Ecosytem Services Assessment of Urban Forests of Adama City, Ethiopia

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Research

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Abstract

Background: The recent urban challenges due to climate change and urban environment deterioration requires proper planning and inventories of urban forests. In this paper, trees and shrub information were used to estimate leaf area/biomass, carbon storage, carbon sequestration, pollution removal, and volatile organic compound (VOC) emissions, hydrological and functional values of Adama city urban forest. This study was conducted to assess and quantify the ecosystem services of urban forests of Adama city, Central Ethiopia.

Results: The result of i-tree Eco model has indicated that the tree species such as *Azadirachta indica, Eucalyptus globulus, Carica papaya and Delonix regia* sequester high percentage of carbon which is approximately 14.7%, 7.4%, 7.3% and 6.2% of all annually sequestered carbon respectively. Besides, urban forests of the city was estimated to store 116,000 tons of carbon; the most carbons were stored by the species such as *Eucalyptus globulus, Azadirachta indica, Carica papaya and Delonix regia* that stores approximately 22.1%, 12.3%, 9.5% and 4.2% of all stored carbon respectively. Trees in Adama urban forests were estimated to produce 19.93 thousand tons of oxygen per year. It was estimated that trees and shrubs remove 188.3 thousand tons of air pollution due to O_3, CO, NO_2, PM2.5 and SO_2 per year. In the city, 35 percent of the urban forest's VOC emissions were from *Eucalyptus cinerea* and *Eucalyptus globulus*. Besides, the monetary value of Adama urban forest in terms of carbon storage, carbon sequestration, and pollution removal was estimated to 16,588,470 ETB/yr, 118,283 ETB /yr and 12,162,701,080. 9 ETB /yr respectively.

Conclusion: Urban forest of Adama city has significant contribution in terms of enhancing woody species diversity and the regulation of urban environment of the study area. From the management and conservation perspectives, urban forests of the study area needs consolidated interventions in terms of tree planting in bare areas and management works. Hence, reliable commitment should be demanded form the key stakeholders such as government, urban foresters and city dwellers.

1. Introduction

In our world, human population growth and urbanization have adverse environmental impacts such as elevated temperatures, increases in air pollution and stormwater quantity, and decreases in stormwater quality, which pose major environmental and public health problems in cities (Rydin et al. 2012; Seto and Shepherd, 2009). In this regard, urban forest ecosystem plays an important role in providing multiple service and environmental benefits to urban environment (Forrest et al. 1999 ; Strohbach & Haase, 2012).

Ethiopia has one of the largest urbanization rates (about 4–5%) in the world, and its urban population is expected to increase from time to time. Also, urbanization at a rapid pace is a reality at present (Rama, 2013). The current phenomenon in Ethiopia has been associated with environmental problems in most cities. The major problems are urban sprawl, solid and liquid waste management; water, air, and noise pollution; illegal settlements and the degradation of open green areas (Thomas, 2013). 15% in 2000 to almost 30% in 2030 (UN Population Division, 2004). Ethiopia is experiencing the effects of climate change such as an increase in average temperature and change in rainfall patterns.

There are several techniques and models that have been developed to help quantify ecosystem services, such as i-Tree Eco and i-Tree Streets (i-Tree, 2010a). In this work, i-Tree Eco is a software suite were used for the analysis. i-Tree Eco was designed to use standardized field data from randomly located plots, as well as local hourly air pollution and meteorological data, to quantify urban forest structure, ecological function, and the associated value (Nowak et al. 2008a, McPherson 2010b).

The main aim of this study is assessing the ecosystem service of urban forest of Adama city interms of climate change mitigation; specifically, the study was intended i) to assess carbon storage and sequestiration potential of adama city trees ii) to estimate the oxiygen production and pollution removal by different species of adama city trees and iii) assess the hydrological and functional values of trees in Adama city.

