oligocarpum	Oxyanthus speciosus
Euphorbia ampliphylla	Ficus sur	Clausena anisata	Phoenix reclinata
Fagaropsis angolensis	Ocotea kenyensis	Coffea arabica	Psychotria orophila
Flacourtia indica	Olea welwitschii	Croton macrostachyus	Rothmannia urcelliformis
Premna schimperi	Pittosporum viridiflorum	Dracaena steudneri	Rytigynia neglecta
Rhamnus prinoides	Polyscias fulva	Dracaena afromontana	Syzygium guineense
Schefflera abyssinica	Pouteria adolfi-friederici	Elaeodendron buchananii	Teclea nobilis
Trema orientalis	Prunus africana	Galiniera saxifraga	Vepris dainellii
	Sapium ellipticum	Ilex mitis	-
	Vernonia amygdalina	Lepidotrichilia volkensii	
	Vernonia auriculifera	Macaranga capensis	

TABLE 4: Species conservation priority classes.

(relative frequency, relative density, and relative abundance) [35]. We pointed out that Important Value Index gives a more realistic figure of dominance from the structural point of view. It is useful to compare the ecological significance of species [27]. In the present study, 59.92% of the IVI was contributed by *Olea welwitschii*, *Elaeodendron buchananii*, *Olea capensis*, *Syzygium guineense*, *Schefflera abyssinica*, *Vepris dainellii*, *Oxyanthus speciosus*, *Millettia ferruginea*, *Sapium ellipticum*, and *Coffea arabica*. These species were abundant, frequent, and dominant in Agama Forest.

In Agama Forest, distribution of all individuals in different height and DBH classes indicated an inverted J-shaped curve, which shows a normal population structure with a high number of individuals in the lower size classes and only a few individuals in the higher size classes. This pattern is an indicator of healthy regeneration of the forest and species and shows a good reproduction and recruitment capacity. Even though the overall height and DBH distribution revealed inverse J shape, different population dynamics for different species were in this study.

Information on the population structure of a tree species indicates the history of the past disturbance to that species and the environment and, hence, is used to forecast the future trend of the population of that particular species [13]. Population structure is an extremely useful tool for orienting management activities and perhaps most important for assessing both the potential of a given resource and the impacts of resource extraction [13]. In this study, four patterns population distributions based on DBH were revealed for selected woody species. These are J-shaped, bellshaped, inverted J-shaped, and irregular shaped. The J-shaped patterns show poor reproduction and hampered regeneration due to the fact that either most trees are not producing seeds due to age or there are losses due to predators after reproduction (e.g., Schefflera abyssinica). A bell shape follows a Gauss distribution pattern. This pattern indicates a poor reproduction and recruitment of species, which may be associated with the overharvesting of seed bearing individuals (e.g., Olea welwitschii). Bell-shaped or variable size class distribution has been attributed to a disturbed forest where regeneration is hampered [36]. An

inverted J-shaped distribution pattern of species is considered as an indication of stable population status or good regeneration status [37]. An irregular shaped pattern characterized by no individual in DBH class one, with an abrupt increase from DBH class two to the middle classes and with an abrupt decrease from the middle to the higher classes (e.g., *Sapium ellipticum*), might reflect limited regeneration, possibly due to human disturbance, livestock trampling or browsing, and other biotic and abiotic factors.

4.3. Regeneration Status. Regeneration refers to the process of silvigenesis by which trees and forests survive over time [38]. The population structure along different developmental stage of a species in a forest can express its regeneration behavior [39]. The population structure, described by the existence of sufficient population of seedlings, saplings, and adults, shows successful regeneration of forest species [39].

In this study, five distribution patterns of regeneration status were observed from the 54 woody species investigated for regeneration. (1) Seedling > sapling > tree/shrub state (e.g., Millettia ferruginea): this pattern indicates good regeneration. (2) Seedling > sapling < tree/shrub state (e.g., Elaeodendron buchananii): this pattern represents fair regeneration and recruitment of the species. (3) Seedling < sapling < tree/shrub state (e.g., *Ficus sur*): this pattern shows poor reproduction and hampered regeneration either due to the fact that most trees are not producing seeds as a result of their old age or there has been a loss of seeds by predators after reproduction. For instance, the fruits of Ficus sur were usually eaten as food by many animals including humans, which might be a reason for this pattern. (4) With no individual either in seedling or sapling stages but relatively many individuals in tree/shrub stage (e.g., Fagaropsis angolensis and Flacourtia indica): this pattern also shows poor reproduction and hampered regeneration. (5) With no individual in seedling and sapling stages but relatively many individuals in tree/shrub stage (e.g., Ekebergia capensis and Schefflera abyssinica): species exhibiting this pattern were not regenerating. Even though Schefflera abyssinica exhibits this pattern of regeneration, it

is difficult to conclude the species was not regenerating. The main reason is that it grows as an epiphyte mainly on other tree species and finally overtakes it to become an independent tree; as a result, the seedling and sapling stages are not visible on the ground [40].

