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LOCAL PEOPLE'S PERCEPTION OF VEGETATION COVER DYNAMICS IN THE GROUNDNUT BASIN : A CASE STUDY OF THE DJILOR DISTRICT

PERCEPTION DES POPULATIONS LOCALES SUR LA DYNAMIQUE DU COUVERT VÉGÉTAL DANS LE BASSIN ARACHIDIER : ÉTUDE DU CAS DE L'ARRONDISSEMENT DE DJILOR

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ABSTRACT

Natural plant resources are subject to changes linked to the effects of climate change and the impacts of human activities. In this context, the assessment and understanding of their dynamics is imperative for the establishment of any conservation policy. This study aimed to understand, in the Djilor District, the perceptions of the populations on the dynamics of the vegetation cover and the determining factors of this evolution. To this end, surveys addressed to 513 households and interviews with resource persons were conducted in 45 sampled villages. In addition to these practices, floristic inventories were carried out. The results showed that 93% of the people surveyed perceive a regressive evolution of the vegetation cover. Added to this, according to the populations, is the decline of certain species whose confrontation with the inventory data made it possible to realize the extent of the losses in biodiversity. The populations mainly attribute this situation to: logging, agricultural expansion, rainfall deficit, population growth and salinity. The information provided by this study shows that the dynamics undergone by the vegetation cover of the study area, from the country's independence to the present day, is not in the direction of their conservation. Consequently, it is important to make a paradigm shift by adopting policies for the restoration, development and protection of vegetation areas.

Keywords : Perception, dynamics, vegetation cover, species and groundnut basin

RÉSUMÉ

Les ressources végétales naturelles sont soumises à des mutations liées aux effets des changements climatiques et des impacts des activités humaines. Dans ce contexte, l'évaluation et la compréhension de leur dynamique est un impératif à l'établissement de toute politique de conservation. Cette étude s'est fixée pour objectif d'appréhender, dans l'Arrondissement de Djilor, les perceptions des populations sur la dynamique du couvert végétal et des facteurs déterminants de cette évolution. A cet effet, des enquêtes adressées à 513 ménages et des entretiens auprès des personnes ressources ont été menées dans 45 villages échantillonnés. En plus de ces pratiques, des inventaires floristiques ont été effectués. Les résultats ont montré que 93% des personnes interrogées perçoivent une évolution régressive du couvert végétal. A cela s'ajoute, d'après les populations, le déclin de certaines espèces dont la confrontation avec les données d'inventaire a permis de se rendre compte de l'ampleur des pertes en biodiversité. Les populations imputent principalement cette situation à : l'exploitation du bois, l'expansion agricole, le déficit pluviométrique, l'accroissement démographique et la salinité. Les informations fournies par cette étude montrent que la dynamique subit par le couvert végétal de la zone d'étude, de l'indépendance du pays à nos jours, ne va pas dans le sens de leur conservation. Par conséquent, il est important de procéder à un changement de paradigme en adoptant des politiques de restauration, d'aménagement et de protection des espaces de végétation.

Mots-clés : Perception, dynamique, couvert végétal, espèces et bassin arachidier

INTRODUCTION

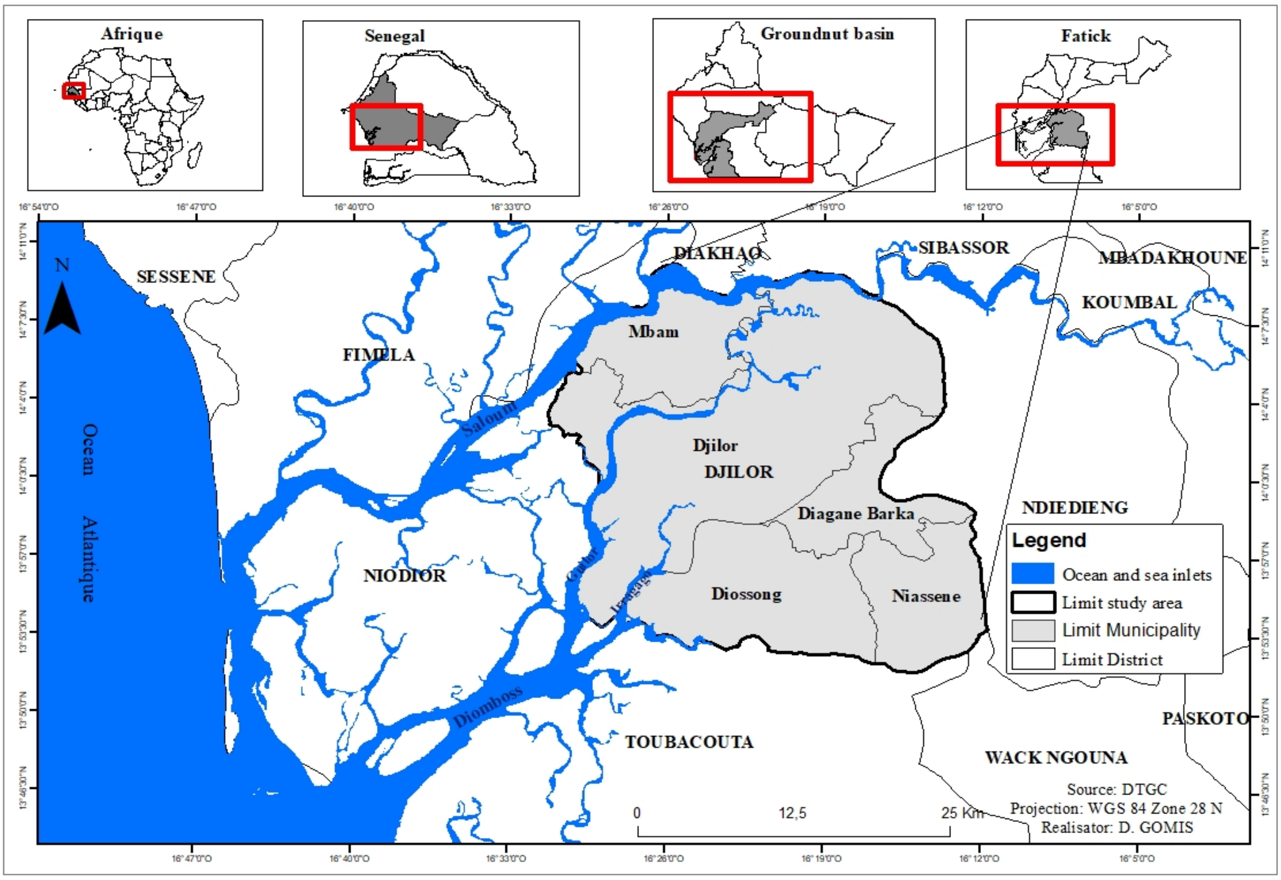
Forest ecosystems are home to an impressive wealth of flora and fauna (Mengue-Medu 2002: 1). They contribute in their function to the planetary balance through their contribution to the biogeochemical cycle of carbon, nitrogen, water, etc. (Mbow 2009 : 13; Sambou 2017: 11). They also represent an important socio-economic interest for local populations throughout the world through their important role in meeting many food, energy, medicinal and cultural needs (Diop, 2011: 96 ; Manga 2012: 115). In West Africa, most rural populations base their economy on the exploitation of wood and non-wood products from these ecosystems (Lykke 2000: 107). However, in Senegal and more particularly in the peanut basin, these ecosystems have been deeply affected by the significant changes that occurred with the worsening rainfall of the drought of the 1970s and the population growth leading to increasing anthropization of these ecosystems, most of which resulted in their degradation (Ndiaye & Ndiaye 2013: 7 ; Sambou 2004: 1). The extent of these changes most often differs depending on the environments according to the types of pressure and their ecological and environmental conditions. This situation has given rise to several studies with a view to a better understanding of the dynamics of these ecosystems in the face of these various disturbances in order to define the guidelines necessary for their conservation (Dièye 2013: 629 ; Faye 2010 : 101). Indeed, the imbalance of these ecosystems generates several disadvantages: loss of biodiversity, modification of energy and water flows between the soil, the biosphere and the atmosphere and finally serious ecological crises such as climate change as well as food, energy and economic insecurity among local populations (Mbow 2009 : 226 ; Ba 2017: 5255-5273 ; Ndiaye & Ndiaye 2013 : 12). To achieve such an understanding, most recent studies on the evolution of vegetation in Senegal have focused on the remote sensing approach (Solly 2020 : 42-67 ; Ba 2017: 5255-5273). However, knowledge of the perceptions of populations on the dynamics of the landscape of their environment and its floristic richness remains essential to understanding such changes. It allows, in fact, not to limit oneself to the opinions of experts but rather to go to the source, to the local populations. Thus, in the Senegalese peanut basin, an area with a strong agricultural dominance, it would be important to collect the opinion of the population on the dynamics of the plant cover and its different causes. It is in this respect that the present study conducted in the Djilor District, a locality of the peanut basin, set itself the objective of collecting the perception of the populations on the spatial and specific dynamics of the flora of the study area as well as the determining factors of their evolution. This specifically involves characterizing the different respondents, collecting their perception of the spatial and specific dynamics of the plant cover and the different periods of rupture, comparing the flora previously indicated as existing in the study area with current floristic inventory data and finally distinguishing the factors of these changes according to the different opinions of the populations.