2. Research Methods

2.1. Study Area

This study was conducted in Adama city of Oromia Regional State, Central Ethiopia. Adama city is geougraphically situated between 8° 32' 24" N, latitude and 39° 16' 12" E longitude within the altitudinal range of 1,712 meter a.s.l. (Fig. 1). The total area of the city is about 13,366.5 hectar and 99 km far from Addis Ababa the capital city of Ethiopia. The annual average minimum and maximum temperature of the study area is 13^0c and 27^0c, respectively. The annual average rainfall is 837-1005.7 mm and climate varies due to the great variation in altitude (BoFED, 2012). The total population of Adama is about 303,569 of which 150,228 are males and 153,341 are females. Currently, the city contains 18 kebele administrations.

Figure 1: Location map of the study area (source: http://www.google.com.et & survey)

2.2. Research Design and Sampling

The reconessance survey was conducted (from October to December, 2018) by a team of 5 people. The site assessment has done to observe the general plot information used to identify the plots and its general characteristics. In this work, trees and shrub information were used to estimate trees and shrubs leaf area/biomass, pollution removal, and volatile organic compound (VOC) emissions. Finally, tree informations used to estimate forest ecosystem value, carbon storage, carbon sequestration and hydrological functions of Adama city urban forest.

In this study, a total of 214 sample plots (27 percent of the city) have established by using a simple random sampling method. As a general rule, 200 plots (one-tenth acre each) will yield a standard error of about 10% for an estimate of the entire city. As the number of plots increases, the standard error will be decrease; and therefore we were more confident to estimate for the population. With regard to the sample plot size, the standard plot size for an Eco analysis is a 0.1-acre circular plot with a radius of 11.16 m or 0.0407 hectares. The samples of plots were created directly in the Eco application using the random plots generator via the Google Maps function (Fig. 2).

The diameters of all identified trees and shrubs were measured at breast height (1.3 m above ground) using a diameter tape (5 m length). Diameter of individual trees were recorded to calculate basal area and relative basal area of plant species. Height of all sampling trees and shrubs were measured by silva hypsometer.

The field data collection crews were typically located field plots using maps to indicate plot location. Aerial photographs and digital maps were used in order to locate plots and features. During random plots distribution in the city, the researchers faced a challenge of miss place placement of some plots; for example, some plot center has fallen in buildings, private land and the border of different land ownerships and land-use types; as a result the researchers professional skills were used to shift the plot center into appropriate locations.

Figure 2: Sample plots (highlighted yellow) distribution randomly within the project site based on the standard of the i-Tree Eco Model

2.3. Data collection and analysis

In this study, the data was collected from sample plots which have an area of 0.0407 ha (1/10 ac) that randomly laid in city areas of states and data was analyzed using the i-Tree Eco (formerly Urban Forest Effects (UFORE)) model (Nowak et al., 2008). The state plots were based on Forest Inventory Analysis national program plot design and data were collected as part of pilot projects testing FIA data collection in urban areas (Cumming et al., 2008). For each tree fourd in the sample plots carbon storage, annual sequestration, oxygen production, pollutant removal and hydrological functions were estimated using biomass and growth equations. Inorder to carryout in national estimates of carbon storage and sequestration, the carbon data was standardized per unit of tree cover.

3. Results

The results of this study were from a complete tree inventory and i-Tree Eco analysis of the 214 plots from Adama city, Central Ethiopia. In this section, the structure, carbon storage, carbon sequestration, volatile organic compound (VOC) emissions, air pollution removal and hydrological functions of Adama city urban forest were analyzed and presented in detail.

3.1. Structure of tree species of Adama tree

During data collection, trees were identified to the most specific taxonomic classification possible. In this work, field data were collected during the leaf-on season to properly assess tree canopies. Typical data collection includes land use, ground and tree cover, individual tree attributes of species, stem diameter, height, crown width. In this work a total of 86 woody speiceis have identified and the height, crown area, DBH of 806 trees and shrubs were measured at field level.

