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Environmental and economic potential of a natural regeneration of *Pentaclethra eetveldeana* in Kikola in Kongo Central / DRC

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Abstract: The forest islet of Kikola, a natural regeneration put in defense for the past 4 years in the Madimba territory in the DRC, offered us the opportunity to have data on the carbon rate sequestered by an indigenous melliferous flora, and to evaluate its environmental and economic potential.This ethnobotanical survey, of which indigenous plant species constituted the bulk of the biological material and materialized by a visual inventory, was initiated in order to consider the ecological role played by this forest recruit in the process of the fight against global warming.

This florule, colonized at 54% *by Pentaclethra eetveldeana* De Wild and Th, Dur, was restricted to 226 individuals of this species by one hectare, which evolve alongside other species very poorly represented. These include *Alchornea cordifolia* (Schum and Thonn) Mull (2%), *Craterispermum cerinanthum* Hiern (1%), *Hymenocardia acida* Tul (14%), *Leptoderris nobilis* Welw. ex Bak (7.3%), *Millettia drastica* Welw, ex Bak (3%), *Millettia laurentii* De Wild (3%), *Oncoba welwitschii* Oliv (7%), *Pentaclethra macrophylla* Benth (1%), *Piptadeniastrum africanum* Hook.F (1%), *Rauvolfia mannii* Stapf (1%) and *Sclerocroton cornutus* Pax (10%).

Thanks to the biovolume modeladapted by[1],232.24±13.4 teqCO_2 is the quantity of CO_2, obtained by projecting from total biomass (126.56±7.3 t/ha), which won't be released into the atmosphere at the end of the planned defense in 2025. This forest regeneration would therefore be eligible for the REDD + carbon price and would benefit between 3251.36 ± 187.9 € and 23224 ± 187.9 €.The results of this study make it possible to record the forest island of Kikola on the list of REDD+ pilot projects in the DRC, and to stimulate additional studies, associating teledetection data, to follow the evolution of the carbon quantities sequestered over timein the indigenous woody structure of this forest recruit, for a better perception of its ecological role.

Keywords: Carbon Market, biovolume Model, Economic Potential, *Pentaclethra eetveldeana*.

1. Introduction

Indigenous plants have always played an important role in fulfilling the needs of the inhabitants of the Madimba territory, whose food security is currently threatened in large part by the effects of climate change. [2]believes that indiscriminate harvesting of these plants destroys the plant landscape and causes ecological disruption that is manifested by the introduction of invasive species. Thus, to fight against this ecological rampage, [3] confirms that it is useful to plant *Acacia auriculiformis* on a large scale. However, this species is often contested by several scientists because it acidifies the soil. From this, it will be necessary to propose others, otherwise the environmental crisis and its risks will constantly increase in the neighborhood of Kinshasa. In this regard, [4] adds that the most useful local multipurpose species could be multiplied inexpensively and on a small scale, by rural populations.

It remains a fact that even if there are still many uncertainties about the local manifestations of future climate phenomena, many scientists agree and study the impact of anthropic pressures and global warming on biodiversity and the functioning of ecosystems. And, because of a great potential melliferous, very dynamic and rigorous modern beekeeping in this region of Kongo Central, is likely to reduce the pressure on the fragile natural resources and to create new income opportunities because the honey, considered as a noble and drug-like product of great value [5].

Faced to the challenges of the Reducing Emissions related to Deforestation and Tropical Degradation (REDD+) program, and taking into account the international objectives of control of the quantities of greenhouse gases, the option available to us is of hammering that it is important to quantify the carbon stocks that these melliferous plants harbor, and all the more so since the program plans to financially support the tropical countries in the conservation of these stocks. And to materialize our ambition, we propose to develop and conduct a study to follow, over time, the evolution of the quantities of carbon sequestered by an indigenous melliferous flora.

Our choice in favor of the forest island of Kikola whose surface area defended since nearly four (4) years from now is four (4) hectares, proceeds from the double requirement namely, that of the richness and specific diversity of on the one side, and opportunity on the other. In fact, this islet presents an exceptional dominance of the individuals of *Pentaclethra eetveldeana* De Wild and Th, Dur, whose domestication is in vogue among the beekeepers of the territory of Madimba and those of the neighboring territories of Kasangulu and Mbanza Ngungu. Its seeds are the main source of new plants, both for natural vegetation and for cultivation. This species [6] has the environmental qualities that make it a valuable species and can be recommended in afforestation and reforestation by its ability to sequester the greenhouse gas and its other virtues.

The nkunku [7], a type of artificial forest, is the second type of woodland that structures the landscape of the Bantandu finages studied. They can be constituted on savannah or come from the protection of an existing forest and its enrichment. The nkunku appellation is sometimes used by villagers to describe a fallow that has been maintained for several years and is rebuilding as a forest recruit. Once the tree potential is restored, the space is completely cleared to produce charcoal and crops are installed there. In the current Kongo Central (Bas-Congo), nkunku are also used for honey production and harvesting of different non-timber forest products.