1. PRESENTATION OF THE STUDY AREA

The study was carried out in the Senegalese peanut basin, more precisely in the District of Djilor (Fig.1). The locality is located in the administrative entity of the Fatick region, in the Foundiougne Department, between latitude 13°50-14°11 North and longitude 16°33-16°12 West. It covers an area of 876 km^2 and includes five municipalities: Mbam, Djilor, Diossong, Diagane Barka and Niassene. The locality is bathed in a North Sudanese climate, characterized by a long dry season (October to May) and a short rainy season (June to September). The analysis of climate data from the Fatick station of the National Agency for Civil Aviation and Meteorology (ANACIM), gives an average rainfall of 601.9 mm for the series from 1930 to 2017. The average temperature is 28°C. It conditions a bimodal thermal regime with two maxima in April (39.4°C) and November (34.1°C) and two minima in July (24.1°C) and January (16.8°C). The locality is drained by the arms of the Saloum and Djomboss (the latter contains two tributaries Guilor which divides the area in two and Irragago). This situation has generated the existence in the locality of two groups: an amphibious group and a continental group. The soils in the continental area are predominantly tropical ferruginous with some not or little leached

and others leached while in the amphibious zone, they are essentially hydromorphic. Apart from these arms of the sea, the relief is generally flat with altitudes that do not exceed 35m. The hydro-pedoclimatic conditions of the locality, associated with those of its geographical position give it a diversified vegetation of savannah and mangrove. The locality is home to a population of 79,132 inhabitants according to the general census of the population and housing (RGPH, 2013), for a density of 91.4 inhabitants / km^2. Agriculture mainly under rain as well as livestock breeding, fishing and trade constitute the main activities of the local populations according to data from the National Agency of Statistics and Demography (ANSD) for the year 2014.

Fig. 1: Location map of the study area



2. MATERIALS AND METHODS

The surveys were carried out at the same time as the floristic inventory work during the period from 15 February to 22 July 2019. The first surveys were carried out at the lowest level of the chain, among households, with the aim of quantifying their use of firewood and service wood, while gathering other information, particularly on the dynamics of the plant cover and the factors determining this evolution. In order to carry out these surveys, and given the large number of villages in the Arrondissement, a sample was first taken of 30% of the villages in each Commune (Tabl. I). These villages were chosen from the total number of villages in the Arrondissement by drawing lots without discounting to give all the villages a chance of being selected.

Tabl. I : Number of villages to be surveyed by Commune in the Djilor Arrondissement

Municipalities	No. of villages	Rate %	Sample
Municipality Djilor	44	30	13
Municipality M'bam	7	30	2
Municipality Diagane Barka	23	30	7
Municipality Diossong	40	30	12
Municipality Niassène	38	30	17

Source : D. GOMIS, 2017

Once the villages to be surveyed were known, and given that households are grouped together within concessions, we took the latter as the spatial reference unit for reaching the households. A concession is in fact a 'dwelling (residential) unit formed by one or more buildings, whether or not surrounded by a fence, where one or more households live' (Diouf, 2008). On the basis of the concessions, an optimal sample size was established, given that not all the concessions could be visited. This approach also allows for greater precision in the analysis. The formula used to determine the optimal sample size is Bernouilli's with a margin of error of 10%. It is expressed as follows

$$n = \frac{(1{,}96)^2 \times N}{(1{,}96)^2 + l^2 \times (N-1)}$$

n = size of the sample to be interviewed; N = size of the universe under investigation; l = width of the range expressing the margin of error.

After calculation, a sample size of 457 dealerships was obtained (Tabl. II). We then proceeded by quota to obtain the number of concessions to be surveyed per village. This was done by calculating the ratio of the sum of the concessions in the village to be surveyed over all the villages sampled, and multiplying the result by the sample size. The survey step for each of these villages is defined by the following ratio: N/ni where N = population size (concession) and ni = size of concession sampled. In each village, after presentation and discussion with the village chief, a list of all the concession heads was drawn up with the help of the village chief and the first concession was chosen at random from the list drawn up. From this first concession onwards, the rest of the concessions were surveyed. All households in each concession were surveyed. The questionnaire was administered to the head of household. Failing that, other members of the family, in particular the wives, were interviewed.

Tabl. II : Sampling of concessions by village to be surveyed

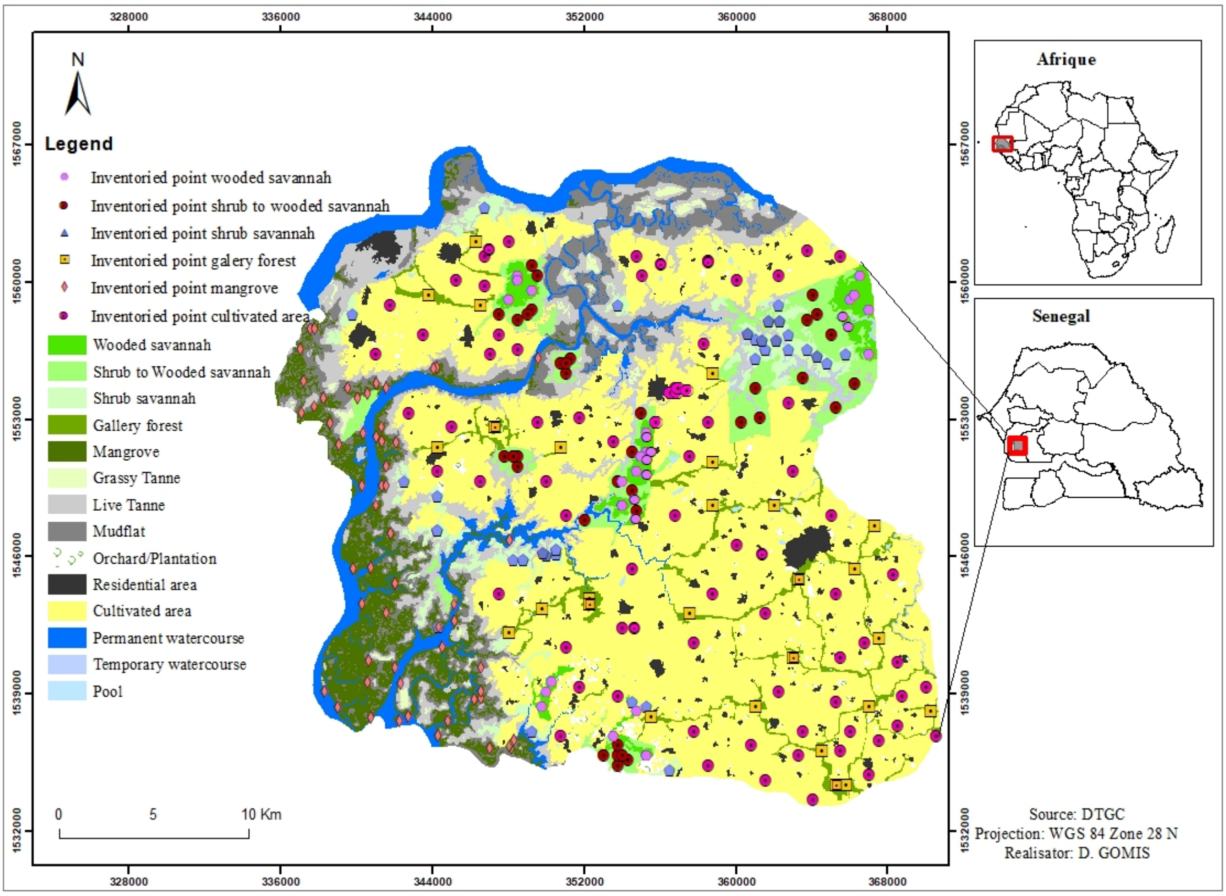
Municipalities	Villages	Concessions	Sample
Municipality Djilor	Badandar	48	13
	Bangalère	35	9
	Boly serère	22	6
	Felane	21	5
	Gague Chérif	82	21
	Keur Thienke Ndias	22	6
	Keur Yoro	34	9
	Lambaye	26	8
	Mbelane	36	9
	Pethie	34	9
	Sadioga	40	10
	Yerwago	21	5
Municipality M'bam	M'bam	324	84
	Mbassis	174	45
Municipality Diagane Barka	Diagane Barka	23	6
	Diagle Djilor	25	7
	Keur Mmadou Fatoum	31	8
	Loumène	29	8
	Ndiaye Ndiaye Sérère	41	11
	Ndoffane Ndary	37	10
	Ngayène Momar	14	4
Municipality Diossong	Bamboucar Malick	39	10
	Bamboucar Massamba	22	6
	Kebe Ansou	46	12
	Keur Fafa Welly	29	8
	Keur Lahine Fatim	24	6
	Keur Mbaye Maty	25	7
	Lerane Coly	35	9
	Mbouloum	82	21
	Ndienghène Mady	27	7
	Ngayène Daour	23	6
	Thiamène Birane	19	5
	Ndiaffe Ndiaffe	57	15
Municipality Niassene	Daga Diery Sérère	16	4
	Daga Ndoup	20	5
	Diagane Sadaer	26	7
	Diogo Sérère I	14	4
	Fass Matar	22	6
	Keur Malao	21	5
	Keur Abdou Fana	21	5
	Ndiaguène Omar	13	3
	Thianda Thisse	09	2
	Thiekene	16	4
	Thiouroum	28	7
Total	45	**1753**	**457**
Sample size		**457**	