Leaf area of trees were assessed using measurements of crown dimensions and percentage of crown canopy missing. In the event that these data variables were not collected, they are estimated by the model. Many tree benefits equate directly to the amount of healthy leaf surface area of the plant. Trees cover about 20 percent of Adama city trees and provide 8.871 square miles of leaf area. Indeed, total leaf area is greatest in urban areas. In Adama urban trees, the most dominant species in terms of canopy cover and leaf area are *Acacia albida*, *Casimiroa edulis*, and *Eucalyptus cinerea*. The attributes of 20 species were presented in (Table 1).

Table 1
The measurements and condition of some common tree species

species	Frequency	DBH	Height	Canopy Cover (ft^2)	Tree condition	Leaf area/ac	Leaf biomass(lb)	Leaf area index	Basal area(ft^2)
Persia americana	31	4.27	18.67	87.82	Good	318.48	4.887	3.635	0.12
Eucalyptus globulus	28	17.05	48.74	102.02	Good	521	13.82	4.51	3.11
Citrus medica	16	8.16	22.77	134.6	Excellent	649.72	17.94	4.23	0.48
Podocarpus falcatus	24	7.46	33.66	88.525	Good	528.7	8.1	5.06	0.43
Eucalyptus camaldulensis	24	7.87	86.05	77.43	Excellent	378.58	10.04	4.94	0.55
Olea europea	11	5.1	16.4	26.4	Poor	104	1.6	3.9	0.1
Acacia abyssinica	40	7.09	17.39	98.36	Fair	403.56	19.97	3.88	0.58
Eucalyptus grandis	14	7.91	36.53	110.62	Fair	754.04	17.85	6.35	0.47
Cordia africana	16	7.42	18.7	120.45	Good	554.11	8.50	3.77	0.38
Mangifera indica	32	5.88	18.88	66.06	Good	250.85	3.84	3.75	0.23
Azadirachta indica	119	8.11	18.39	57.28	Good	247.23	3.78	3.88	0.57
Citrus sinensis	20	4.04	13.61	45.6	Good	194.765	4.97	4.225	0.115
Carica papaya	55	9.10	17.71	41.25	Good	160.02	2.44	3.83	0.89
Delonix regia	33	10.44	36.13	150.65	Excellent	610.06	9.35	4.23	0.71
Grevillea robusta	28	7.07	28.85	80.328	Good	493.57	12.3	5.38	0.46
Eucalyptus cinerea		8.37	75.68	179.28	Good	849.59	22.51	4.7	0.45
Acacia tortilis	38		16.97	146.07	Fair	536.09	26.54	3.48	0.27
Leucaena leucocephala	35	4.62	18.05	50.10	Excellent	182.08	2.78	4.26	0.14
Casimiroa edulis	15	9.12	30.66	272.33	Good	1272.71	19.51	5	0.54
Acacia albida		14.42	31.02	270.53	Good	1366.97	67.67	4.78	1.53
Total		**153.57**	**604.93**	**2205.85**		**10376.2**	**278.46**	**87.82**	**12.18**

3.2. Carbon Storage and Sequestration

Trees reduce the amount of carbon in the atmosphere by sequestering carbon in new growth every year. The amount of carbon annually sequestered is increased with the size and health of the trees. The gross sequestration of Adama city trees is about 8,291 thousand tons of carbon per year with an associated value of Eth. ETB 1.18 million. Net carbon sequestration in the urban forest is about 7,474 thousand tons. The most common species that are known for the greater share of carbon sequestration in adama urban forest are listed in (Table 2). In particular, the tree species such as *Azadirachta indica, Eucalyptus globulus, Carica papaya and Delonix regia* sequester the most perecentage of carbon which is approximately 14.7%, 7.4%, 7.3% and 6.2% of all annually sequestered carbn respectively (Fig. 3).

