



Study of the Floristic Diversity of urban Ecosystems under the urban influence, the case of Boussaada City, Algeria

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ABSTRACT

The urban and sub urban green spaces are parts of social expectations and affective reactions that show the deep attachment of the population. Whatever shape they take, green spaces take part in the shaping the urban scenery and hence they contribute in life quality of the city. Their role is diverse-social, psychological, ecological, aesthetic, cultural and political. With an awareness raising trend, the well being of cities has seen another interest regained in what concerns the city green spaces. This study which concerns itself with the dynamic situation of urban and sub urban green spaces of Boussaada, Algeria and its position in the town management, is conducted through a diagnostic survey achieved under the city managers. The floristic inventory realized showed the existence of a great floristic diversity with an exceeding number of 12000 trees. In sum, 74 species distributed in 62 genres and 37 families. These were heterogeneously distributed through the urban construct, but globally concentrated in the north-east (33%) and to the southwest (32%). Due to the fast urban changes, this horticultural richness started to feel the danger coming from the urban environmental conditions. Hence, it receives multiple aggressions and difficulties (from uprooting, pollution and mechanical impairments, etc). The 90 questionnaires and the number of readings to urban directories in the route of realization (PDAU, POS) clearly show the new look to the city and to the place of trees in the city management. Hence, a coherent management of green spaces needs to be launched to give the city its beautiful scenery with the support of the sustainable development policy of the town.

Key words: green space, urban landscape, floristic diversity, well being sustainable development

INTRODUCTION

Algeria has ratified three important international conventions in 1982, RAMSAR, CITES and African Convention and in 1992, the one related to Biological Diversity Conservation (BDC). In this way, the conservation dimension of the rare species has been inscribed as an urgent priority action due to the great number of threatened disappearing species [1].

One of the most important files is the botanical gardens that play an important role in the conservation of biodiversity [2,3]. They are rare sources of biological material for the scientific research, witness and reserves for biodiversity in general and more specifically for the vegetal. The urban and suburban green spaces play the role of gap fillers of information and public education and constitute real shop windows of the living world [4,5,6].

However, the intricacies related to these ecological entities are numerous and can be envisaged through the question of the green space and territories management namely in the sub urban areas and even to down town. Also, these spaces take part in the political life of territories and can issue varying modalities of social relations and recreational services [7-11].

The zone of study is furnished with gardens situated in the interior of the town or in its suburbs. Due to the long absence and relegation of these spaces, it has incited the mobilization of a massive labor hand, ecological and scientific association as well as the national press that the restitution and restoration of these could be possible. The ecological potentialities and their vital functioning for the local population as unique relaxation places have been seriously impaired. The urgent action on the spot led by the local authorities to safeguard Boussaada city center was financially supported by an estimate sum of more than 260.000.000 DA [12, 13]. In this respect, there is today a new dynamic perspective of sustainable local development. The question that raises itself is that under which conditions will the municipalities actions have positive or negative effects on the dynamics of these spaces?

The sustainable development of the town as it is conceived by the elected, will it take into account the natural green spaces as new parameters for sustainable development of the town or just as designs on work plans? The answer to this question has to be necessarily overlooked by the management system. It is in this view that our study has to bring concrete answers to and show a significant contribution to the knowledge and contribution of the species dynamics. In this respect, we have opted for three objectives:

i) To achieve a territorial evaluation of the urban and suburban green space species that exists in Boussaada City. This evaluation is to be achieved through two distinct ways. The first level is related to the identification of their typology; the second will treat the diagnostics and their present state; ii) To determine the accompanying vegetation of each infrastructure and its management for a better knowledge of its natural patrimony of the region; iii) To elaborate a landscape survey for the identification and the users' behavior towards these infrastructures and to limit their aspirations in terms of green space within the urban milieu. The inventory that constitutes a fundamental step to obtain a quantitative and qualitative floristic patrimony of Boussaada city concerns four urban and sub urban samples (4) and (1) linear green space and an oasis: El Wiaam garden (G1), Okba Ibn Nafaa garden (G2); Hotel Kerdada Garden (G3), City el Anasser Square (G4). This diversity and richness in green spaces is seriously threatened. Yet, few research works have been conducted in this respect.

MATERIALS AND METHODS

Presentation of the study zone

Boussaada city is located on the Tellien Atlas and south of Chott el Hodna and extends over an area of 256 square kilometer, is considered the gate of the desert, situated between $4^{\circ}11'18''$ longitude East and $35^{\circ}13'24''$ latitude North. The culminating point is found at 560 m altitude with a range of weak slopes with an average of (10 to 25%), limited to the north by the municipalities of Ouled Sidi Brahim, Maarif and El Haouamed and to the south by Oultame, Temsa and LHamel (Figure 1).