This study is carried out to solve the problem of the scarcity of data on the carbon rate sequestered by a melliferous indigenous flora. Hence the choice of *Pentaclethra eetveldeana*, this species currently coveted in this part of Kongo Central and the need for this study to preserve, improve and enhance the density of the woody cover. The general objective is to consider the ecological role played by this unassisted natural regeneration in the process of the fight against global warming. More specifically to:

1. determine the melliferous floristic diversity of the site under study
2. quantify woody biomass as well as carbon sequestered by flagship species
3. calculate the financial potential of the site in accordance with the carbon market and to make projections for the end of the defenses planned in 2025.

The expected results of this inventory limited in space and time, will make it possible to estimate the melliferous biomass of this forestry island and the mass of carbon sequestered in the woody structure of the inventoried trees.

2. Study Environment

Kikola is a village opened up from Madimba territory, Kongo Central province in the DRC. It is located along the national highway n°1, 116 km from the city of Kinshasa, and about 4 km from the Botanical Garden of Kisantu. Its geographical coordinates are as follows: south latitude: 05 ° 06 '40.3' ', east longitude: 015 ° 06' 0.10 '' and altitude: 583 m.Figure 1 below shows the administrative map of the Madimba territory and locates the village Kikola.

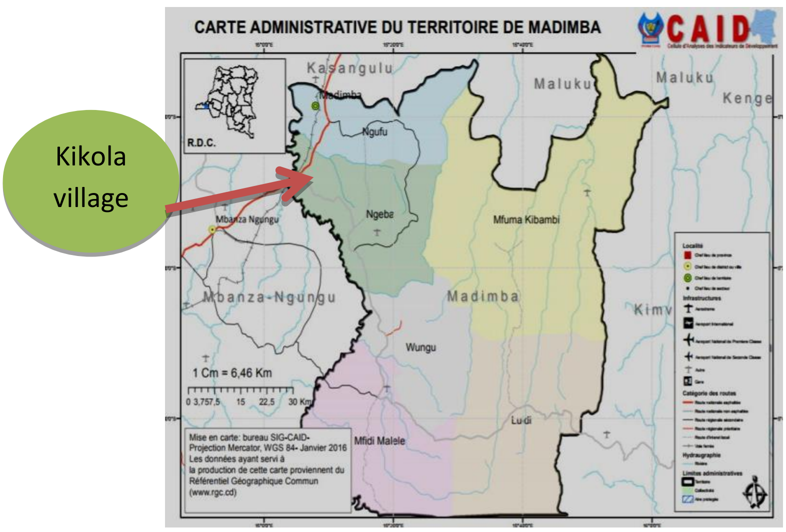

Figure 1 : Localisation of Kikola village. Reference: [7]

[8] estimates that almost all the localities of Kasangulu and Madimba belong to the AW4 climatic type of the Köppen classification, with four months of dry season. It adds that the rainfall is short-lived and varies

around 1500 mm. Also, [9] points out that the vegetation of the Kasangulu and Madimba territories is composed of a mosaic of forestry recruits and savannas, which grow mainly on sandy loam soil.

3. Material and Method

3.1 MATERIAL

Botanical samples collected on the site of study constituted our material which made it possible to identify and inventory the species forming the forest stand concerned in this work. All this material constitutes the reference collection of this study, stored at the Herbarium of the Faculty of Sciences of the University of Kinshasa. For this harvest, the usual equipment and a 1.3 m strand of wood for visual estimation of tree height from the ground [10]were used.

3.2 Method

3.2.1 Field work

We carried out an ethnobotanical survey based on an interview with the 11(eleven) beekeepers of the Kikola Apicultural Project, with the help of whom observations and a visual inventory were conducted from a reasoned sample deliberately limiting our study to a device of half a hectare (½ ha), as shown schematically in Figure 2 below.

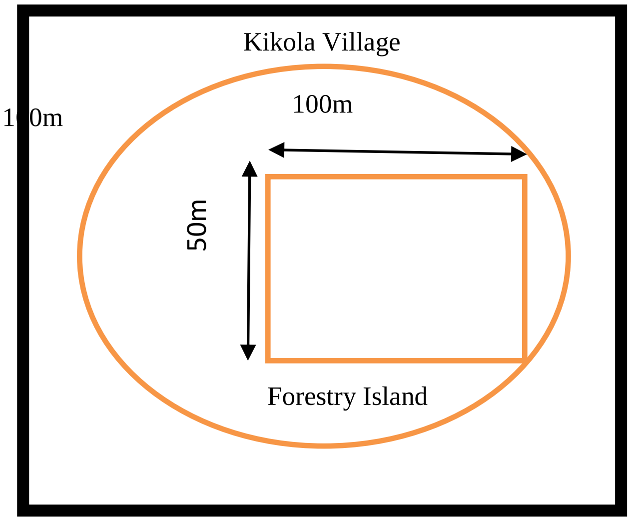

Figure 2: ½ ha (50m x 100m) plot for inventory of indigenous melliferous species

This achievement was restricted to indigenous melliferous trees with a dbh ≥ 10 cm to 1.3 m from the soil[11], and the circumferences and heights from the measurements during this floristic inventory were used by extrapolation, to evaluate the woody biomass as well as the amount of carbon sequestered.