Table 2
Carbon storage and sequestration potential of common woody species of Adama urban forest

Species	No of trees	Carbon storage (ton/yr)	CO2 equivalent(ton)	Carbon sequestration (ton/yr)	CO2 equivalent(ton)
Acacia abyssinica	26099	6086.6	22319.6	321.3	1178.22
Acacia albida	5872	3147.7	11542.6	251.39	921.84
Azadirachta indica	77643	14273.62	52341.4	1220.63	4476.04
Casuarina cunninghamiana	5220	5544.41	20331.4	51.27	188.02
Carica papaya	35886	11018.11	40403.4	607.28	2226.91
Delonix regia	21531	4844.54	17764.9	518.38	1900.9
Eucalyptus cinerea	13702	2260.97	8291	232.21	851.51
Eucalyptus globulus	18269	25676.41	94155.4	612.23	2245.04
Ficus sur	1957	986.93	3619.1	47.36	173.66
Ficus sycomorus	3915	2892.47	10606.7	243.8	894.03
Ficus vasta	652	5001.59	18340.8	14.98	54.95
Grevillea robusta	18269	2670.2	1176.82	320.92	1176.82
Podocarpus falcatus	15659	2114.66	952.95	259.87	952.95
Acacia tortilis	24794	1854.2	6799.2	277.86	1018.91
Casimiroa edulis	9787	1572.1	5765	217.06	795.96
Citrus medica	10439	1640.8	6016.8	179.74	659.12
Ficus elastica	4567	1996.3	7320.3	169.2	620.46
Persea americana	20226	663.5	2433.1	138.63	508.34
Total	**314487**	**94245.11**	**330180.47**	**5684.11**	**20843.68**

Figure 3: Estimated annual gross carbon sequestration (points) and value (bars) for urban tree species with the greatest sequestration, AdamaTrees

Trees in Adama urban forests were estimated to store 116,000 tons of carbon (ETB 16.6 million). Of the species sampled, *Eucalyptus globulus, Azadirachta indica, Carica papaya and Delonix regia* stores the most carbon of approximately 22.1%, 12.3%, 9.5% and 4.2% of all stored carbn respectively (Table 2).

3.3 Air Pollution Removal by Urban Trees

Pollution removalby trees and shrubs in Adama city trees was estimated using field data and recent pollution and weather data available. removal was greatest for sulfur dioxide (Fig. 4). It is estimated that trees and shrubs remove 188.3 thousand tons of air pollution (ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter less than 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2)) per year with an associated value of Eth. ETB. 26.2 billion.

Figure 4: Annual pollution removal (points) and value (bars) by urban trees, Adama city

3.4 Volatile Organic Compaound Emisson

In 2018, trees in Adama city emitted an estimated 51.44 tons of volatile organic compounds (VOCs) per year (33.81 tons of isoprene and 17.63 tons of monoterpenes). The emissions vary among species based on species characteristics (e.g. some genera such as *Grevellia robusta* was high isoprene emitter) and amount of leaf biomass. In Adama city, 35 percent of the urban forest's VOC emissions were by *Eucalyptus cinerea* and *Eucalyptus globulus*. These VOCs are precursor chemicals to ozone formation.

Table 3: Estimates of VOC removal by common woody species of Adama city, central Ethiopia

Table 3
Estimates of VOC removal by common woody species of Adama city, central Ethiopia

Species Name	Monoterpene (lb/yr.)	Isoprene (lb/yr.)	Total VOCs (lb/yr.)
Persea americana	210.00	7.50	217.50
Eucalyptus globulus	2681.90	13430.50	16112.50
Schinus molle	714.10	0.00	714.10
Acacia torulosa	1132.00	8.10	1140.10
Eucalyptus camaldulensis	1670.40	8364.80	10035.20
Acacia abyssinica	5540.80	39.60	5580.50
Eucalyptus grandis	1733.20	8679.40	10412.60
Mangifera indica	643.10	0.00	643.10
Pinus patula	384.70	2.80	387.50
Citrus sinensis	298.70	4.90	303.70
Acacia seyal	489.90	3.50	493.40
Ficus elastica	289.60	7117.60	7407.30
Grevillea robusta	159.10	17.10	176.20
Eucalyptus cinerea	3280.00	16425.80	19705.80
Acacia tortuosa	772.00	5.50	777.60
Acacia tortilis	6992.40	50.00	7042.50
Acacia albida	4222.90	30.20	4253.10
Casimiroa edulis	981.20	14.50	995.70
Eucalyptus globoidea	996.40	4989.70	5986.10
Total	**34055.50**	**59205.70**	**93261.80**