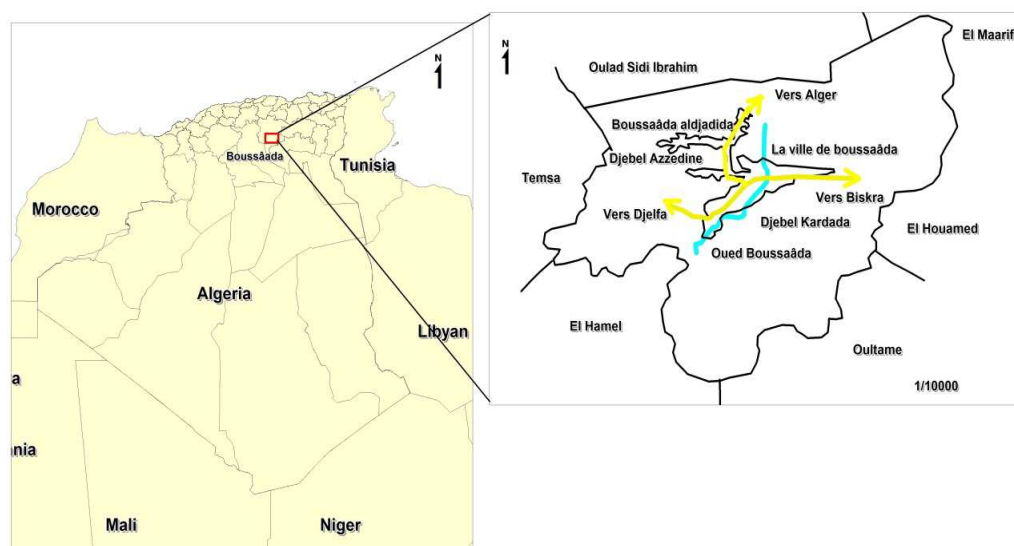


Figure 1: Boussaada Location Map (original drawing)

The hydrographic network in Boussaada region is dense and diversified thanks to its semi permanent rivers, the underground water supplies and the water sources reservoirs that constitute a hydraulic reservoir not to be denied in the region [12,14,15]. At the geological level the study zone represents a stratigraphy of the meridional valley based on rocky ranges pointed in the sand and rocky hills; the Rmel and the mountainous chains are composed of marl and

sandstone. The main types of soil are mineral soils, calcimagnetic, hydromorphous soils, and Saline and Alkaline soils. The average annual rainfall is 185.8mm. The minimal temperature in the coldest month registered in January is 4.1°C and the average maximal temperature of the hottest day (July) is 39.8° C. The dry season extends all along the year, the seasonal type is APHE with an equation Emberger's thermal rainfall, 1955 is 17,55.

Methodology

The methodological approach is based on the identification, all along Boussaada City, of the main actors in charge of suburban and urban green spaces management to collect the different data concerning the quantitative as well as the qualitative of the various existing situations to list and eventually find solutions to these natural spaces.

i) The first phase consists of collecting and synthesizing from the bibliography data, information on the key terms as green space, floristic biodiversity and sustainable towns of Boussaada city. ii) The second phase is based on the direct interactions with the responsible management staff and the specialized services (forest services, Town council Environmental services as Hotel Kerdada with the intent to achieve population surveys and to take notes of the available statistics in this respect. A questionnaire was achieved for this purpose. In terms of steps, registration was obtained through field visits to the existing green spaces of the town (gardens, green spaces, trees etc)

Fig 2 and also to the interior green spaces situated in the cultural and socioeconomic structures; the diagnostic relates the present state of green spaces, their number, the mundane upkeeps, recreational and game spaces, furniture (relaxation material, game equipments, lighting, water fountains, cleanliness, etc.) Also the population frequentation to these structure followed by a floristic inventory established on a subjective scale on all the existing vegetation at the level of the listed green spaces (4 suburban and urban species, One (01) linear green species and one (1) oasis.