3.2.2 Structural diversity of vegetation

We analyzed the horizontal structure of this stand as well as that of the vertical structure, in order to better display the physiognomy of this natural regeneration. To this end, [1] through the adaptation of the hardwood volume model, estimates that the parameters such as density, basal area of the individuals surveyed and their distribution in diameter class reflect the horizontal structure. . As for the vertical structure, it is described by the distribution in height classes of different individuals. Density, defined as the number of individuals per unit area, reflects land use by species. This parameter is calculated using the mathematical formula below: $d = n/S$ where d is the density, n is the number of stems and S is the total area of observation (in hectares).Concerning the basal area, [12] defines it as the area of the trunk section of all trees in a survey at 1.30 m above the ground. This parameter better reflects the horizontal occupation of the soil by the plant species, and is calculated according to the mathematical formula $S = \pi D^2/4$, in which S denotes the basal area and D is the diameter. To achieve this, we have [13] previously converted the circumference values to diameter.

As for woody biomass, [12] says that it is composed of above-ground biomass and underground biomass. Aboveground biomass is the mass of dry plant matter per unit area and is divided into trunk biomass and crown biomass (branches). In this regard, [13] estimate that the best allométric methods are those that include dbh (diameter at breast height), height, and density. The methodology chosen is based on the measurement by the forest inventory of tree circumferences and heights and describes two stages: the calculation of the volume, then that of the biomass. These measurable tree trunk variables are usually sufficient descriptors used to quantify the biovolume or mass of all trees. However, [1] reports that this commercial volume does not represent the total volume of wood in the aerial part of the tree. For this, an expansion factor (EF) of 1.895 is used to obtain the total volume of the aboveground biomass or aboveground biomass. The next step is to convert this volume of wood into dry matter biomass using the specific density constants of the wood.For this purpose, [14]- [16] state that for species with unknown specific gravity, a default value of 0.58 g/cm is used for tropical forests in Africa. The above-ground biomass (AGB) is given by the mathematical formula V x EF x $D_{(sp)}$), while the underground biomass will be estimated at 16% of the above-ground biomass.

For the sake of precision, we have, for the same sample (113 individuals of *Pentaclethra eetveldeana* on feet), also used the allométric model of [17]adapted by [18]listed in table 1 below because it has been recognized as the most accurate [19]compared to other existing equations namely of [16], and that established by [20].

Table 1: Allométrique equation for the determination of aboveground biomass

Allométrique equation (kg/tree)	**Field of validity**	**Authors**
Exp(-0,37+0,333*LN(D)+0,933*LN(D)^2-0,122*LN(D)^3)	5 ≤ DBH ≤ 156 cm	[17]

D = diameter in cm. Reference: [18]

3.2.3 Determination of sequestered carbon stock and co_2 rate (tC/ha)

The estimate of carbon stock in the forest [21]depends on knowledge of dry biomass, the carbon stock being linked to the biomass {C (tC/ha) = CF x B (t/ha)}. [14], [22] note that CF is the conversion factor from biomass to carbon, and it has been reported that the carbon contained in the dry biomass of a tree is 50%. And, after estimating the amount of total carbon contained in a tree, the corresponding sequestered CO_2 level is obtained by using the molar mass ratio of carbon and CO_2.

3.2.4 Economic value of Kikola Forest Island

The financial cost of the carbon content of Kikola melliferous regeneration was estimated in relation with the current economic challenge of the carbon stock. [23] recall that the average selling priceof forest credit is 3 euro/tCO_2 for the CDM, 4.7 euro/tCO_2 for voluntary markets and 14 euro/ tC(low value) or 100 euro/tC (strong value) for REDD+. After extrapolation and projection for the end of the defense, we supported our observation with a mix between [6], [24] through his personal field communication on *Pentaclethra eetveldeana*, as well as the circumference measurement (167cm) of *Pentaclethra eetveldeana*on feet, almost 50 years old in the Kisantu Botanical Garden (south latitude: 05 ° 08 '49.6' ', east longitude: 015 ° 04'45.4 " and altitude: 541m). This allowed us to admit an average annual growth of 1.1 cm in diameter and 0.5 m in height. Photo 1 below shows a front view of this forest island.

Figure 3: Natural regeneration at *Pentaclethra eetveldeana*at Kikola.Reference: [25].

4. Results

4.1 Melliferous floristic inventory of the Kikola forest islet

The information concerning the indigenous species recorded during this inventory; highlight the count of the 211 dbh trees ≥ 10 cm, distributed in six (6) families, among which we distinguish *Fabaceae/Mimosoideae, Euphorbiaceae, Rubiaceae, Salicaceae, Phyllanthaceae and Apocynaceae*, distributed in Figure 4 which follows.