3.5 Hydrological benefits of urban trees

Urban forests as a whole have important roles throughout the hydrological cycle. Tree crowns intercept rain and reduce the amount of water reaching the pervious or impervious surfaces below. This can increase evapotranpiriation and transpiration of urban forests. The total leaf area of adama urban forest was 5,677.22 acre. The potential evapotranspirtion of Adama urban forest is 187,655,093.82 ft^3 per year, whereas the transpiration potential was 48,441,685.85 ft^3 per year. Table 4: Hydrological benefits of 18 tree species of Adama city

Table 4
Hydrological benefits of 18 tree species of Adama city

Species Name	Number of Trees	Leaf Area	Potential Evapotranspiration	Transpiration
Ficus sur	1957	35.90	1186695.64	306336.14
Ficus vasta	652	2.64	87181.81	22505.30
Citrus medica	10439	155.71	5146853.39	1328619.70
Podocarpus falcatus	15659	190.06	6282314.47	1621730.05
Eucalyptus cinerea	13702	267.24	8833401.02	2280272.96
Casimiroa edulis	9787	285.95	9451862.27	2439923.87
Acacia tortilis	24794	305.14	10085969.15	2603613.57
Acacia abyssinica	26099	241.79	7992174.74	2063117.02
Azadirachta indica	77643	440.68	14566266.32	3760167.03
Carica papaya	35886	131.83	4357542.49	1124865.31
Eucalyptus globulus	18269	218.51	7222632.76	1864465.81
Grevillea robusta	18269	207.00	6842149.76	1766247.12
Persea americana	20226	147.88	4888111.40	1261827.49
Delonix regia	21531	301.55	9967327.43	2572987.15
Acacia albida	5872	184.28	6091170.63	1572387.77
Casuarina cunninghamiana	5220	24.65	814877.96	210354.33
Ficus elastica	4567	611.96	20227693.99	5221620.04
Ficus sycomorus	3915	225.14	7441674.13	1921009.62
Total	**14487**	**3977.91**	**1485899.36**	**33942050**

3.6 Eco benefit of Adama urban forest

The summary of Ecosystem value that include number of trees, carbon storage and sequestration, pollution removal, and structural value of woody species of Adama urban forest were estimated and summarized in (Table 5).

Table 5
The summary of monetary value of Adama urban trees

Trees		**Carbon Storage**			**Gross Carbon Sequestration**			**Pollution Removal**	
No	**SE**	**Ton**	**SE**	**ETB**	**Ton/yr.**	**SE**	**ETB/yr.**	**Ton/yr.**	**ETB/yr.**
525235	± 43,558	116279.7	± 33,049.3	16588470	8291.3	± 844.8	1182834	89445.4	12162701080.9
SE: Standard Error, ETB: Birr **yr.**: year									
Figures included in the manuscript									

Carbon storage and gross carbon sequestration value were calculated based on the price of ETB 142.66 per ton. Also, the pollution removal value was calculated based on the prices of Eth. ETB. 39,459.67 per ton (CO), ETB. 277,823.10 per ton (O3), ETB 277,823.10 per ton (NO2), ETB. 68,015.64 per ton (SO2), ETB. 185,489.71 per ton (PM2.5).