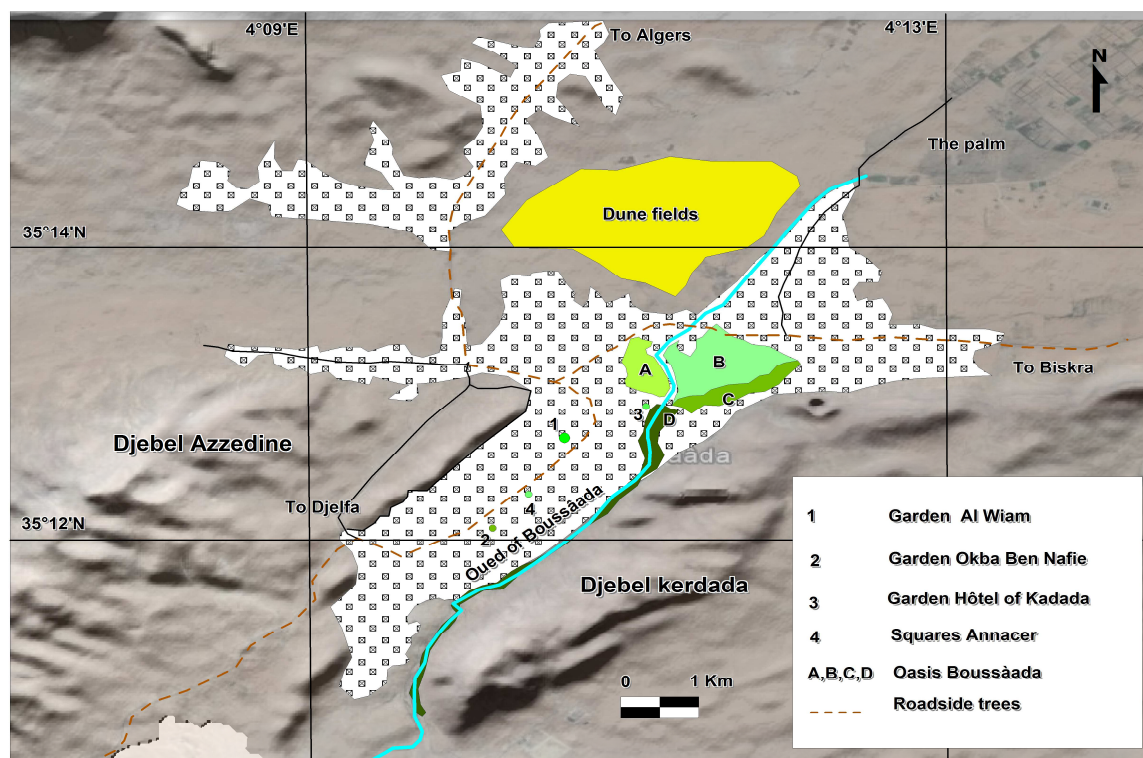


Figure 2 : Map localizing the studied sites

Each sample is photographed and coded by a number, the identification of species is made from the work of Quezel and Santa (1962), Ozenda (1991), Rebbas and *al* (2012, 2014), Beniston (1984) [16,17,18,19,20] and a specimen is deposited in the laboratory of department of nature and life sciences. To determine relation between patient and green space, and to better appreciate the interest accorded to the natural element in the town, as a biological support, we tried to limit the urban populations' aspirations towards the green spaces and to clarify the different roles assumed. In this respect, 90 persons took part.

The surveyed sampling choice was aleatory with the intent to vary more in the groups [21]. The established questionnaire is based on the identification of the surveyed sample with open and multi answers.

RESULTS AND DISCUSSION

Specific richness

In this study, six green spaces in which one linear space and an oasis are selected.

The number of items listed within the green spaces is 74 vegetal species representing 62 genres and 37 botanical (Table1).

Among the registered flora at the green spaces level, the Fabaceae(11), the Arecaceae (6), the Moraceae (6), the Rosaceae (5), the Verbenaceae (4), the Cupressaceae (3), the Oleaceae (3) are the best represented with a numbering rate of more than three(3) species. These families represent around 51% of the total green spaces specific richness. The Nyctaginaceae, Anacardiaceae, the Poaceae, the Malvaceae, the Agavaceae, and the Bignoniaceae, are present each with two species, the other families with one species. The frequency of specific richness is well marked at the level of the four studied gardens, El Wiam garden, Okba ibn Nafie ,El Kerdada Hotel Garden and El Annacer.

Table 1: Distribution of species and their frequency per garden

Species	G1	Fr%	G2	Fr%	G3	Fr%	G4	Fr%
<i>Latania lantaroides</i> Gaertn	121	12,7	425	27,7	195	18,59	92	11,82
<i>Duranta plumieri</i> L.	92	9,63	230	15	109	10,4	87	11,18
<i>Phoenix dactylifera</i> L.	89	9,31	135	8,8	96	9,15	79	10,15
<i>Phoenix canariensis</i> H.	75	7,85	95	6,18	89	8,48	66	8,48
<i>Ficus longifolia</i> L.	70	7,33	86	5,6	75	7,15	58	7,45
<i>Ficus microcarpa</i> L.	65	6,8	79	5,14	68	6,48	49	6,29
<i>Olea europea</i> L.	63	6,6	54	3,51	57	5,43	37	4,75
<i>Leucaena gloeca</i> (L.) Benth	56	5,86	43	2,8	42	4	35	4,5
<i>Ceratonia siliqua</i> L.	40	4,18	35	2,28	38	3,62	23	2,95
Other species	284	29,8	353	23	280	26,7	252	32,43
Total	955	100	1535	100	1049	100	778	100