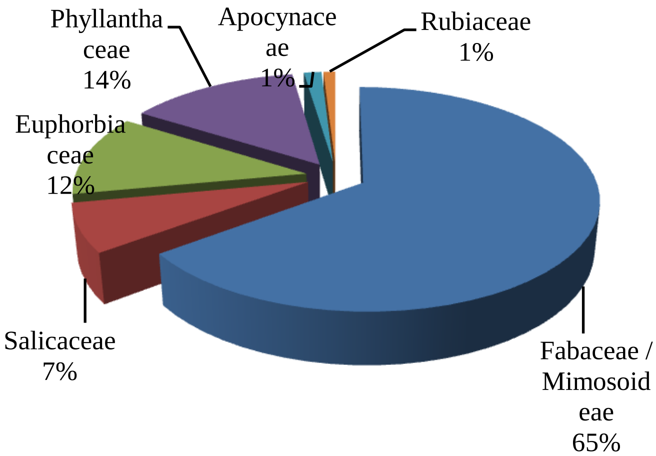

Figure 4: Melliferous floristic spectrum of the Kikola forest islet

In this figure, the *Fabaceae/Mimosoideae* is the most represented family (65%), followed by those of *Phyllanthaceae* (14%), *Euphorbiaceae* (12%), *Salicaceae* (7%), *Apocynaceae* (1%) and *Rubiaceae* (1%).The species inventory of this forest regeneration restricted to woody species is presented in Figure 5.

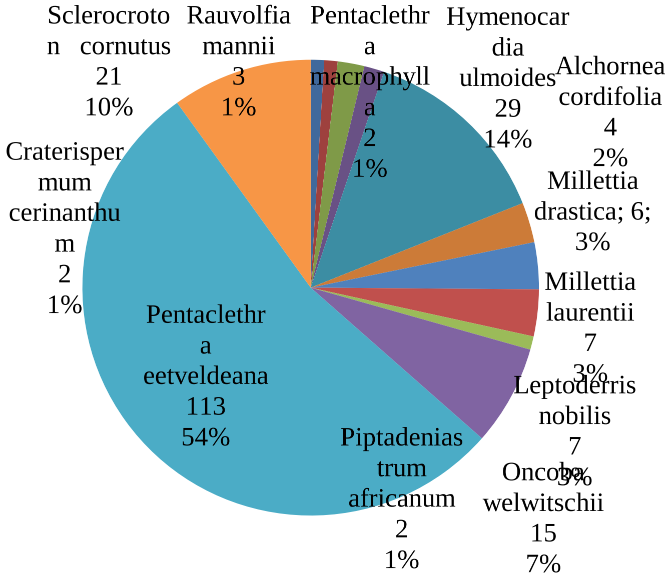

Figure 5: Spectrum of distribution of indigenous species in Kikola

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This spectrum shows twelve (12) species, including *Alchornea cordifolia* (Schum and Thonn) Mull (2%), *Craterispermum cerinanthum* Hiern (1%), *Hymenocardia acida* Tul (14%), *Leptoderris nobilis* Welw. ex Bak (7.3%), *Millettia drastica* Welw, ex Bak (3%), *Millettia laurentii* De Wild (3%), *Oncoba welwitschii* Oliv (7%), *Pentaclethra eetveldeana* De Wild and Th, Dur (54%), *Pentaclethra macrophylla* Benth (1%), *Piptadeniastrum africanum* Hook.F (1%), *Rauvolfia mannii* Stapf (1%), *Sclerocroton cornutus* Pax (10%). It is worth noting that the frequency and spatial occupation are largely in *Pentaclethraeetveldeana* De Wild and Th, Dur (Figure 5 above). It deserves special attention in this study.

4.2 Quantitative and structural diversity of *Pentaclethra eetveldeana*

The diametric structure as well as the height distribution of the individuals of *Pentaclethra eetveldeana* are visualizable through figures 6 and 7 below.

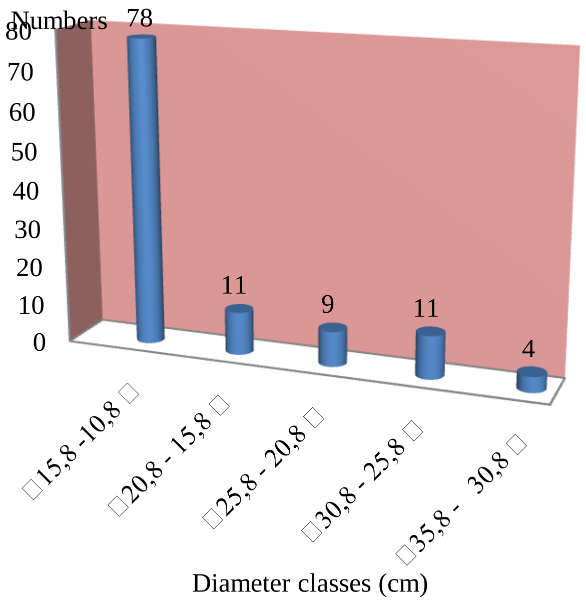

Figure 6: Distribution of diameter classes of individuals of *Pentaclethra eetveldeana*