4. Discussions

This study provided a quantity of the C stored and sequestered by urban trees in Adama city of Central Ethiopia. The result of carbon sequestration and storage of Adama city was appeared higher than carbon assessment work conducted in cities such as Padua, Bolzano and Florence, Lisbon,Portugal, Zurich Switzerland (Crema 2008; Paoletti et al. 2011; Wälchli 2012). In the results current study the amount of carbon stored and sequestered in Adama urban trees was higher than result indicated in the study of Pace Rocco et al. (2018) regarding ecosystem services modeling for urban trees in Munich city of Germany; which was estimated to be 6225 ton and 214 tons per year respectively. Further more, the carbon storage and sequestration indicated in the current study were also compared with the study results presented for three cities of North America. Accordingly, the carbon storage and sequestration estimates of cities such as New York, Chicago and Jersey City were 1,225,200 & 38,400 tonn C^{-yr}, 854,800 & 40,100 tonn C^{-yr} and 19,300 & 800 tonn C^{-yr} respectively (Nowak and Crane, 2002). This comparison showed that the annual carbon storage and sequestration of the cites were higher than that of Adama city of Ethiopia except the annual carbon sequestration of Jersey City which was less than Adama city.

The C storage and sequestration results from this study were difficult to assess in terms of accuracy and to compare with other studies because of the use of different estimation methodologies, climatic condition, different species composition, and urban forest structures (Jo & McPherson 1995; Strohbach & Haase 2012).

The pollution removal indicated in this study was lower than the result reported form City of Baton Rouge which was 860 tons/year. In the work of Nowak et al. (2014) recently analyzed the effects of urban forests on air quality and human health in the United States, they found that in highly vegetated areas, trees can improve air quality by as much as 16% (Kroeger et.al 2014). Baumgardner et al. (2012) pointed out that around 2% of the ambient PM10 in Mexico City is removed from the study area. In a study carried out in the city of Barcelona (Spain), Barò et al. (2014) reported that urban forest services reduce PM10 air pollution by 2.66%. Moreover, in the Mediterranean city of Tel-Aviv, Cohen et al. (2014) observed that an urban park significantly mitigated nitrogen oxides (NOx) and PM10 concentrations, with a greater removal rate being observed in winter, and increased tropospheric ozone levels during summer.

In this result, the amount of annual Volatile Organic Carbon (VOC) removal was lower than the report of study conducted in Scotlandville's trees which yearly produce 8.91 tons of monoterpene, 125.53 tons of isoprene, and produce 134.43 tons of volatile organic compounds (VOCs); that may contribute to ozone formation. (Nowak & Dwyer 2007, Nowak et al. 2014).

In Adama urban forest trees such as *Acacia tortilis*, *Azadirachta indica* and *Ficus elastica have higher potenatial evapotranspirationa and transpiration* (Table 4). Similary, Xiao and McPherson (2016) reported that trees in urban areas can increase the return of runoff to the atmosphere through transpiration, providing associated air cooling benefits. Furthermore, according to the study of Gwynns Falls watershed in Baltimore indicated that heavily forested areas can reduce total runoff by as much as 26% and increase low-flow runoff by up to 13% compared with non-tree areas in existing land cover and land use conditions (Neville, 1996). Studies have also reported that tree cover over pervious surfaces reduced total runoff by as much as 40%; while tree canopy cover over impervious surfaces had a limited effect on runoff.

The Adama urban forest interms of monetory value have presented in the result sction (Table 5). The outcome of current study was compared with the study conducted in city of Baton Rouge the annual monetory value of urban forest service were lower, interms of Carbon storage ($6.2 million/year), Carbon sequestration ($41.0 million) and pollution removal ($ 1.1 million/year).

In general, this work has tried to quantify the ecosystem service value of Adama city of Ethiopia which will help for further urban forest development work and government intervention interms of policy and awareness creation. Further researches should be conducted the assess and evaluate the ecosystem service value of urban trees in several Urban Green Insfrustures (UGI) and comparing with different cities in the country. This will sensitize cities to learn and compute in urban forest development to enhance the ecosystem value of trees.

5. Conclusions

Urban forests are a significant and increasingly vital component of the urban environment that can impact human lives. Trees and forests have a positive effect on human health and well-being by improving air quality and reducing greenhouse gases, mainly through reducing air temperatures and energy use and through direct pollution removal and carbon sequestration. Understanding the value of an urban forest can give decision makers a better understanding of urban tree management. These results provide baseline information for management recommendations to maximize the ecological benefits provided by trees. By understanding the effects of trees and forests on the atmospheric environment, urban forest managers and policy makers can decide on the policy and strategic planning of urban greening. Subsequently, it will help for designing appropriate and healthy vegetation structure in cities to improve air quality and consequently human health and well-being for current and future generations.