Source : D. Gomis, 2017

A total of 513 households were surveyed. Within each household, the questions covered a number of aspects, including identification of the respondent, family composition and size, perception of the dynamics of the plant cover, periods of change, past and recent species richness, factors in the dynamics of the plant cover, etc.

The floristic inventory was carried out randomly on plots of varying size depending on the unit (40 × 40m for cultivated areas, 20 × 20m for natural savannah vegetation and 10 × 10m for mangroves). A total of 254 plots were carried out, covering 16.7 ha, including 74 plots for cultivated areas, 60 plots for mangroves and 120 plots for natural savannah vegetation (see fig. 2).

Fig 2: Map showing location of survey points (Source : D. GOMIS, 2018)



2. RESULTS

2.1. Characteristics of respondents

513 heads of household from 45 selected villages in the five communes were surveyed. The characteristics of the respondents are grouped in Table III below. The most representative age group was 35-55. The dominant ethnic groups were Serer, Woloff, Peul and Laobe. The main activities of the majority of respondents were farming, livestock rearing, fishing and trading. The number of households surveyed per commune varied according to their size.

Tabl. III : Identification of respondents

Respondent	Value
Total respondents	513
Gender	Male (76%) ; Female (24%)
Age category	17-35 years (13%) ; 36-55 years (51%) ; 56-90 years (37%)
Level of education	No formal education (67.6%) ; Arabic-Koranic (11.7%) ; Primary (17.2%) ; Lower secondary (1.2%) ; Secondary (1%) ; Higher (1.4%)
Ethnic group	Séreer (60.5%) ; Woloff (21.6%) ; Peul (5.8%) ; Laobé (5.3%) ; Manding (2.5%) ; Toucouleur (1.2%) ; Bambara (1.2%) ; Diola (0.8%) ; Sarakholé (0.6%) ; Balante (0.2%) ; Manjack (0.2%) ; Maure (0.2%)
Respondents' activity	Farmer (76.1%) ; stockbreeder (5.3%) ; fisherman (4%) ; shopkeeper (3.4%) ; bricklayer (1.9%) ; Koranic teacher (1.5%) ; primary school teacher (1.5%) ; civil servant (1.1%) ; driver (1%) ; tailor (0.5%) ; sapper (0.5%) ; sculptor (0.3%) ; carpenter (0.3%) ; soldier (0.3%) ; policeman (0.3%) ; caretaker (0.3%) ; electrician (0.2%) ; veterinary surgeon (0.2%) ; musician (0.2%) ; health assistant (0.2%) ; baker (0.2%) ; welder (0.2%) ; plumber (0.2%) ; traditional healer (0.2) and blacksmith (0.2%).
Respondents by Municipality	Municipality Niassène (10%) ; Municipality Djilor (32%) ; Municipality Mbam (25%) ; Municipality Diossong (23%) and Municipality Diagane Barka (10%)

Source: D. GOMIS, 2019

2.2. People's perception of the dynamics of the vegetation cover

Over 90% of respondents in the five communes mentioned a regressive trend in vegetation cover (Table IV). An increase in vegetation cover was perceived by only 4% of respondents. For the remaining 2% of respondents, the vegetation cover was stable, while the remaining 1% said that the vegetation was recovering. There were no significant differences in the perception of regression in the five communes. Few people in the communes of Djlor (3.1%), Mbam (3.8%) and Diossong (2.5%).

Tabl. IV : Local people's perception of the dynamics of plant cove

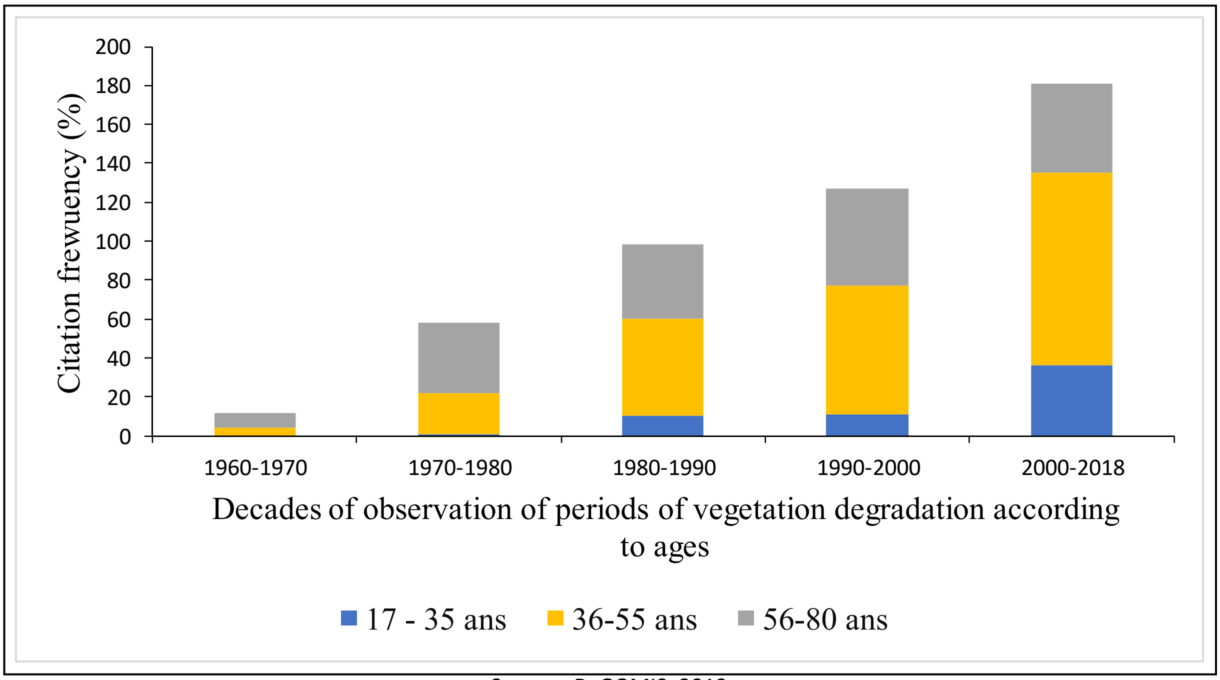
Change in vegetation cover	Municipality Niassène	Municipalit y Djilor	Municipality Mbam	Municipality Diossong	Municipality Diagane Barka	District
Increase	-	3,1	3,8	2,5	-	4
Reconstitution	-	3,7	-	-	-	1
Stable	-	1,2	3,1	1,7	3,8	2
Decrease	100	92,0	93,1	95,8	96,2	93
Total	100	100	100,0	100,0	100,0	100

Source : D. GOMIS, 2019

2.3. Break periods

A study of the different periods of regression of the vegetation cover in the popular memory of the people who reported the degradation reveals, according to age category, decades ranging from the 1960s to the present day (Fig. 3). Observations of this regression by respondents for the 1960-1970 and 1970-1980 decades were more common in the 36-55 and 56-80 age categories, which seems normal given their life experience. However, for all age categories, responses on the periods of regression were progressive from one decade to another (1980-1990, 1990-2000 and 2000-2018).