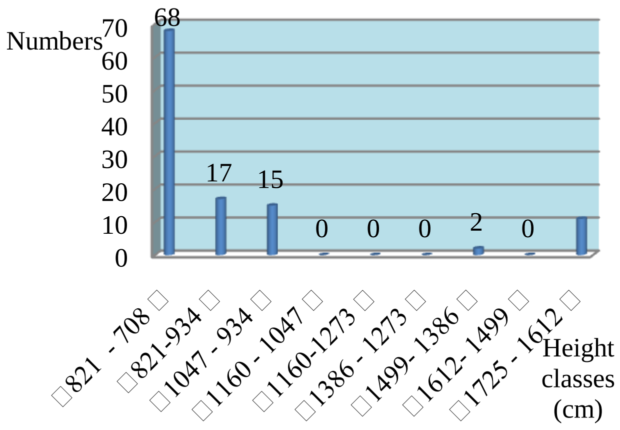

Figure 7: Distribution of *Pentaclethra eetveldeana* by category of heights.

These figures 6 and 7 show the diametric structure as well as the distribution at heights of the flora at *Pentaclethra eetveldeana* distributed respectively in 5 and 9 opened classes at the upper extremities, because of the continuity of these variables in the interval considered.

4.3 Estimation of biomass and sequestered carbon rate

Table 2: Estimation of biomass and carbon rate per class of diameter of*Pentaclethra eetveldeana* following [1]

Diameter classes (cm)	Number	Basal area (m^2)	Volume (m^3)	Aerial biomass (t/ha)	Underground biomass (t/ha)	Total biomass (t/ha)	Carbon (t/ha)
□ 10.8- 15.8□	78	1.00	6.7	7.4	1.2	8.6	4.3
□ 15.8 – 20.8□	11	0.3	2.2	2.4	0.4	2.8	1.4
□ 20.8 – 25.8□	9	0.4	3.7	4.1	0.7	4.8	2.4
□ 25.8 – 30.8□	11	0.7	8.8	9.7	1.5	11.2	5.6
□30.8 - 35.8 □	4	0.3	4.7	5.1	0.8	6.0	3.0
Total	**113**	**2.7**	**26.1**	**28.7**	**4.6**	**33.3**	**16.7**
Average		0.5	5.2	5.8	0.9	6.7	3.3
Standard deviation		0.3	2.6	2.8	0.5	3.3	1.6

The biomass height values per classes are given in Figure 8 below.

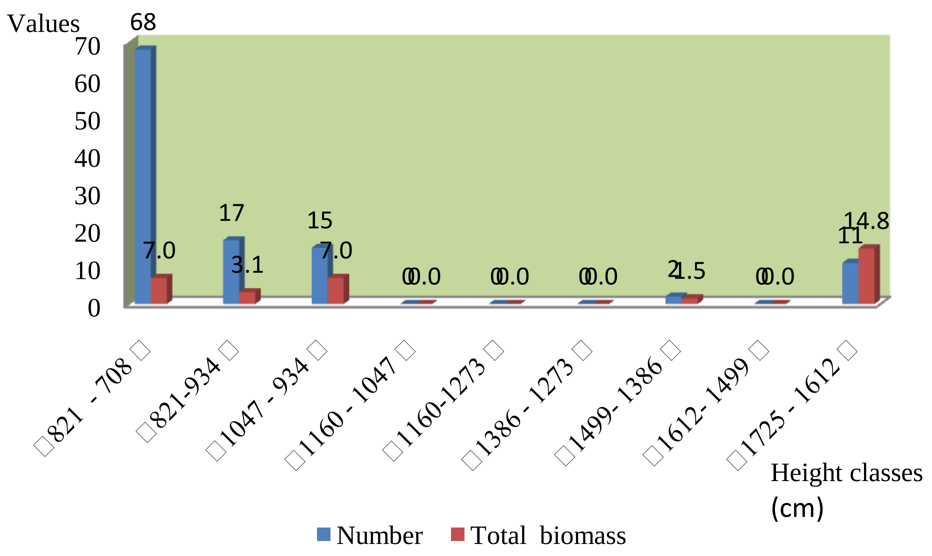

Figure 8: Biomass estimation of the Kikola forest block by height classes of *Pentaclethra eetveldeana* following [1]

Table 3: Estimation of biomass and carbon rate per diameter classes of *Pentaclethra eetveldeana*following [17], adapted by[18]

Diameter classes (cm)	Number	Basal area (m^2)	Aerial biomass (t/ha)	Underground biomass (t/ha)	Total biomass (t/ha)	Carbon (t/ha)
□ 10.8- 15.8□	78	1.00	7.19	1.15	8.34	4.17
□ 15.8 – 20.8□	11	0.28	2.53	0.40	2.93	1.47
□ 20.8 – 25.8□	9	0.39	4.19	0.67	4.86	2.43
□ 25.8 – 30.8□	11	0.69	8.14	1.30	9.44	4.72
□30.8 - 35.8 □	4	0.32	3.93	0.63	4.56	2.28