Abbreviations

SE: Standard Error; **ETB:** Ethiopian Birr; **yr:** year; **VOC:**Volatile Organic Carbon**; lb:** pound (a unit of mass or weight) ; **CO_2 :** Carbon dioxide; **ft2 :** Feet Squeare; **DBH**: Diameter at Breast Height; **SO2:** Sulfur dioxide; **O_3:**Ozone; **CO:** Carbon mono oxide; **NO_2:**Nitrogen dioxide; **$PM_{2.5}$:** Particulate Matter less than 2.5 microns; **UGI:** Urban Green Insfrustures.

Declarations

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Computing interest

The authors declares no competing interests.

Author's Contributions

HH: contributed in designing the research idea, data collection and data analysis; AD: participated in data analysis, interpretation and report writing; SS: participated in designing method, sturucturing report and guiding the overall paper work.

Ethical Approval and Conset to participate

Not Applicable

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Figures

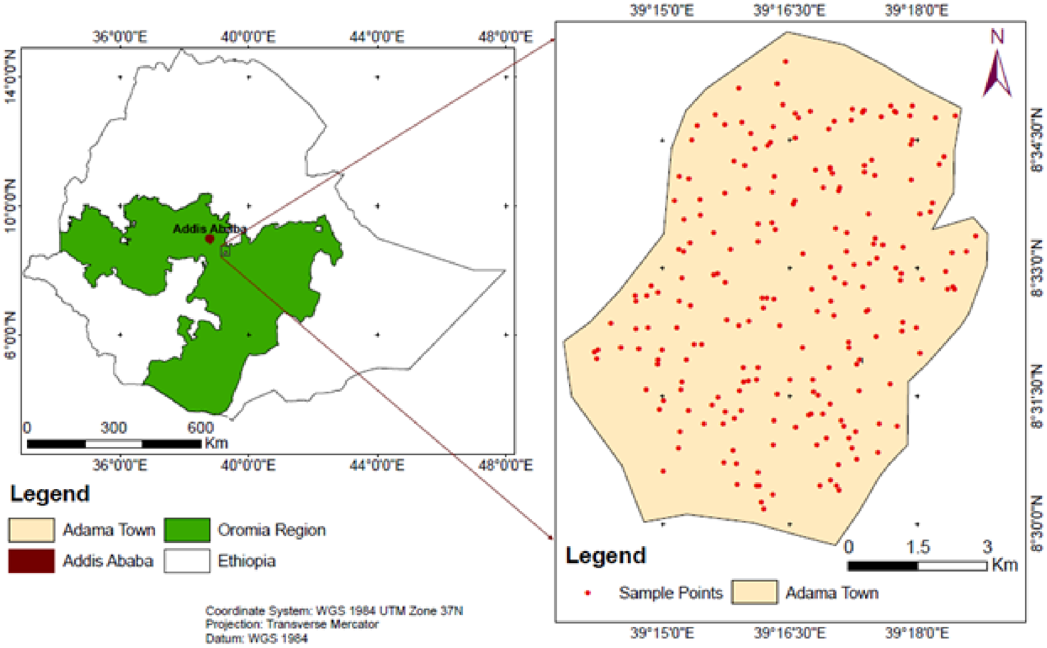

Figure 1

Location map of the study area (source: http://www.google.com.et & survey)