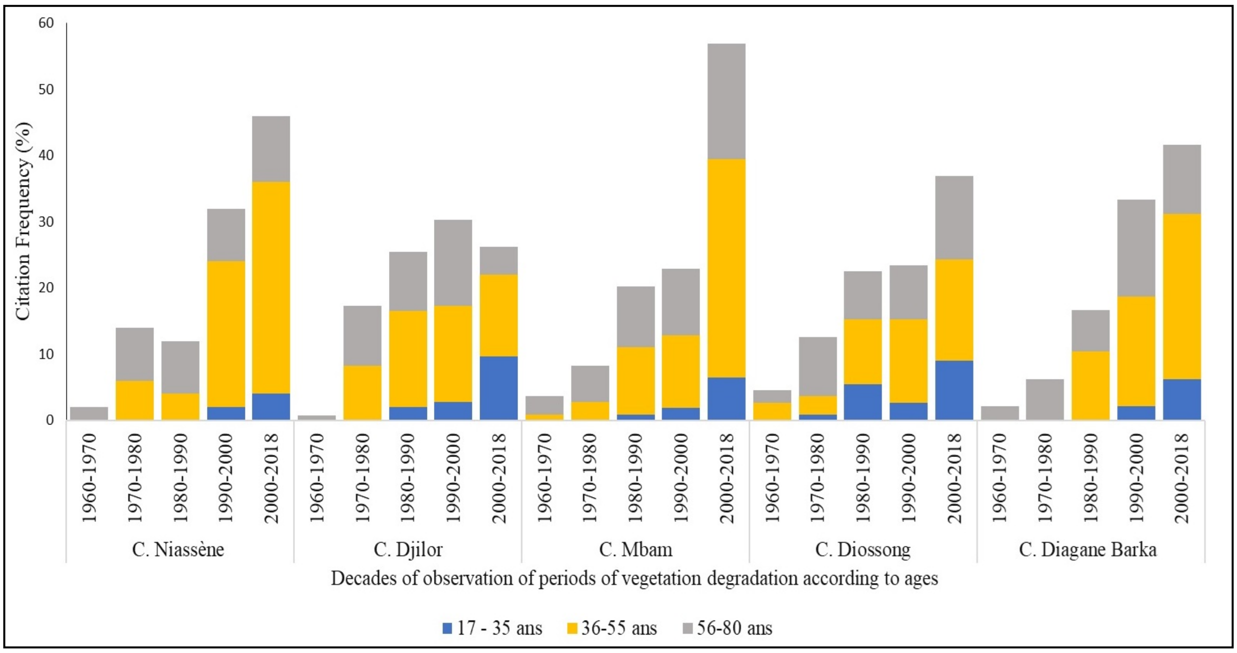
Fig. 3 : Population perception of periods of change at the Arrondissement level



Source : D. GOMIS, 2019

These results obtained at the Arrondissement level also remain similar, with a few exceptions, to those obtained at the municipal level (fig. 4).

Fig. 4 : Perception of populations according to municipalities on periods of change



Source : D. GOMIS, 2019

2.4. Perception of the population on the floristic composition

The perception of local populations on the dynamics of the plant cover is also reflected in the decline in the number of species. A total of 89 species belonging to 37 families and 73 genera were cited as having become rare or absent (Tabl. V).

Tabl. V : Lists of species cited as rare or absent by the populations

Families	Genus	Scientific names	M. Nia (%)	M. Dji (%)	M. Mba (%)	M. Dio (%)	M. D. B. (%)	Dis(%)
Anacardiaceae	Sclerocarya	*Sclerocarya birrea*	2,9	1,9	0,0	0,0	3,2	1,3
	Mangifera	*Mangifera indica*	0,0	1,6	1,0	0,0	0,6	0,8
	Spondias	*Spondias mombin*	0,0	0,0	3,1	0,0	0,0	0,7
	Heeria	*Heeria insignis*	0,0	1,1	1,0	0,3	0,0	0,6
	Lannea	*Lannea acida*	1,7	0,3	0,7	0,0	0,6	0,5
	Lannea	*Lannea velutina*	0,0	1,3	0,3	0,0	0,0	0,5
	Anacardium	*Anacardium occidentale*	0,0	0,0	1,0	0,0	0,6	0,3
	Heeria	*Heeria insignis*	0,6	0,0	0,0	0,0	0,0	0,1
Annonaceae	Annona	*Annona senegalensis*	0,0	0,3	6,3	0,0	0,0	1,5
	Hexalobus	*Hexalobus monopetalus*	0,0	0,5	1,0	0,0	0,0	0,4
	Annona	*Annona muricata*	0,0	0,0	1,0	0,0	0,0	0,2
Apocynaceae	Adenium	*Adenium obesum*	1,2	0,8	0,0	0,3	0,6	0,5
	Saba	*Saba senegalensis*	0,0	0,0	0,0	0,0	1,3	0,2
	Strophantus	*Strophantus sarmentosus*	0,0	0,0	0,0	0,3	0,0	0,1
Asteraceae	Vernonia	*Vernonia senegalensis*	0,0	0,3	0,0	0,0	0,0	0,1
Bignoniaceae	Newbouldia	*Newbouldia laevis*	0,0	0,0	0,0	0,0	1,3	0,2
Bombaceae	Ceiba	*Ceiba pentendra*	0,0	0,3	0,0	0,7	0,6	0,3
	Adansonia	*Adansonia digitata*	0,0	0,8	1,0	0,3	1,9	0,8
	Bombax	*Bombax costatum*	0,6	0,8	0,3	0,3	0,6	0,5
Caesalpiniaceae	Cassia	*Cassia sieberiana*	0,6	0,5	0,3	0,0	1,3	0,5
	Dialium	*Dialium guineense*	0,6	0,0	0,0	0,0	0,0	0,1
	Cordyla	*Cordyla pinnata*	11,0	17,0	9,8	21,2	11,5	14,9
	Detarium	*Detarium microcarpum*	4,1	3,5	13,2	0,0	7,6	5,5
	Detarium	*Detarium senegalense*	0,6	1,9	4,2	1,4	0,0	1,9
	Tamarindus	*Tamarindus indica*	1,2	0,5	1,4	1,4	2,5	1,2
	Piliostigma	*Piliostigma reticulatum*	1,2	1,3	0,7	0,7	1,3	1,0
	Daniellia	*Daniellia oliveri*	0,6	1,9	0,0	2,4	1,3	1,3
Capparidaceae	Maerua	*Maerua angolensis*	0,0	0,0	0,3	0,0	0,0	0,1
Celastraceae	Maytenus	*Maytenus senegalensis*	0,0	0,3	0,0	0,0	0,0	0,1
Chrysobalanaceae	Neocarya	*Neocarya macrophylla*	0,0	1,1	0,3	2,1	1,9	1,1
	Chrysobalanus	*Chrysobalanus icaco*	0,0	0,3	0,3	0,0	0,0	0,2
Combretaceae	Combretum	*Combretum micranthum*	0,0	0,3	1,0	11,0	0,0	2,8
	Anogeissus	*Anogeissus leiocarpus*	0,6	3,5	0,7	1,0	3,8	1,9
	Combretum	*Combretum glutinosum*	0,0	2,7	3,5	1,0	0,6	1,9
	Terminalia	*Terminalia glaucescens*	4,1	1,1	0,0	2,1	1,3	1,5
	Guiera	*Guiera senegalensis*	0,0	0,8	3,1	0,0	1,3	1,1
	Terminalia	*Terminalia avicennoides*	2,3	0,3	0,7	0,3	0,0	0,6
	Terminalia	*Terminalia macroptera*	0,0	0,3	1,0	0,0	0,0	0,3
	Combretum	*Combretum nigricans var. nigricans*	0,0	0,0	0,0	0,7	0,0	0,2
Ebenaceae	Diospyros	*Diospyros mespiliformis*	1,7	1,3	1,4	1,4	3,2	1,6
Euphorbiaceae	Securinega	*Securinega virosa*	0,0	0,0	0,7	0,0	0,0	0,2