Total	**113**	**2.7**	**26.0**	**4.2**	**30.1**	**15.1**
Average		0.5	5.2	0.8	6.0	3.0
Standard deviation		0.3	2.4	0.4	2.7	1.4

Table 2 above indicates that 113 individuals of *Pentaclethra eetveldeana* diameter ranging from 10.8 cm to 35.8 cm (excluded) have a volume of 26.1 ± 2.6 m^3, cover a basal area of 2.7 ± 0.3 m^2, with a total estimated biomass of 33.3 ± 3.3 t/ha, which shows 16.7 ± 1.6 t/ha of carbon sequestered over the entire considered space of our inventory. This information apparently diverge with those in Table 3 which shows, for the same diameter structure, the same area but a total biomass estimated at 30.1 ± 2.7 t / ha, showing 15.1 ± 1.4 t / ha sequestered carbon. These results, reported per hectare after extrapolation, and taking into account the fact that the estimation of the biomass of a tree is always accompanied by an error which corresponds to the difference between the biomass values observed and the values predicted by the allometric model [26], give us the values shown in Table 4 below.

Table 4: Comparison of results between [17] and that of[1]

Dendrometry of the stand	[17]	[1]
Basal area (m^2)	5.2 ± 0.7	5.2 ± 0.7
Total biomass(t/ha)	60.2 ± 5.4	66.6 ± 7.3
Carbon (t/ha)	30.1 ± 2.7	33.4 ± 3.7

This table attests the similarity of the results between these two approaches, and reassures us to be able to retain the model of volume of strong wood for the continuation of our analysis, because the best allometric methods [13] are those which include the dbh, height and density. Table 5 gives estimation of biomass and cost of sequestered carbon.

Table 5: Estimation of sequestered atmospheric CO_2 stock and equivalent costs per diameter classes of *Pentaclethra eetveldeana*

Diameter classes (cm)	Number	Basal area (m^2)	Total biomass (t/ha)	Carbon (t/ha)	CO_2(t/ha)	CDM carbon price (□)	MV carbon price (□)	REDD+ price (□)
□ 10.8- 15.8□	156.0	2.0	17.4	8.8	32.3	96.9	151.8	452.1
□ 15.8- 20.8□	22.0	0.6	6.0	3.0	11.0	33.0	51.7	154.1
□ 20.8- 25.8□	18.0	0.8	10.0	5.0	18.4	55.1	86.2	256.9
□ 25.8- 30.8□	22.0	1.4	24.0	12.0	44.0	132.1	207.0	616.6
□30.8 – 35.8 □	8.0	0.4	9.2	4.6	16.9	50.6	79.3	236.3
Total	**226.0**	**5.2**	**66.6**	**33.4**	**122.6**	**367.7**	**576.1**	**1716.1**
Average		1.0	13.3	6.7	24.5	73.5	115.2	343.2
Standard deviation		0.7	7.3	3.7	13.4	40.3	63.1	187.9

4.4 Economic weight of *pentaclethra eetveldeana* on feet

Subject to the standard deviations as set out above, the economic value of an individual of *Pentaclethra eetveldeana*De Wild and Th, Dur on feet having an average diameter of 16.7 ± 7.9 cm and a height of 8, 5 ± 3.1 m, according to the present study, is visualized through the measurements shown in Figure 9 below. While Figure 10 projects this economic value for the end of the defense.

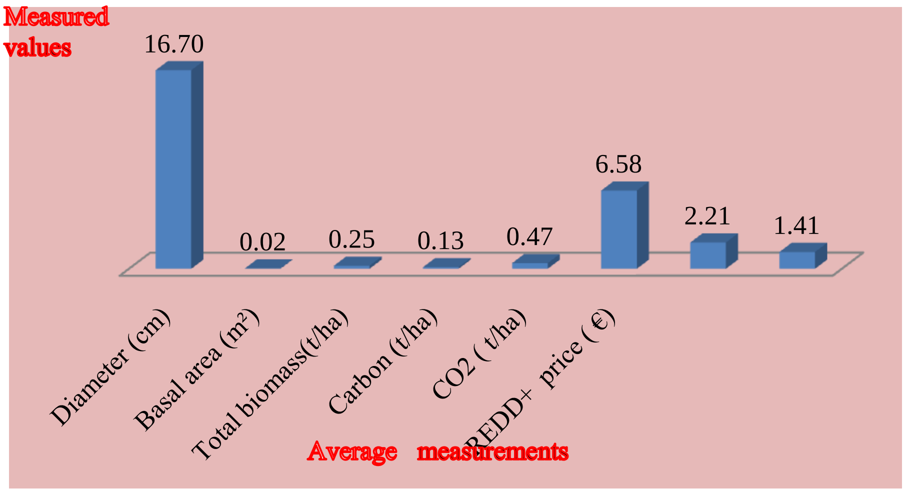

Figure 9: Economic value of an individual of *Pentaclethra eetveldeana*on feet in August 2019