From the three classes established for priority setting based on their regeneration status for the sake of conservation activities, those species under class 1 and class 2 are recommended to be given the highest priority. Thus, all stakeholders at both national and regional level should participate in the conservation endeavor of these species which can encompass both in situ and ex situ conservation.

5. Conclusion

Description of floristic diversity of woody species in Agama Forest revealed the presence of high species diversity. Of the species recorded in this forest, two tree species, Vepris dainellii and Millettia ferruginea, are endemic to Ethiopia. Structural analysis and assessment of regeneration status of woody species in this forest showed that the overall ecological condition of the forest was healthy. However, structural analysis and assessment of regeneration of some species revealed that there are species which exhibit abnormal population structure and abnormal pattern of regeneration which in turn necessitates conservation and management of these species. The in situ conservation strategy, which has been implemented by FARM Africa, an NGO that has been engaged in conservation endeavor of the study forest, in the form of participatory forest management (PFM), should be strengthened via collaboration of all potential stakeholders to reverse the unhealthy population structure and regeneration status of woody species.

Data Availability

Part of the data used in this research are included and attached as Additional Files 1, 2, and 3. Thus, the data used for this manuscript are available.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

The authors would like to acknowledge Addis Ababa University for providing financial support and logistics to conduct this research.

Supplementary Materials

Additional File 1: data were used to calculate density, frequency, basal area, and relative density, relative frequency, and relative basal area. Additional File 2: data were used to calculate Importance Value Index (IVI). Additional file 3: data were used to determine regeneration status and priority class for conservation. (*Supplementary Materials*)

References

- [1] EPA, Conservation Strategy of Ethiopia, EPA, Addis Ababa, Ethiopia, 1997.
- [2] I. Hedberg, I. Friis, and E. Person, Flora of Ethiopia and Eritrea Volume 8: General Part and Index to Vol 1-7, The National Herbarium and Uppsala, Sweden, Addis Ababa, Ethiopia, 2009.
- [3] E. Kelbessa and S. Demissew, "Diversity of vascular plant taxa of the flora of Ethiopia and Eritrea," *Ethiopian Journal of Biological Sciences*, vol. 13, pp. 37–45, 2014.
- [4] I. Friis, S. Demissew, and P. van Breugel, A New Potential Vegetation Map of Ethiopia in 1:2,000,000, Det Kongelige Danske Videnskabers Selskab, Copenhagen, Denmark, 2010.
- [5] M. Reusing, "Change detection of natural high forests in Ethiopia using remotesensing and gis techniques," in *International Archives of Photogrammetry and Remote Sensing*, vol. 33, Amsterdam, The Netherlands, 2000.
- [6] M. Reusing, *Monitoring of Natural High Forests in Ethiopia*, Ministry of Agriculture and GTZ, Addis Ababa, Ethiopia, 1998.
- [7] K. Yeshitela and T. Bekele, "Plant community analysis and ecology of Afromontane and transitional rainforest vegetation of southwestern Ethiopia," *SINET: Ethiopian Journal of Science*, vol. 25, no. 2, pp. 155–175, 2002.
- [8] M. Ezra, "Demographic responses to ecological degradation and food insecurity: drought-prone areas in northern Ethiopia," Doctoral dissertation, University of Groningen, PDOD Publications, Amsterdam, The Netherlands, 1997.
- [9] M. Lemenih and T. Woldemariam, "Review of forest, woodland and bushland resources in Ethiopia up to 2008," in *Ethiopian Environment Review No. 1*, S. Edwards, Ed., Forum for Environment, Addis Ababa, Ethiopia, 2010.
- [10] M. Kent, Vegetation Description and Data Analysis. A Practical Approach, John Wiley & Sons, Chichester, UK, 2012.
- [11] C. J. Krebs, *Ecological Methodology*, Addison Welsey Educational Publishers, Boston, MA, USA, 2nd edition, 1999.
- [12] J. L. Harper, Population Biology of Plants, Academic Press, London, UK, 1982.
- [13] C. M. Peters, "The ecology and management of non-timber forest resources," World Bank Technical Report No. 322, World Bank, Washington, DC, USA, 1996.
- [14] U. Shankar, "A case of high tree diversity in a Sal (Shorea robusta) dominated lowland forest of Eastern Himalaya: floristic composition, regeneration and conservation," *Current Science*, vol. 81, no. 7, pp. 776–786, 2001.
- [15] EVDSA. Ethiopian Valleys Development Studies Authority. Addis Ababa, Ethiopia, 1996.
- [16] NMSA, National Meteorological Service Agency, Ethiopia, 2018.
- [17] EMA, *National Atlas of Ethiopia*, Ethiopian Mapping Authority, Addis Ababa, Ethiopia, 1988.
- [18] M. Dumbois and H. Ellenberg, Aims and Methods of Vegetation Ecology, John Willey and Sons, New York, NY, USA, 1974.
- [19] B. McCune and J. B. Grace, Analysis of Ecological Communities, MjM Software Design, Gleneden Beach, OR, USA, 2002.
- [20] S. Edwards, M. Tadesse, and I. Hedberg, Flora of Ethiopia and Eritrea: Canellaceae to Euphorbiaceae, Vol. 2, Addis Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 1995.
- [21] S. Edwards, S. Demissew, and I. Hedberg, *Flora of Ethiopia* and Eritrea: Hydrocharitaceae to Arecaceae, Vol. 6, Addis

Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 1997.