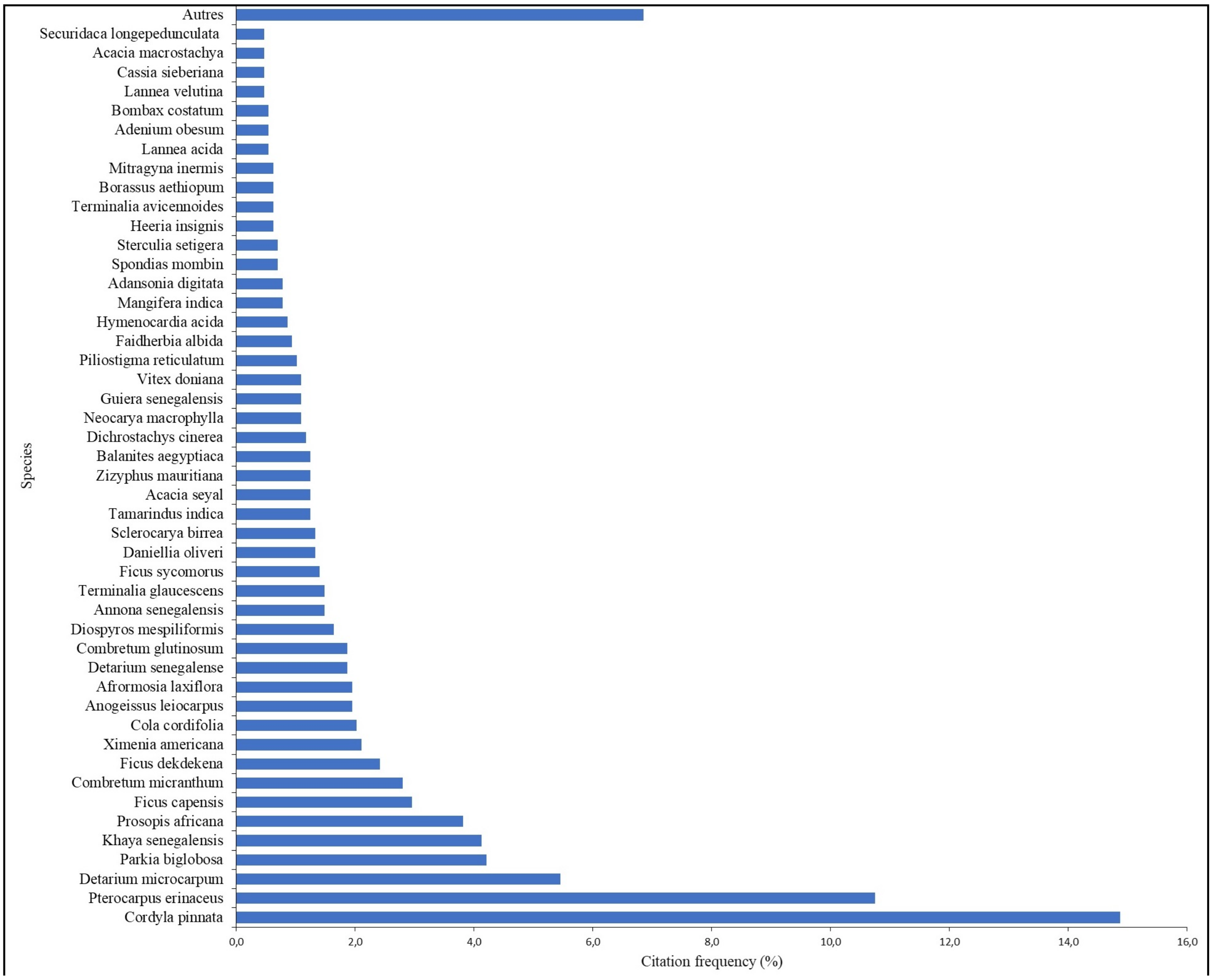
Fabaceae	Pterocarpus	*Pterocarpus erinaceus*	15,1	12,8	4,9	11,3	10,8	10,7
	Afrormosia	*Afrormosia laxiflora*	5,8	0,5	0,0	3,8	1,3	1,9
Hypericaceae	Psorospermum	*Psorospermum corymbiferum*	1,7	0,0	0,0	0,0	0,0	0,2
Lamiaceae	Vitex	*Vitex doniana*	0,0	3,2	0,7	0,0	0,0	1,1
Meliaceae	Khaya	*Khaya senegalensis*	2,9	2,1	5,2	6,2	4,5	4,1
	Azadirachta	*Azadirachta indica*	0,0	0,0	0,0	0,3	0,0	0,1
Mimosaceae	Acacia	*Acacia macrostachya*	0,0	0,5	0,3	0,0	1,9	0,5
	Dichrostachys	*Dichrostachys cinerea*	0,0	0,3	4,9	0,0	0,0	1,2
	Faidherbia	*Faidherbia albida*	0,6	2,1	0,7	0,3	0,0	0,9
	Parkia	*Parkia biglobosa*	6,4	5,1	1,4	6,2	1,3	4,2
	Prosopis	*Prosopis africana*	5,2	4,5	1,0	5,1	3,2	3,8
	Acacia	*Acacia seyal*	0,0	2,7	0,7	0,0	2,5	1,2
	Entada	*Entada africana*	0,0	0,0	1,0	0,0	0,6	0,3
	Acacia	*Acacia nebneb*	0,0	0,0	0,0	0,3	0,6	0,2
Moraceae	Ficus	*Ficus capensis*	6,4	0,5	0,3	6,8	2,5	3,0
	Ficus	*Ficus dekdekena*	6,4	0,8	1,4	2,7	3,2	2,4
	Ficus	*Ficus sycomorus*	1,2	1,6	0,7	1,0	3,2	1,4
	Ficus	*Ficus platyphylla*	0,6	0,0	0,0	0,0	0,0	0,1
	Ficus	*Ficus thonningii*	0,6	0,0	0,0	0,0	0,0	0,1
	Ficus	*Ficus dicranostyla*	0,0	0,0	0,3	0,0	0,0	0,1
	Ficus	*Ficus glumosa*	0,0	0,0	0,0	0,3	0,0	0,1
Olacaceae	Ximenia	*Ximenia americana*	0,6	2,9	3,5	0,0	3,2	2,1
Palmaceae	Borassus	*Borassus aethiopum*	0,0	1,3	1,0	0,0	0,0	0,6
Papilionaceae	Swartzia	*Swartzia madagascariensis*	0,0	0,0	0,3	0,0	0,0	0,1
Phyllanthaceae	Hymenocardia	*Hymenocardia acida*	0,0	1,1	1,0	0,3	1,9	0,9
	Bridelia	*Bridelia micrantha*	0,6	0,0	0,0	0,0	0,0	0,1
Polygalaceae	Securidaca	*Securidaca longepedunculata var. longepedunculata*	0,0	0,5	1,4	0,0	0,0	0,5
Rhamnaceae	Zizyphus	*Zizyphus mauritiana*	0,6	1,3	1,0	1,4	1,9	1,2
Rhizophoraceae	Rhizophora	*Rhizophora sp*	0,0	0,5	0,7	0,0	0,0	0,3
Rosaceae	Parinari	*Parinari excelsa*	0,0	0,0	0,0	0,3	0,0	0,1
Rubiaceae	Mitragyna	*Mitragyna inermis*	0,6	1,1	0,7	0,3	0,0	0,6
	Gardenia	*Gardenia ternifolia*	0,0	0,3	1,0	0,0	0,0	0,3
	Nauclea	*Nauclea latifolia Sm.*	0,6	0,5	0,0	0,0	0,0	0,2
	Gardenia	*Gardenia erubescens*	0,6	0,0	0,0	0,0	0,0	0,1
	Morelia	*Morelia senegalensis*	0,6	0,0	0,0	0,0	0,0	0,1
Rutaceae	Citrus	*Citrus aurantifolia*	0,0	0,0	0,0	1,0	0,0	0,2
	Citrus	*Citrus sinensis*	0,0	0,5	0,0	0,0	0,0	0,2
Sapindaceae	Lepisanthes	*Lepisanthes senegalensis var. senegalensis*	0,0	0,0	0,0	0,0	1,3	0,2
Simaroubaceae	Hannoa	*Hannoa undulata*	0,0	0,0	0,3	0,7	0,0	0,2
Solanaceae	Solanum	*Solanum albicaule*	1,2	0,0	0,0	0,0	0,0	0,2
Sterculiaceae	Cola	*Cola cordifolia*	1,2	1,6	4,5	0,7	1,9	2,0
	Sterculia	*Sterculia setigera*	1,7	0,5	0,0	0,7	1,3	0,7
Tamaricaceae	Tamarix	*Tamarix senegalensis*	0,0	0,3	0,3	0,0	0,0	0,2
Tiliaceae	Grewia	*Grewia bicolor*	1,2	0,5	0,0	0,3	0,0	0,4
Ulmaceae	Celtis	*Celtis integrifolia Lara.*	0,6	0,0	0,0	0,0	0,0	0,1
Verbenaceae	Lippia	*Lippia chavalieri*	0,0	0,0	0,0	0,3	0,0	0,1
	Vitex	*Vitex madiensis*	0,0	0,0	0,0	0,3	0,0	0,1
Zygophyllaceae	Balanites	*Balanites aegyptiaca*	0,6	2,1	0,3	0,0	3,8	1,2