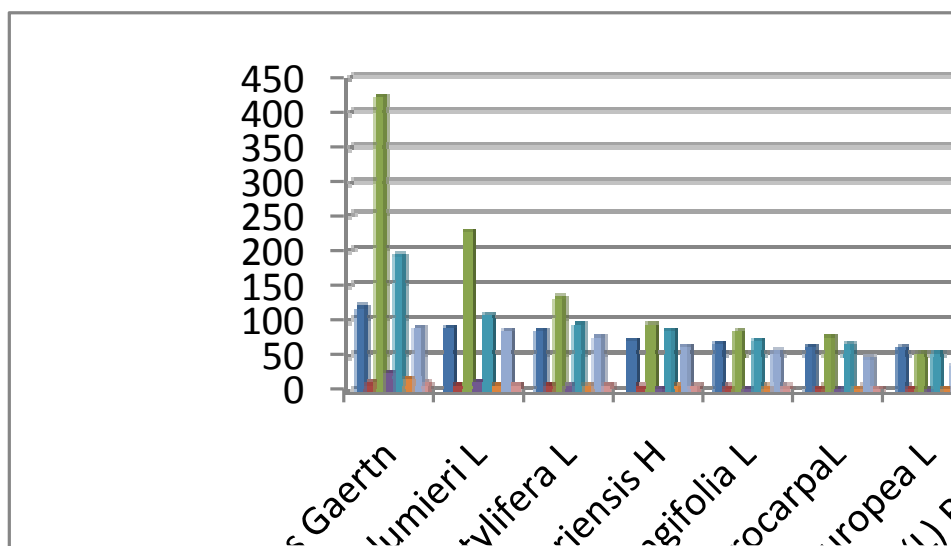


Figure3: Histogram of species repartition and their garden frequency

The garden (G2) includes 1535 vegetal specimen, a very important number that shows the richness that the garden offers not only in number of species that it contains but also in the number of specimen. It is obvious that *Latania lantaroides* is the most dominant with 425 specimens at a rate of 27.7% of the total listed species, occupying thus a quarter of the installed plants in Okba Ibn Nafie garden

The second in class is *Duranta plumieri* with 230 specimens at a rate of 14.98% followed by *Phoenix dactylifera* with 135 specimens (8.8%) and *Phoenix Canariensis* with 95 specimens (6.18%). The species *Ficus longifolia*, *Ficus microcarpa*, *Olea europea*, *Leucaena glauca* et *Ceratonia siliqua*, present important numbers whereas the rest of species are represented the least.

According to Figure 2, the distribution of species is more expanded in G2 than in gardens (3),(1) and (4). The floristic inventory done at the oasis level has allowed the completion of the fixed list of floristic species on tab (2) and the counting of aligned species on (Table 3). The families that present high numbering rate are the

Fabaceae that dominate with a rate of 31% among the families constituting garden (2) flora, and garden (3) with a rate of 28%, garden (1) with a rate of 23%, followed by garden (4) with a rate of 21%.

The quasi-totality of vegetal species existing in the four gardens, the oasis and linear space are designed decorative, the specimens are presented at different ages. There are even some that were implanted in 1915 [22,23] with the starting garden launching, they appeared well though they were badly treated.

It must be noted that many species have disappeared mainly at the level of garden (3) and garden (4) due to the milieu biodegradation. According to the protection statute of UICN, there exists an endangered species in the four gardens (1),(2),(3) and (4) under the name of *Latania lantaroides* of the *Arecaceae* family, and two quasi-threatened species *Washingtonia filifera* of the *Arecaceae* et *Cupressus sempervirens* families that belong to the *Cupressaceae* family.

Bousaada Oasis

Bousaada oasis the nearest oasis to capital city, Algiers. It contains some 10 000 palm dates between 1850-1860 extended over 74 hectares with a density of 135 plants /ha. Contrary to what is today, some 6000 extended over 150 hectares with a density of 40 palm trees per ha where the watering system is very traditional-the use of saguia (ditch watering).

The oasis is a green space of tree growing vocation, the spontaneous vegetation is abundant, and with the absence of upkeep hand labours that in certain cases inexistant. The oasis is subdivided into four orchards (djnanes) Djnane Nakhara, Djnane Hemaïda, Djnane Batoum et Djnane mimoune. The inventory works achieved over the four natural zones of this site by DSA (2006), Dahbazi (2010) [24,25] have shown that Bousaada oasis still maintains an important diversity of cultivars and is distinguished by varieties that pertain to Bousaada and its regions proper (Boussaâdia, Nebgaya, Zebla).

The number of cultivars recounted is 20 with 2024 feet of palm dates; the repartition of cultivars in their descending order is the following: Boussaâdiya (37 %), Halwa (13, 98 %), Degllet- Nour (10,02 %), Rotbaya (8.25 %), Mech-Dgla (8.10 %), Ghars (6,71 %). The other cultivars as Hamray, Kawawiya, Horra, Sennine Meftah, Deglet Zaine et Nebgaya, are a little present whereas the varieties of Gattara and Hilib Lbel, Sourri, Zebla, Mkarkcha, Kahlay (0,14 %) et Dfar l'gat (0,64 %), are very rare (Table 2 and Figure 4).