- [22] S. Edwards, M. Tadesse, S. Demissew, and I. Hedberg, Flora of Ethiopia and Eritrea: Magnoliaceae to Flacourtiaceae, Vol. 2, Addis Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 2000.
- [23] I. Hedberg and S. Edwards, *Flora of Ethiopia: Pittosporaceae to Araliacae*, Vol. 3, Addis Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 1989.
- [24] I. Hedberg, S. Edwards, and S. Nemomissa, *Flora of Ethiopia and Eritrea: Apiaceae to Dipsaceae*, Vol. 4, Addis Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 2003.
- [25] I. Hedberg, E. Kelbessa, S. Edwards, S. Demissew, and E. Persson, *Flora of Ethiopia and Eritrea, Volume 5, Gentianaceae to Cyclocheilaceae*, Vol. 5, Addis Ababa: The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia, 2006.
- [26] J. T. Curtis and R. P. McIntosh, "The interrelations of certain analytic and synthetic phytosociological characters," *Ecology*, vol. 31, no. 3, pp. 434–455, 1950.
- [27] H. Lamprecht, Silviculture in the Tropics: Tropical Forest Ecosystems and Their Tree Species—Possibilities and Methods for Their Long Term Utilization, TZ-Verlagsgesellschaft GmbH, Rossdort, Germany, 1989.
- [28] K. Gebrehiwot and K. Hundera, "Species composition, plant community structure and natural regeneration status of Belete moist evergreen montane forest, Oromia regional state, Southwestern Ethiopia," *Momona Ethiopian Journal of Science (MEJS)*, vol. 6, no. 1, pp. 97–101, 2014.
- [29] B. Alemu, K. Hundera, and B. Abera, "Floristic composition and structural analysis of Gelesha forest, Gambella regional State, Southwest Ethiopia," *Journal of Ecology and The Natural Environment*, vol. 7, no. 7, pp. 218–227, 2015.
- [30] F. Gurmessa, T. Soromessa, and E. Kelbessa, "Structure and regeneration status of Komto afromontane moist forest, East Wollega Zone, West Ethiopia," *Journal of Forestry Research*, vol. 23, no. 2, pp. 205–216, 2012.
- [31] A. Assefa, S. Demissew, and Z. Woldu, "Floristic composition, structure and regeneration status of Masha forest, South-west Ethiopia," *African Journal of Ecology*, vol. 52, no. 2, pp. 151–162, 2013.
- [32] E. Lulekal, E. Kelbessa, T. Bekele, and H. Yineger, "Plant species composition and structure of the Mana Angetu moist montane forest, South-Eastern Ethiopia," *Journal of East African Natural History*, vol. 97, no. 2, pp. 165–185, 2008.
- [33] P. J. Grubb, J. R. Lloyd, T. D. Pennington, and T. C. Whitmore, "A comparison of montane and lowland rain forest in Ecuador I. The forest structure, physiognomy, and floristics," *The Journal of Ecology*, vol. 51, no. 3, pp. 567–601, 1963.
- [34] S. A. Cain and G. M. d. O. Castro, Manual of Vegetation Analysis, Harper and Brothers, New York, NY, USA, 1959.
- [35] J. T. Curtis and R. P. McIntosh, "An upland forest continuum in the prairie-forest border region of Wisconsin," *Ecology*, vol. 32, no. 3, pp. 476–496, 1951.
- [36] L. Poorter, F. Bongers, R. S. A. R. van Rompaey, and M. De Klerk, "Regeneration of canopy tree species at five sites in West African moist forest," *Forest Ecology and Management*, vol. 84, no. 1–3, pp. 61–69, 1996.
- [37] J. W. Silvertown, Introduction to Plant Population Ecology, Longman, London, UK, 1982.
- [38] P. Bhuyan, M. L. Khan, and R. S. Tripathi, "Tree diversity and population structure in undisturbed and human impacted

stands of tropical wet evergreen forest in Arunachal Pradesh, Eastern Himalayas, India," *Biodiversity & Conservation*, vol. 12, pp. 1753–1773, 2003.

- [39] A. K. Saxena and J. S. Singh, "Tree population structure of certain Himalayan forest associations and implications concerning their future composition," *Vegetatio*, vol. 58, no. 2, pp. 61–69, 1984.
- [40] A. Abiyu, G. Gratzer, D. Teketay, G. Glatzel, and R. Aerts, "Epiphytic recruitment of schefflera abyssinica (a. rich) harms. and the role of microsites in affecting tree community structure in remnant forests in Northwest Ethiopia," *SINET: Ethiopian Journal of Science*, vol. 36, no. 1, pp. 41–44, 2013.