Total	100	100	100	100	100	100

M. Nias (Municipality Niassène) ; M. Dji (Municipality Djilor) ; M. Mba (Municipality Mbam) ; M. Dio (Municipality Diossong) ; M. D. B. (Municipality Diagane Barka) ; Dis (District) ; % (Percentage)

Of these species, the most cited are *Cordyla pinnata* (14.9%), *Pterocarpus erinaceus* (10.7%) and *Detarium microcarpum* (5.5%). They are followed by *Parkia biglobosa* (4.7%), *Khaya senegalensis* (4.1%), *Prosopis africana* (3.8%), *Ficus capensis* (3%), *Combretum micranthum* (2.8%), *Ficus dekdekena* (2.4%), *Ximenia americana* (2.1%) and *Cola cordifolia* (2%) (Fig. 5). These species account for almost 59% of the frequency of citations.

Fig; 5 : Frequency of citation of species considered rare or absent



Source : D. GOMIS, 2019

2.5. Comparison of survey data and inventory data

The comparison of species estimated to be in decline by populations with those recorded by inventory made it possible to identify common and particular species. Thus, out of the 89 species considered absent or rare, 44 species were found by inventory and the 45 species were not found in the inventory, which confirms their statement (Tabl. IV).

Tabl. VI : Comparison of species cited as rare or absent by populations with inventory data

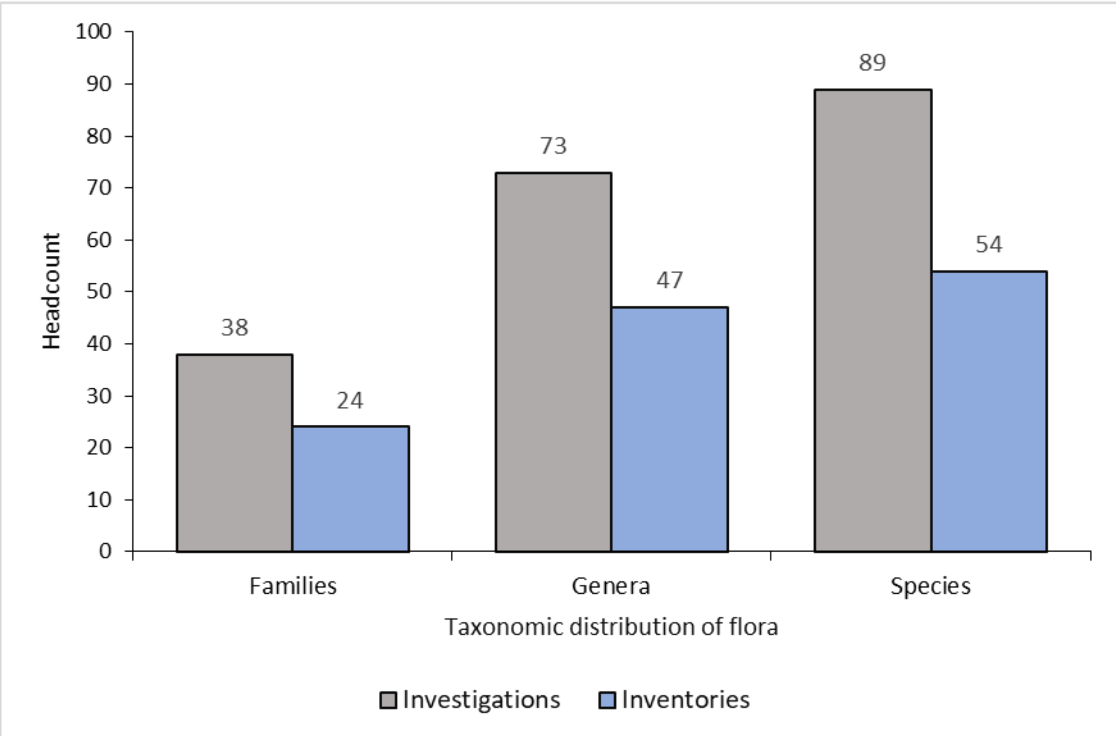
Species cited and inventoried	Species cited	Species inventoried
Sclerocarya birrea	*Spondias mombin*	*Conocarpus erectus*
Mangifera indica	*Lannea velutina*	*Euphorbia balsamifera*
Heeria insignis	*Annona muricata*	*Acacia ataxacantha*
Lannea acida	*Adenium obesum*	*Acacia sieberiana*
Anacardium occidentale	*Saba senegalensis*	*Ficus basarensis*
Hexalobus monopetalus	*Strophantus sarmentosus DC.*	*Feretia apodanthera*
Adansonia digitata	*Vernonia senegalensis*	*Avicennia africana*
Bombax costatum	*Newbouldia laevis*	-
Cassia sieberiana	*Dialium guineense*	-
Cordyla pinnata	*Detarium senegalense*	-
Tamarindus indica	*Daniellia oliveri*	-
Piliostigma reticulatum	*Maerua angolensis*	-
Neocarya macrophylla	*Maytenus senegalensis*	-
Combretum micranthum	*Terminalia avicennoides*	-
Anogeissus leiocarpus	*Combretum nigricans var. nigricans*	-
Combretum glutinosum	*Afrormosia laxiflora*	-
Terminalia glaucescens	*Psorospermum corymbiferum*	-
Guiera senegalensis	*Entada africana*	-
Terminalia macroptera	*Acacia nebneb*	-
Khaya senegalensis	*Ficus capensis*	-
Azadirachta indica	*Ficus platyphylla*	-
Acacia macrostachya	*Ficus thonningii*	-
Dichrostachys cinerea	*Ficus dicranostyla*	-
Faidherbia albida	*Swartzia madagascariensis*	-
Parkia biglobosa	*Hymenocardia acida*	-
Prosopis africana	*Gardenia ternifolia*	-
Ximenia americana	*Morelia senegalensis*	-
Securidaca longepedunculata var. longepedunculata	*Citrus aurantifolia*	-
Zizyphus mauritiana	*Citrus sinensis*	-
Tamarix senegalensis	*Lepisanthes senegalensis var. senegalensis*	-
Balanites aegyptiaca	*Hannoa undulata*	-
Rhizophora sp	*Solanum albicaule*	-
Gardenia erubescens	*Celtis integrifolia Lara.*	-
Sterculia setigera	*Lippia chavalieri*	-
Grewia bicolor	*Ceiba pentandra*	-
Ficus sycomorus	*Chrysobalanus icaco*	-
Mitragyna inermis	*Bridelia micrantha*	-

Borassus aethiopum	*Vitex doniana*	-
Diospyros mespiliformis	*Securinega virosa*	-
Pterocarpus erinaceus	*Nauclea latifolia Sm.*	-
Acacia seyal	*Cola cordifolia*	-
Heeria insignis	*Vitex madiensis*	-
Annona senegalensis	*Parinari excelsa*	-
Detarium microcarpum	*Ficus dekdekena*	-
-	*Ficus glumosa*	-

Source : D. GOMIS, 2019) ; - (None

From a taxonomic point of view, this is a difference of 14 families, 27 genera and 35 species between the species inventoried on site and those declared to exist in the past but which have become absent in the area (Fig. 6).