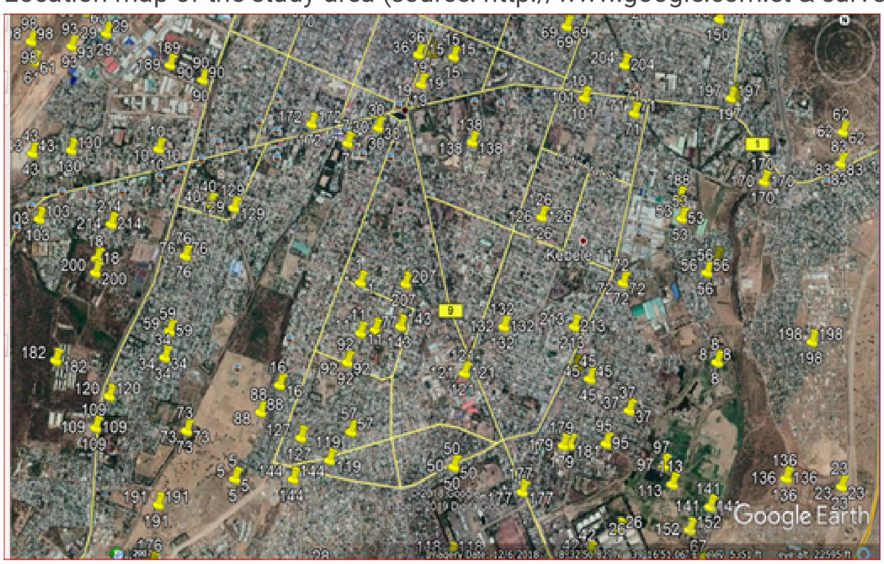

Figure 2

Sample plots (highlighted yellow) distribution randomly within the project site based on the standard of the i-Tree Eco Model

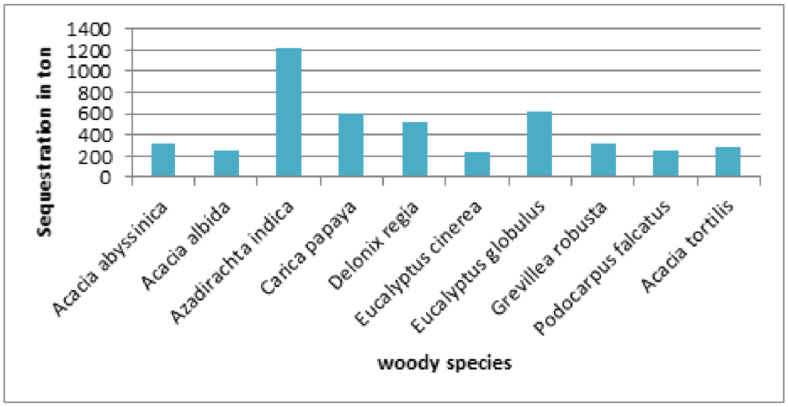

Figure 3

Estimated annual gross carbon sequestration (points) and value (bars) for urban tree species with the greatest sequestration, Adama city

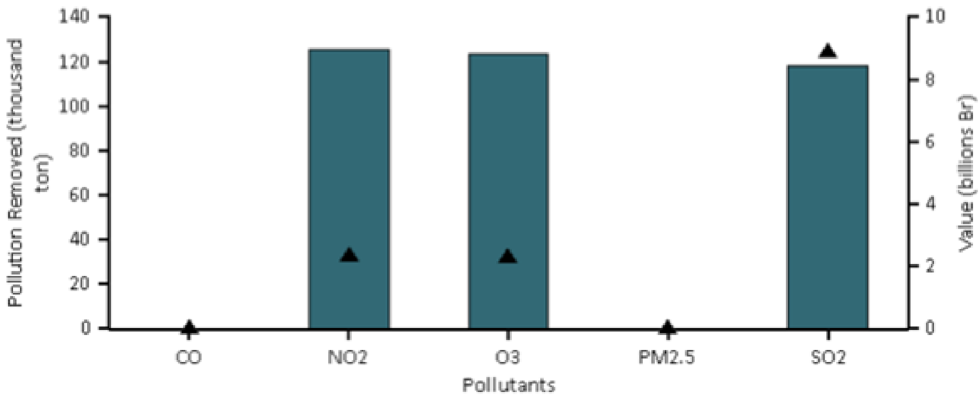

Figure 4

Annual pollution removal (points) and value (bars) by urban trees, Adama city