4.5 Projection of average measurements and economic weight of *Pentaclethra eetveldeana* in august 2025

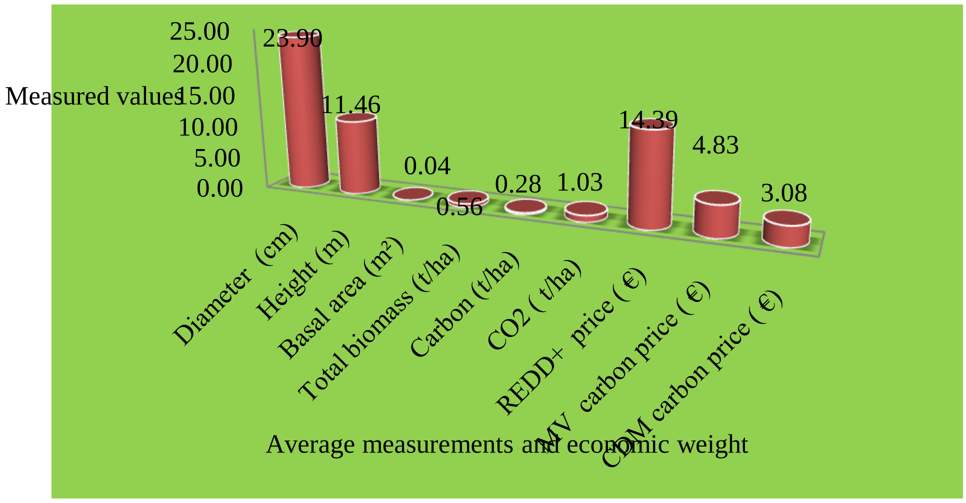

Figure 10: Economic value of an individual of *Pentaclethra eetveldeana*
on feet projected in August 2025.

4.6 Estimation of the economic value of the Kikola islet in august 2025

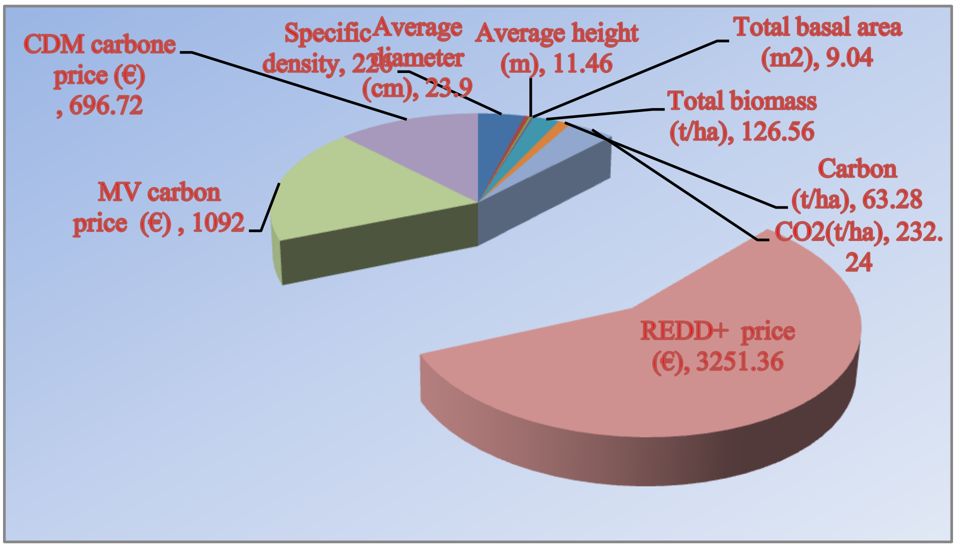

Figure 11: Economic weight of natural regeneration at *Pentaclethra eetveldeana*of Kikola by 2025.

5. Discussion

5.1 The melliferous flora of the Kikola forest islet

The inventory limited to indigenous melliferous plants at dbh ≥ 10 cm to 1.3 m from the soil, made it possible to count 211 individuals, distributed in 12 species and 7 families over a space of ½ ha, reasoned sample selected from the four(4) ha covered by forest regeneration put in defense. All these species belong to the guineo-congolese semi-evergreen forest zone of the guineo-congolese regional endemiccenter characterized by grassy vegetation derived from the destruction of the former [27]. They are generally used as lumber, or exploited for various purposes (traditional medicine, food, cosmetics, etc.), and are the subject of many abusive exploitation [28].

Occupying the 65% of this phytogeographic spectrum, the *Fabaceae/Mimosoideae* are the most represented family and make the star at *Pentaclethra eetveldeana* De Wild and Th, Dur (54%).This dominance corroborates [29] data on the Kimwenza and [11] on the forest islet of the Monastery of Notre Dame d'Assomption in South Kinshasa, and could confirm that *Pentaclethra eetveldeana* has characteristics of strong wood [30] which give it its power of store a large amount of carbon, and intrinsic and extrinsic aspects that meet the criteria of a fast-growing plant and are more resistant to bush fires [31].