Table 2: Floristic and varietal inventory Boussaâda oasis

Variety	Djnane Nakhara	Djnane Hemaïd	Djnane Btoum	Djnane mimoune	Total	percentage
Boussaâdiya	193	175	110	270	748	37 %
Halwa	88	90	35	70	283	13.98 %
Ghars	55	42	18	21	136	6.71 %
Mech-Dgla	17	79	43	25	164	8.10 %
Gattara	6	0	11	0	17	0.83 %
Degllet- Nour	4	50	80	69	203	10.02 %
HilibLbel	4	0	0	1	5	0.24 %
Sourri	2	0	0	0	2	0.09 %
Rotbaya	0	47	27	93	167	8.25 %
Zebla	0	7	5	0	12	0.59 %
Hmray	6	7	12	14	39	1.92 %
Makkiya	0	0	3	4	7	0.34 %
Kawkawya	0	6	15	3	24	1.12 %
Mekarkcha	0	3	0	17	20	0.98 %
Horra	0	4	0	32	36	1.77 %
Sennine Meftah	0	2	13	61	76	3.75 %
Kahlay	0	3	0	0	3	0.14 %
Deglet Zaine	0	0	20	14	34	1.67 %
Nebgaya	0	0	32	3	35	1.72 %
Dfar l'gat	0	0	8	5	13	0.64 %
Total	375	515	432	702	2024	100 %

In general and according to Bousaada agricultural services, this marvelous site has been submitted to various constraints:

*the oued (river) pollution caused by the unorganized and anarchical rural constructions mainly along and on the nearby of the oasis.

*The heritage problem induced has placed the palm trees to fragmentation of small areas that have become sterile.

*The palm trees uproot by the proprietors under the pretext that vegetable products are more beneficial than the palm dates in the region.

*Land pressure demands an oasis suffocation due to urban population in extension and the negative effects it result in (domestic wastes, walking on green spaces, stealing of crops, etc).

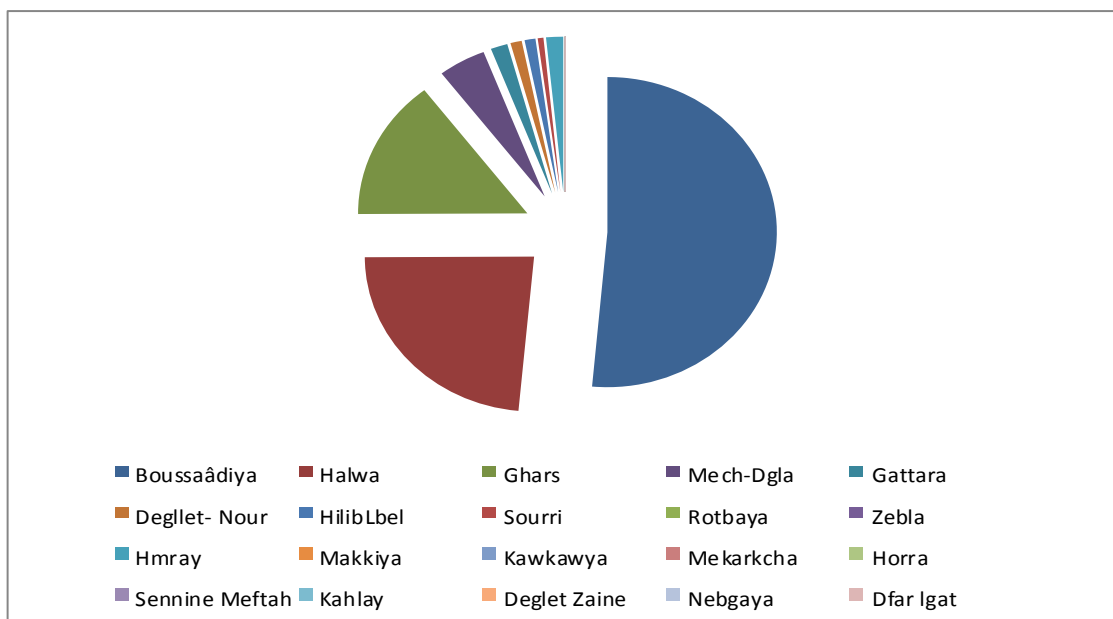


Figure 4 : Abundance frequencies per palm tree variety at the oasis level

Linear spaces: The aligned trees

Since a long time, the traffic roads have played a great role in the development of a region. Today they have become a landmark in the daily landscape of the region from the street to the Main road. Their principal role is the transport of people and their stuff.

However, beyond this functional role, the street ,the thoroughfare, and even the small street create the gap in our towns, cut short the territories and reshape the streets and design the landscape as a major element in urban and more specifically in the traffic planification especially in its aligned forms [26].

The majority of the urban aligned trees of the city of Bousaada are located adjacent to the high streets borders (down town towards Biskra, down town towards Algiers, downtown to Djelfa, downtown towards Hostel technical Institute and the touristic road towards Ferrero mill), and the principal axes of the town (Figure 2). These plantations diminish at the level of secondary streets and are totally absent on the secondary axes. It is mainly at the level of city center and the ancient residential cities where the aligned trees plantations are very developed (Caroubier, Eucalyptus).

The trees bypass the streets pavements either unilaterally or bilaterally, certain of them dated back to the colonial period (the case of El Badr district).The generalization of the tree within the town space limit remains insufficient particularly at the level of newly inhabited localities (Bousaada el jadida) (new) and the few trees existing are but the product of the population proper initiatives.