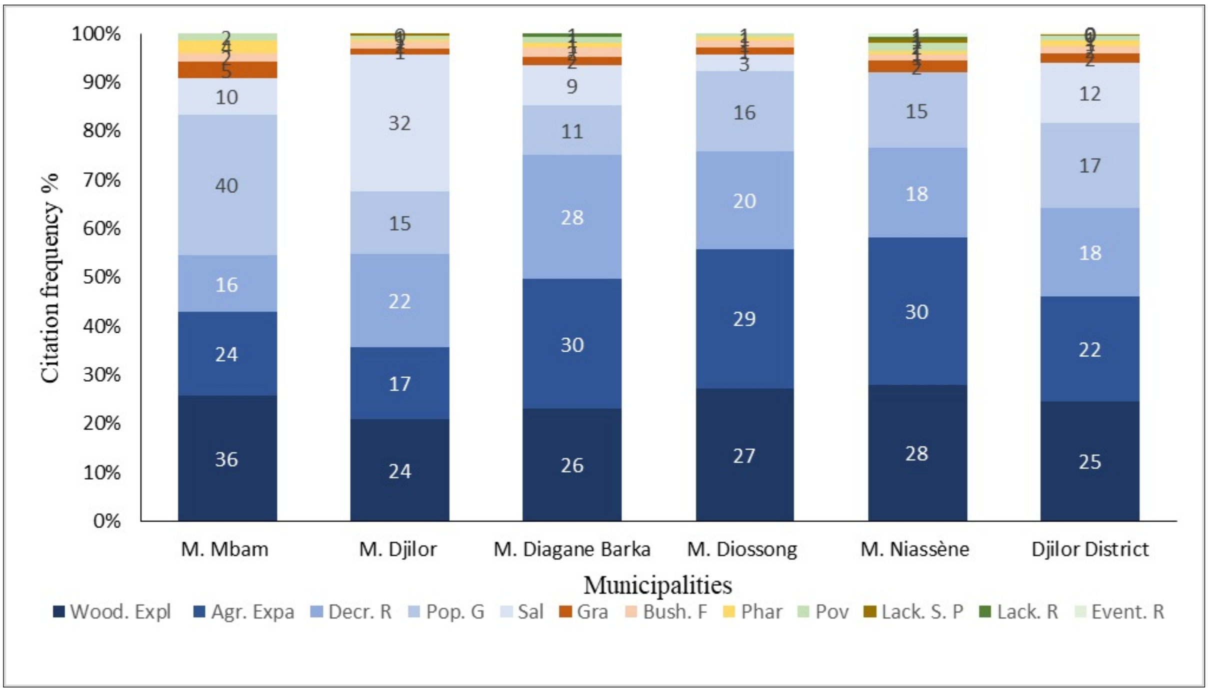
Fig. 6 : Taxonomic distribution of the species cited and inventoried (D. GOMIS, 2019)



2.6. Factors of deforestation and degradation of plant cover

Local populations have identified a range of factors responsible for the dynamics of plant cover and woody species (Fig. 7). The most cited at the district level are : logging (24.6%), agricultural expansion (21.6%), reduced rainfall (18.2%), population growth (17.2%) and salinity (12.2%). To these factors are added to a lesser extent : grazing (1.9%), bush fires (1.5%), pharmacopoeia (1.2%), poverty (1%), lack of surveillance and punishment (0.2%) and finally lack of reforestation (0.1%).

Figure 7 : factors in the evolution of plant cover at the scale of the District



Source : D. GOMIS, 2019. Wood. Expl (Wood exploitation); Agr. Expa (Agricultural expansion) ; Decr. R (Rainfall) ; Pop. G (Population growth) ; Sal (Salinity) ; Gra (Grazing) ; Bush F (Bush fire) ; Phar (Pharmacopoeia) ; Pov (Poverty) ; Lack S. P (Lack of surveillance and punishment) ; Lack R. (Lack of reforestation ; Event. R (Religious event)

At the municipal level, the perception of local populations on the factors of the decline in vegetation cover shows some differences (Fig. 6). In the Municipality of Niassène, the most cited causes are, in descending order : agricultural expansion, logging and reduced rainfall. On the other hand, in that of Djilor, to name just one, these are salinity, logging, reduced rainfall and agricultural expansion.

3. DISCUSSION

In order to gain an understanding of the perception of the dynamics of natural vegetation cover by local populations, survey were carried out in the five municipalities of the study area from 513 households. The majority of respondents described a regressive trend in the evolution of vegetation cover. This perception corresponds to the conclusions of most of the works on landscape dynamics carried out in the peanut basin: ecogeographic zone to which the study area belongs (Diop, 2011: 168; Sarr, 2013: 67; etc.). It reflects, as observed by Lassina Traoré, (2011: 265), Diouf, (2011: 126) and Ouoba et al., (2014: 34), that populations have a good knowledge of the different developments in their environment. However, a small proportion of those interviewed indicate a trend of increase or stability or even reconstitution of the plant cover. Similar results were obtained by Diouf (2011: 108) in the ferlo where contrary to the majority regressive trend indicated, some respondents noted an abundance and improvement of the plant cover. This could be understood to the extent that since 2013 certain natural areas classified from the administrative point of view as "classified forest" have been the subject of development with the establishment of intervillage management committees. Such initiatives developed with the concern of preserving wood resources could be facts that would have led some people to note improvements, stability or even a reconstitution of the vegetation cover compared to the regressive trend mostly observed.

The observation of the periods of regression varies according to the age categories of the respondents. The longest period indicated is that of the decade 1960-1970. The beginning of this process in the peanut basin, according to Faye (2010: 130), remains prior to this period. Indeed, he specifies, Trochain (1940 in Faye, 2010: 130) then Giffard (1974 in Faye, 2010: 130) already reported this phenomenon by showing that the climax vegetation of the Peanut Basin (wooded savannah), would give way to a shrub savannah following a progressive destruction of the wooded stratum. Such facts are supported by Lericollais (1984: 188) who described, already in 1965, in the Sob terroirs, in the peanut basin, a landscape dynamic marked by a regression of tree cover. The phenomenon has certainly worsened over time, given the importance of the designations of the decades that followed, for periods of regression of the vegetation cover.

The perception of the regression of the vegetation cover refers, however, to the relatively abundant nature of the vegetation of the past and the presence of certain animals. Indeed, this is what emerges from the statements of some village chiefs interviewed : for the village chief of Lambaye "*we could not see that of Djilor from our village, there was so much vegetation. Now, this is no longer the case* » ; for the chief of Mbam "*at night we could hear the cries of the hyenas so close* » ; for the chief of the village of Thianda Thissé "*it was impossible to go to the livestock grazing areas without seeing a reptile and/or a snake and/or a monkey crossing*". These comments refer to changes in land use to the detriment of the vegetation and the animals that were there. The population's perception is also based on declining species that have become absent. For the latter, a total of 89 species were listed by the populations surveyed. These are mainly overly lignified species (*Coryla Pinnata, Pterocarpus erinaceus, Prosopis africana, Khaya senegalensis, Cola cordifolia,*) and/or fruit species (*Detarium microcarpum, Parkia biglobosa, Saba senegalensis, Dialium guineense, Solanum albicaule,*), generally Sudanese or Sudano-Guinean, most of which have commercial, nutritional, energy and medicinal value. The multi-use or useful nature of these species in relation to the needs of populations could be the cause of their decline. Indeed, Lykke (2004: 1978) and Badjaré B. (2015: 8), in the context of their studies, had to show the relationship between the socio-economic importance of woody species and the threats of decline that weighed on them. The multi-use character would therefore lead to a significant risk of decline in biodiversity. This could also be linked to the rainfall deficit because according to Diop (2005 : 103), the regeneration of overly lignified species such as those previously mentioned remains very sensitive to water deficit.