The histogram of the distribution of *Pentaclethra eetveldeana* by diameter category [32]-[33] shows that in a stable natural environment, the number of individuals of a forest stand decreases steadily from small dbh trees to larger trees and is attributed to species regeneration.

5.2 Quantitative and structural diversity of *Pentaclethra eetveldeana*

The sample of this assessment consists of 113 trees of *Pentaclethra eetveldeana*(Figure 6) recorded on a plot of ½ ha or 226 individuals per hectare. This number is valid because [34] admits that a sample of 50 to 100 trees is sufficient to carry out a study of gasoline in a given region. Five (5) diameter classes and nine (9)height classes were sufficient [35]to visualize the structural diversity of this florule.

5.3 Estimation of biomass and carbon stock

We have chosen hardwood volume model[1] which includes dbh, height and density, the results of which do not diverge with those obtained with the allometric equationof [17] adapted by [18]. On a basal area of 5.2±0.7 m^2/ha conforming to a younger or lighter stand [36], the two distributions of *Pentaclethra eetveldeana*(by height and by diameter) respectively have a total biomass of 66.6± 7.3 t/ha and 67± 7 t/ha. These results are significantly higher than 8.5 t/ha of aerial biomass obtained by [11] on the forest island of the Monastery of Notre Dame d'Assomption, in the south of Kinshasa as well as 13.03 t/ha of that of [37] in the forest complex of the Spiritual Center Manresa of Kimwenza, and this, for the same species. This characterizes the presence of forest regeneration in savannah protected from fire [38].

The diameter class [25.8-30.8[has a total biomass equal to 24.0 ± 7.3 t/ha and stores 12.0 ± 3.7 t/ha of carbon well above those of the class diameter of [10.8-15.8[(respectively 17.4 ± 7.3 t/ha and 8.8 ± 3.7 t/ha), and confirms [39] who deduces that the specific gravity has a low influence on the biomass rate.

On the other hand, the influence of the dbh on the quantity of biomass and thus on the sequestered carbon rate is reflected by the considerable variation of the average values of biomass and those of carbon from one class of diameter to another because, the more the diameter of the tree is large, the higher the carbon content sequestered by it.

Similarly, the distribution of individuals in height classes evolves in the same direction as average biomass values (Figure 8). This would mean that the higher a tree is, the higher its biomass. The height parameter also influences the amount of biomass, as also demonstrated [40].The apparent contrast that exhibits a sawtooth fluctuation of the total biomass from the class [934-1047[height class could be explained by the fact that this species has a denser canopy and abundant foliage that allows it to contain large biomass and sequester a significant amount of carbon.

The results presented in Table 5 show that this natural regeneration plays an important ecological and environmental role in the process of combating global warming, by sequestering **122.6 ± 13.4 teq CO_2** /ha, higher than that of [11] on the small islet of Kinshasa (14.6 teq CO_2/ha), as well as the one found by [41] on *Pentaclethra eetveldeana*planted next to the students residencebloc 150 of the University of Kinshasa (20.62 teq CO_2 /ha). On the other hand, this result is close to that of [29] quantified in the Kimwenza forest concession (128.27 teqCO_2/ha). This contribution to REDD+ efforts can currently be worth it [23] between **1716.1 ± 187.9 □ and 1226.0 ± 187.9 □**

These results ensure that this forestry island under study is indeed in regeneration and contains individuals of *Pentaclethra eetveldeana*, relatively aged, with an average diameter of 16.7 ± 7.9 cm at chest height and height average of 8.5 ± 3.1 m. The exploitation of the apiary implanted within it by the association of the beekeepers of Kikola has a direct positive consequence on the sufficient regeneration of the stand.

5.4 Economic weight of *Pentaclethra eetveldeana* on feet

The average measurements (figure 9) from our observations were sufficient to estimate those of an individual from *Pentaclethra eetveldeana* (Figure 10) and the economic weight of regeneration generated (Figure 11) at the end of the setting in defens.This islet, whose indigenous melliferous flora has been restricted to the dominant species thanks to the phytogeographical spectrum (figure 5) and which would thus be the proof of the evolution of the savannah vegetation in forestry vegetation, will have sequestered **232.24 ± 13.4 teqCO_2/ha**, amount of CO_2 that will not participate in the greenhouse effect by 2025. This regeneration would therefore be eligible for the REDD+ carbon price and would benefit [23] between **3251.36 ± 187.9 □ and 2322.4 ± 187.9 □.**These results are indeed those expected from our analysis.

Conclusion

The estimation of the environmental and economicpotential of this natural regeneration values and qualifies *Pentaclethra eetveldeana*De Wild and Th, Dur, one of the indigenous melliferous species of Madimba territory in Kongo Central, for efforts to fight against global warming. The results obtained in our observations show that it has the propensity to sequester a no less important quantity of atmospheric CO_2, the main greenhouse gas.

We highly recommend planting it to reforestation decision-makers as well as to beekeepers in order to preserve, improve, increase its density and acquire additional passive income that can be generated in the carbon market.

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