The follow up to this patrimony is in general limited to the whitewashing just for the aesthetic sake and is often done by non qualified hand labour. It is also to be noted that there is a total absence in the irrigation operation or the phytosanitary treatment.

All through the city of Bousaada, the plantations are realized by the technical services of the town council; the forestry services and also by particulars who voluntarily plant trees near their residences or their workshop. At the level of ancient buildings, the tree stands as a marking line for private properties. In fact, we have used one tree for one house.

In what concerns the follow up to the plantation operation and with regards to the plantation status, it is evident that the follow up and the upkeep are at fault at the level of the urban and sub urban composites.

The upkeep team rarely comes back to the new shoots only at the replacement operation or at times of decorations. It is then to be noted that the management of growing trees and their realization obey to no code of use due to the absence of specific management documentations.

This lacuna is narrowly related to the management composition team charged of follow up and treatment of green spaces where urban forestry competencies and the beauty of landscape conception are a defect.

It is then recommended to conceive a simple and well documented folio including all the elementary data (species, variety or cultivar, date of plantation, origin and quality of plants and also management directives namely those that concern the trees suppression an treatment modalities.) This document will accompany the green spaces process, well written to avoid all the intricacies and errors inherent to the management and the changing of stuff and allows the permanent follow up to the tree growing patrimony.

It is to be noted also that the aligned trees contribute to the creation of certain harmony within the urban architecture and the aesthetic beauty of the town to give support to the citizen's well being with the pleasure to sense and feel the four seasons where the tree evokes the colour of spring, autumn, the refreshing shadow of the hot summer and winter spectrum).

Table 3: The aligned trees and their frequency in linear space in Boussaâda

Families	Genre	species				
		Commun Name	Scientific Name	Nb	(%)	
Arecaceae	Phoenix	Palmier dattier	<i>Phoenix dactylifera</i> L.	2200	27,5	
	Phoenix	Dattier des canaries	<i>Phoenix canariensis</i> H	400	5	
	Chamaerops	Palmier nain	<i>Chamaerops humilis</i> L	95	1,18	
	Washingtonia	Palmier japon	<i>Washingtonia filifera</i> L	100	1,25	
	Washingtonia	Washingtonia	<i>Washingtonia robusta</i> H	350	4,38	
Moraceae	Ficus	Figuier	<i>Ficus glomerata</i> L	120	1,5	
	Ficus	Figuier des pagodes	<i>Ficus religiosa</i> L	100	1,25	
Fabaceae	Acacia	Cassier	<i>Acacia cyanophylla</i> L	110	1,37	
	Gleditsia	Févier d'Amérique	<i>Gleditsia triacanthos</i> L	200	2,5	
	Robinia	Robinier	<i>Robinia pseudoacacia</i> L	90	1,12	
	Medicago	Luzerne	<i>Medicago arborea</i> L	165	2,06	
Cupressaceae	Cupressus	Cyprés	<i>Cupressus sempervirens</i> L	850	10,6	
	Juniperus	Genevrier	<i>Juniperus communis</i> L	150	1,87	
	Thuja	Thuja	<i>Thuja orientalis</i> L	140	1,75	
Casuarinaceae	Casuarina	Casuarina	<i>Casuarina equisetifolia</i> L	130	1,62	
Pinaceae	Pinus	Pin d'Alep	<i>Pinus halepensis</i> Mill	200	2,5	
Tamaricaceae	Tamarix	Tamarin	<i>Tamarix aphylla</i> L	159	1,99	
Caesalpinoideae	Ceratonia	Caroubier	<i>Ceratonia siliqua</i> L	300	3,75	
Nyctaginaceae	Bougainvillée	Bougainvillea	<i>Bougainvillea spectabilis</i> Willd	300	3,75	
	Bougainvillée	Bougainvillea	<i>Bougainvillea spinosa</i> Heimerl	245	3,06	
Anacardiaceae	Pistacia	Lentisque	<i>Pistacia lentiscus</i> L	350	4,38	
Cyperaceae	Cyperus	Papyrus	<i>Cyperus papyrus</i> L	60	0,75	
Myrtaceae	Eucalyptus	Gommier rouge	<i>Eucalyptus camaldulensis</i> Dehnh	185	2,31	
Apocynaceae	Nerium	Laurier rose	<i>Nerium oleander</i> L	150	1,87	
Terebinthaceae	Pistacia	Pistachier térébinthe	<i>Pistacia terebinthus</i> L	50	0,62	
Oleaceae	Fraxinus	Frêne à fleurs	<i>Fraxinus ornus</i> L	265	3,18	
	Olea	Olivier	<i>Olea europea</i> L	200	2,5	
Rasaceae	Rosa	Ancien rosier	<i>Rosa rugosa</i> Thunb	42	0,52	
Aceraceae	Acer	Erable palmé	<i>Acer palmatum</i> Thunb	70	0,87	
Thymeliaceae	Daphne	Daphne	<i>Daphne mezereum</i> L	70	0,87	
Agavaceae	Agave	Agave	<i>Agave americana</i> L	38	0,47	
Lamiaceae	Rosmarinus	Romarin	<i>Rosmarinus officinalis</i> L	102	1,58	
				Total	7986	100

All this will be an integral part of the cultural patrimony of the country. Trees play a primordial role as

*A signal trait, the trees fix the passing of travelers to their destinations, they help facilitate the car riders in keeping company.