The comparison of the species cited with those inventoried reveals a reduction by two times of what would have been the floristic richness of the years 1960-1970 because, not having been observed on the field surveys. Among the species inventoried, there are also those that are not cited by the population while they are rare in reality and species very present but considered to be in decline. This evokes the direct interest that local populations grant to certain plant species. It is also for this reason that Hahn-Hadjali and Thiombiano (2000: 287) in a similar study noted that the populations only mention or notice the species that are useful to them, those that are not used go unnoticed and can even disappear without them realizing it. On the other hand, those that are useful, although still representative, a small reduction is enough for the population to realize it. It should also be noted that the floristic inventory could not observe all the species due to its random nature.

The main determinants of the regression of the plant cover are according to the populations : logging, agricultural expansion, rainfall reduction, demographic increase and salinity. Anthropogenic actions therefore seem to play a major role in the destruction of the plant cover. Agricultural expansion, although coming second in the citations after logging, constitutes the main factor indicated in the Communes of Niassène, Diossong and Diagane Barka. This agricultural expansion on plant ecosystems is consistent with the results obtained by several authors (Touré et al., 2002: 6 ; Sarr O., 2013: 68 ; Guiro et al., 2012: 2018). It is explained by the strong demand for agricultural land following the increase in the population, the rapid changes in the landscape of the peanut basin can be explained according to the population and as revealed by Guiro et al., (2012: 2020) by the intensification of animal traction. Indeed, in the Peanut Basin region, to boost agricultural production, the number of cattle increased tenfold between 1970 and 1980 (L'hoste P. 1983: 294). Agriculture, which was done by hand with a "conko" hoe, is now done by animal traction with seeders, thus giving the farmer the possibility of easily plowing large areas and cultivating large plots. The promotion of this agricultural practice by SODEVA (Société de Développement et de Vulgarisation Agricole) which aimed to increase agricultural production in order to meet the growing food demand and commercial opportunities for the sale of peanuts. These practices have consequently encouraged deforestation leading to the decline of plant cover (Lhoste P. 1983 : 299), and the fragmentation of the landscape (Curran et al., 2004 in Sambou, 2017: 64) tending according to Sarr (2013 : 83) to a standardization of landscapes with the development of agrosystems hosting only a few species deemed useful. Only land likely to be flooded during the rainy season or difficult to cultivate due to its more clayey texture or protected plant areas remained uncultivated areas of the land, open to herds.

Regarding the exploitation of wood, which is mainly cited as a major factor in the destruction of plant cover, it was carried out in the environment by harvesting firewood, service wood, charcoal production and finally timber. Such a fact is also shared by Cisa et al (2015: 30) in the Democratic Republic of Congo, which indicates the exploitation of wood among the main causes of deforestation and forest degradation. Indeed, more than 80% of households in the study area depend on wood for cooking and building houses. This dependence is more exacerbated in the area during religious events (Tabaski, Korité and the Gamous organized in the area). According to Mr. Ly, it is as if these events give them a valid pretext to go and exploit the resource. This state of affairs is justified by the availability of the resource and the lack of means to use other forms of energy. The populations, with some proportions, consider very low, the impact of these domestic levies but, they estimate that it is the exploitation of wood for the production of charcoal for the purpose of satisfying the energy needs of the cities, which has most destroyed the vegetation cover. According to, Manga (2012: 116), in the period 1960-1975, the group to which the study area belongs, namely the Sine-Saloum region, was the leading producer of charcoal before production gradually tightened in eastern Senegal and exploitation was subsequently banned in 1998, due to the dwindling resource. Despite the ban, exploitation continued clandestinely before the development of protected vegetation areas en bloc in 2013. This situation shows how the urban sector consumed the forests of the rural world including that of the Sine-Saloum region (Fatick-Kaolack). These exploitations were carried out through quotas issued by the central State without taking into account at the local level the production capacities of these ecosystems.

Added to this pressure was that linked to the phenomenon of selective felling of timber. Our surveys of local populations have established that species of commercial value (*Cordyla pinnata, pterocarpus erinaceus, Khaya senegalensis, Bombax costatum*) were systematically exploited, not for their own needs but rather for economic reasons. This exploitation was encouraged in the study area by the presence of sawmills in Dramé escale and Mbowène as well as the complicity of forest agents whose responsibility was much indexed by the populations of the Communes of Diossong, Niassène and Diagane Barka. Thus, from their testimonies, we can retain some : "*we sometimes went to the fields and noticed that the foot of Cordyla pinnata that was there had been cut b*y "pass-everywhere*" saws and taken away*." or "*Only certain twisted individuals were spared*." Today, these sawmills no longer exist in the study area, due to the dwindling resource. They would have moved to the South-East of the country, where the potential for timber still seems abundant. These different methods of exploitation have been important sources of reduction in plant cover and therefore in biodiversity. They have been exasperated, just like agricultural expansion, by population growth, which was cited by 17%. Such facts have also been observed in Burkina Faso by Ouédraogo et al., (2010: 458) whose results showed the existence of a positive correlation between population growth and the destruction of plant cover. In the study area, this demographic increase was the work of the local population but also of the settlement of the "Siin-siin" who came in search of agricultural land and populations from the Rip. Moreover, at the level of Mbam, some respondents, particularly the older ones, place the beginnings of the degradation of the vegetation cover at the arrival of "siin-siin" in the area, around 1965.

Among the most cited determinants of the decline in vegetation cover, there is also the decrease in rainfall. Since the 1970s and 1980s, the study area has experienced, like Senegal and Africa, a long period of drought that has affected natural ecosystems. The average rainfall at the Fatick station in the study area region fell by 29% between the periods 1930-1966 and 1967-2017, from 797 mm to 563 mm. According to Bellefontaine et al., (1997: chapter 3.1), like Africa, this has had the effect on forest systems of increasing mortality, making it more difficult to establish regeneration, destroying the grass cover which is very sensitive to the absence of water and increasing the pressure (topping) on surviving trees. In addition to this, in the study area, this decline has modified the hydrological regime of the watercourses with the consequence of a sharp decrease in freshwater inputs, thus delivering them to the essential supply of marine water inputs under the action of the tides which combined with evaporation, in the parts among, accentuates the salinity. This situation has led to the advance of tannes to the detriment of the mangrove whose most significant declines were obtained, according to the results of other studies, during these rainfall deficits (Andrieu, 2010: 25 ; Dièye, 2013: 10). Despite a rainfall return noted since 2005, the advance of the salt front still remains a reality. In the villages of Pethie, Bolly, Kamatane, Keur Yoro and Keur Thieneke, arboriculture is practically impractical because the fruit trees do not grow and the few individuals that are there turn yellow and do not allow the expected result to be obtained.

For the other factors aggravating the degradation of the plant cover in the study area, there are grazing, bush fires and pharmacopoeia as indicated respectively by 1.9% ; 1.5% and 1.2% of respondents. The anthropogenic pressure of pastoralism is mainly linked to the incursion of transhumant herders commonly called "baranabé" or "nouranabé" in the local language. These destructive effects of fires and livestock farming on the plant cover were noted by Lykke (2002: 73) and Toutain (1998: 4) respectively in the Salom Delta National Park in Senegal and in the Sahel.

CONCLUSION

This study has shed light on the perception of the populations of the study area on the dynamics of the plant cover as well as the factors that determine it. This perception was translated here, according to the majority of people interviewed, by a marked negative trend : a reduction in the area of the plant cover and a decline of almost half of the species previously present. This dynamic is also perceived according to the interviews by a significant drop in the density of the plant cover. The observations of this state of degradation date back to the 1960s-1970s according to the oldest people, but the extent has intensified over time to reach the current situation. This demonstrates the level of sensitivity to erosion that improves with age. Timber exploitation, agricultural expansion, rainfall deficit, population growth and salinity have been identified by the populations as the main drivers of the dynamics of the vegetation cover. In addition to these factors, there are constraints related to pastures, poverty, lack of participation of the populations in the monitoring of forests, etc. Ultimately, this study poses, through a local vision, the problem of the sustainability over time of plant resources in the face of environmental and socio-economic changes. Consequently, to maintain these ecosystems and their services, it is important to take into account these perceptions of the populations in the adoption of conservation policies. However, these policies must ensure good involvement of local populations in the management of these ecosystems while offering them the opportunity to benefit from the added values that will result from their contribution.

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