*A great landscape patrimony due its beautiful sceneries and its role in giving a picturesque image

*They are demarcation line and fixing borders in keeping land partitions, in what concerns the diversity of crops and vegetable products.

*A social patrimony thanks to the ambiance created as a life framework, the ecological role they play against the wind acting as wind breakers, a shelter against the sun and rain, a comforter to dust, an orienteer for passengers and travelers missing their destinations at times of fog and mists.

*Trees are an historical patrimony; they are accompanying elements of artistic art,

*A botanical patrimony for the species that are out of their natural habitat or as exotic creatures

The inventory that constitutes a fundamental step to obtain a quantitative and a qualitative tree growing patrimony of the city of Boussaada is concerned with a sample rating estimated to 7986 trees, DGF, 2014. The most dominant species are : *Phoenix dactylifera* (27,5%), *Cupressus sempervirens* (10,6%), *Washingtonia robusta* (4,38%). 32 species belonging to 20 families. The most represented family of *Arecaceae* (39, 31 %) with 05 species, followed by the *Fabaceae* with 04 species (7,05 %) The *Cupressaceae* represent (14, 22 %) with 03 species, the *Moraceae*(2,75 %), the *Nyctaginaceae*(6,81), and *Oleaceae* (5,68) with 02 species each. The other families are present with less than two. (Table 3)

(Figure 5) represents the generic frequency per botanical family of aligned trees in the linear green space of Bousaada. The families that possess high elevated rate number are the *Fabaceae* (4), *Arecaceae* (3), *Cupressaceae* (3), *Oleaceae* (2) and the other families are present with one genre.

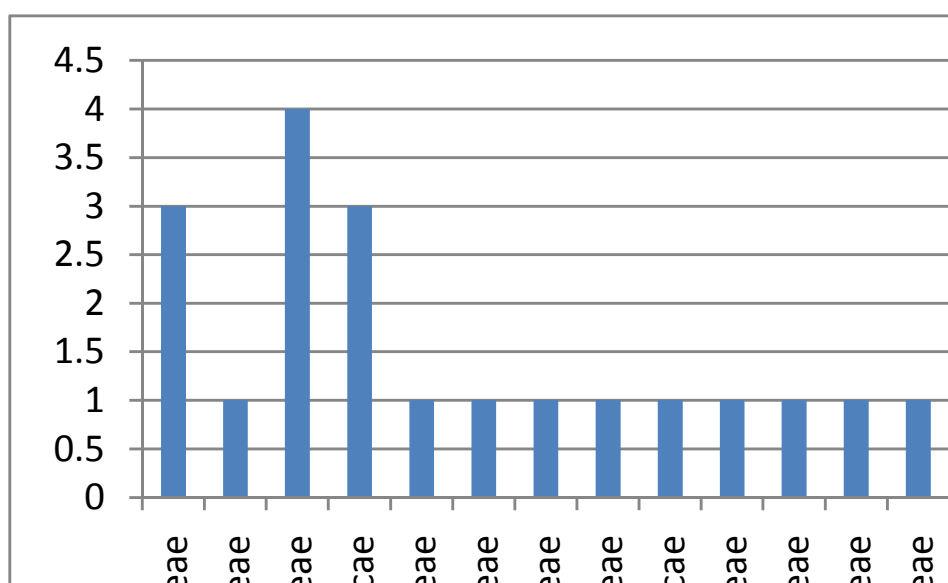


Figure 5: Generic frequency per botanical family of aligned trees in linear green spaces of Bousaada

Table 4: Characterization and identification of the surveyed population

Sexe repartition						
Category	Feminine		Masculine		Total	
number	39		51		90	
Percentage(%)	44		56		100	
Age class						
Category	C1:0 -15	C2 : 16- 30	C3 :31-45	C4 :46-59	C5 > 61	Total
number	13	38	16	8	15	90
Percentage(%)	14,44	42,22	17,77	8,88	16,69	100
Instruction Level						
Category	/	Palier1	Palier2	Palier3	Univ	Total
number	17	11	22	18	22	90
Percentage(%)	18,88	12,24	24,44	20	24,44	100
Activity						
Category	Retreated	Employed	Schooled		Total	
Number	13	31	46		90	
Percentage(%)	14,44	34,44	51,12		100	

Socio-economic Approach

Through the sampling population representing 90 questioned throughout the city of Bousaada, a rate of 100% of the global sampling surveyed, the participation rate reveals the big interest that the population accords to their environmental preoccupation related to their mode of living. The treatment of the data obtained allows us to get the

following analysis-56% of the surveyed population is of male sex against 44% female sex. Female participation in this survey is more or less judged satisfactory. Taking into account the literacy rate reveals to us that 44.44% are from colleges or universities, 36.66% have an elementary or fundamental levels and finally 18 % are illiterate. Globally speaking the majority of the population surveyed are literate whatever their age is, 28, 88 % is active, 21, 11 % jobless and 16, 66 % are retreated. The schooled population rate is 33, 33 %. (Table 4)

The totality of surveyed population, whatever their age class, reckon the necessity of creating green spaces amidst the urban milieu with the objective to provide them with places of détente and relaxation and leisure with 42, 22 %, the highest percentage has been registered with Class 4 (87,5 %) and C5 (53,3 %), recreational spaces with 18,88 % principally with C1 (84,81 %). This explains the frequentation of these spaces in search of leisure and games.

Table 5: The objectives of green spaces

Age Category	C1: 0-15		C2: 16-3		C3: 31-45		C4: 46-59		C5: > 60		Total	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Détente and leisure	1	7,69	15	39,5	7	43,8	7	87,5	8	53,3	38	42,2
Game	11	84,81	6	15,8	0	0	0	0	0	0	17	18,9
Space to protect	1	7,5	1	2,36	0	0	0	0	1	6,66	3	3,35
No precise answer	0	0	16	42,1	9	56,2	1	12,5	6	40,04	32	35,6
Total	13	100	38	100	16	100	8	100	15	100	90	100

The old aged persons justify their frequentation in the pursuit of calmness and the facilities offered by these spaces. Other persons hide behind not frequenting these spaces because they have no time, the insecurity and lack of sanity of the places.

Concerning voluntary services rating, the 88, 88 % of the surveyed volunteers have demonstrated their free will and availability to clean and plant in the districts they live in or throughout their city (table 6).

Table 6: Voluntary work

Age Category	C1 0-15		C2 16-30		C3 31-45		C4 46-59		C5 > 60		Total	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
yes	13	100	35	92,1	15	93,75	8	100	9	60	80	88,88
No	0	0	3	7,9	1	6,25	0	0	6	40	10	11,12
Total	13	100	38	100	16	100	8	100	15	100	90	100

To ameliorate in the state of being, the city of Boussaada is furnished with many suburban and urban green spaces represented by the oasis and other planted sites (but less important) which are squandered here and there in the suburbs. In the city, this patrimony represents a great variety in form starting with public places, to squares, then to gardens and finally to the urban park (not yet realized)

The dynamic process of these spaces remains very slow in accordance with the staggering number of population. No garden has ever seen daylight for long despite the high population rate; and the urban expansion that has followed. Certain gardens existed during the colonial period the case of (Kerdada garden)

In matters of floristic diversity, the diagnostic has shown a high presence of vegetation.

However, the choice of species does not obey to any reflection that takes into account the local climate and other landscape considerations. On the other hand, social order constraints are very related to the citizens' behavior towards the green spaces and the tree in particular in down town where the influences are strongly used leading to significant stress problems. In this respect, we are able to identify some: trees uprooting and felling, walking on the green grass and wastes.

In the present time, the applied management towards the green spaces is ancient and archaic and is limited to the cutting of disturbing branches, replacements or refurbishment. Once, the existing problems turn complex, even the urban trained staff in tree growing and horticulture could not find the appropriate solution. The negative aspects technical matters listed give a clear idea about the absence of reflection in what concerns the choice of the plantation structure, also an insufficient cultural conduct. Hence, the collaboration with specialists in ornamental horticulture remains a necessary act; mainly this should come on term and in the right moment [27, 28].

Among the predicted solution to the effective management of suburban and urban green spaces and to safeguard the existing biodiversity and enrich it, two main points must be retained:

(i) To offer the managing staff and services the means and the competencies to put to action an effective work plan.(ii) establish a true management plan, together with a related documentation to the conception of the spaces implanted. Once established, such a system allows a coherent and effective management, the elaboration of global management plan that fits with the city scale and its main districts(ancient and new residential zones; the elaboration of basic documentation to list the historical background of the various tree growing management projects realized on time. This will be very beneficial in case of staff mobility, a strict collaboration of tree specialists and landscape within a pluri disciplinary process will be very effective.

CONCLUSION

The city of Bousaada is thriving with green spaces represented by an oasis and other tree growing ranges that cover and spread all along its suburbs. Down town, this green patrimony comprises different varieties and forms. This registered diversity is important in all the ecosystems urban and suburban(oasis, private gardens, plantations, etc.) that, in the course of time , are a relaxation place and welfare for the inhabitants .In its spatial dimension, the problem of the climate, soils and altitude as well as the human activity play important roles. Green spaces in Bousaada are not regularly distributed; hence the majority of the species are found in the localities where the humans mostly frequent. Green spaces are not well treated and kept; there exist a lot of constraints that curb the development and the effective management of these leisure spots. The best predicted solution to safeguard this natural patrimony is to assist specialists in horticulture with means and competent labour hand, to prepare a well documented working plan that will be a lifelong folio for the management of the city in the future. Tree growing effective framework and policy if it is well done will save the city and give it an aesthetic value face for tourism in the near future to come.

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