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# Inventory of rare or threatened plants of low Casamance

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## ABSTRACT

Lower Casamance corresponds to the region of Ziguinchor which occupies the extreme south of Senegal. In spite of a very rich biodiversity, its flora knows for some years considerable disturbances. This study is a survey of the populations of the targeted areas, with a view to identifying the rare or endangered plants, the different uses, the parts of plants used and the causes of these threats. During this survey, 87 species considered rare or threatened with extinction were listed, the most commonly mentioned being *Khaya senegalensis*, *Carapa procera*, *Landolphia hirsuta*, *Parinari excelsa*, *Pterocarpus erinaceus*. The distribution by department shows that the departments of Bignona and Oussouye each have 56 species and Ziguinchor 35 species. These plants are mainly used in pharmacopoeia, food and crafts with respectively 32.54%, 26.98% and 15.87% of cases. The fruits with 25.09% of the cases, are the most used organs, followed by wood (19.86%), leaves (16.03%), roots (13.59%), and barks of stems. (12.89%). Rainfall deficit, overexploitation of resources and bush fires have been identified as the main causes of biodiversity loss. The study shows that the plant biodiversity of Lower Casamance is home to several threatened species, the main causes of this loss being climate hazards and human actions.

**KEYWORDS :** Inventory, Rare plants, Endangered plants, Lower Casamance

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## INTRODUCTION

For decades, the world's forests have been shrinking globally, due to climatic factors and anthropogenic actions. These forests thus attacked increasingly lose their regulatory function of the environment, which contributes to the disappearance of fauna and flora [1]. These forest formations, apart from food uses and the pharmacopoeia, continually offer man unimaginable services [2,3]. In Senegal, according to a joint FAO/CSE study [4], forest formations have experienced an annual decline rate of 2 to 3%. The Basse Casamance which is a region located in the southwest of Senegal, owes its reputation to its once legendary luxuriant vegetation. But for several decades, like other regions of Senegal, the latter has undergone a metamorphosis of its natural environment. The forest area is gradually being reduced. In the department of Oussouye, the sacred urban forests, whose areas used to vary, from 0.25 ha for the smallest forest unit to 3 ha, now represent only 0.001 ha for the smallest and 0.747 ha for the largest 5. Most studies on the vegetation of the Lower Casamance do not include the perception of the populations on the degradation of the forests. However, the local knowledge of these populations acquired over the centuries and permanent contact with this environment are significant assets for understanding the phenomena of disappearance of species. These reasons justify our approach in this study.

## METHODOLOGY

### Study Area

Basse Casamance is located at 12 ° 33 'north latitude and 16° 16' west longitude. Its altitude is 19.30 m in the southwestern part of Senegal. It occupies an area of 7,339 km<sup>2</sup>, or 3.73% of the national territory and is limited to the North by the Republic of Gambia, to the South by the Republic of Guinea Bissau, to the East by the regions of Kolda and Sédhiou and to the West by the Atlantic Ocean [6]. It includes the departments of Bignona, Oussouye and Ziguinchor. Official demographic projections estimate the population of this region at 713,440 inhabitants in 2010, or 5.7% of the population of Senegal [6]. Lower Casamance has a great ethnic diversity, the Joola ethnic group with 57.8% of the population being in the majority. The population density is 75 inhabitants per km<sup>2</sup> [6]. The region is influenced by the sub-Guinean climate, thus promoting high rainfall compared to the central and northern regions of the country. We note the formation of a forest domain consisting of dense dry forests and gallery forests located mainly in the southern part. The mangrove and the palm grove colonize the fluvio-maritime area; we also note the presence of palm groves. The rainy season runs from May to September [7,8].

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## Data Collection

In order to identify the problem of the scarcity and/or threat of disappearance of plant species from the Lower Casamance, we carried out surveys in 29 localities distributed as follows:

- Department of Bignona: 14 villages
- Oussouye department: 8 villages
- Department of Ziguinchor: 7 villages.

A total of 206 people were interviewed, including 17 women. The breakdown by department gives:

- Bignona: 79 people
- Oussouye: 73 people
- Ziguinchor: 54 people.

Our informants are mainly people who are at least 40 years old and have proven experience in the knowledge and use of plants.

For data collection, we have created a questionnaire sheet which aims to:

- Identify plants considered rare or endangered;
- Identify the different uses of these plants;
- Identify the parts of plants used;
- Identify the causes of loss of plant biodiversity in the study area.

The interviews were mainly conducted in the Joola language which includes several dialects or languages: Joola Fogny from Bignona (F), Joola Kassa from Oussouye (K), Joola Bandial from Ziguinchor (B). Other languages were also used (Socé, Mancagne, Wolof). The consistency of the information is checked according to the data comparison technique of El Rhaffari [9]. Information is considered to be consistent when it is reported at least twice in two different locations and by different informants, if not, it is said to be divergent.

## Data Analysis and Processing

For the determination of the species from the harvested and dried samples, we have referred to the herbarium specimens of the Pharmacognosy and Botanical laboratory of the Faculty of Medicine, Pharmacy and Odontology and of the IFAN of the Cheikh Anta University. Diop of Dakar (Senegal). The precision of certain local names was obtained with reference to Berhaut [10]. For each parameter addressed, we were interested in the number of times it was cited during the survey. This made it possible to calculate the percentage of citation (frequency of citation) of each parameter.

## RESULTS

### Directory of Rare or Endangered Species

The survey identified 87 species considered by the entire population of this region to be rare or endangered (Table 1). These species are distributed in 34 families among which Caesalpiniaceae and Euphorbiaceae are the most represented with respectively 11 and 7 species. These two families are

followed by Arecaceae and Moraceae which each total 6 species (Figure 1). The distribution by department shows that Bignona and Oussouye are the localities where there were more plants mentioned, with 56 species for each department against 35 species in Ziguinchor, regional capital (Tables 2, 3 and 4). Analysis of the overall results reveals that 38 species have been cited in at least two departments. On a regional scale, *Carapa procera*, *Khaya senegalensis*, *Pterocarpus erinaceus*, *Parinari excelsa* and *Landolphia hirsuta* are the most cited species with respective citation percentages of 29.78%, 28.86%, 25.43%, 24, 46% and 23.25% (Table 3).

### Different uses and Parts Used

The plants mentioned have several uses in the survey areas. The main areas of use are pharmacopoeia (32.54% of citations), food (26.98% of citations) and handicrafts (15.87% of citations) (Figure 2). The parts of plants used in the different fields are mainly fruits (25.09% of quotes), wood (19.86% of quotes), leaves (16.03% of quotes), roots (13.59 citations) and stem bark (12.89% citations) (Figure 3).

### Causes of Disappearance of Plants

Among the causes that could explain the threat or the disappearance of plant species, the subjects surveyed gave little mention of the natural death of the species (2.9% of

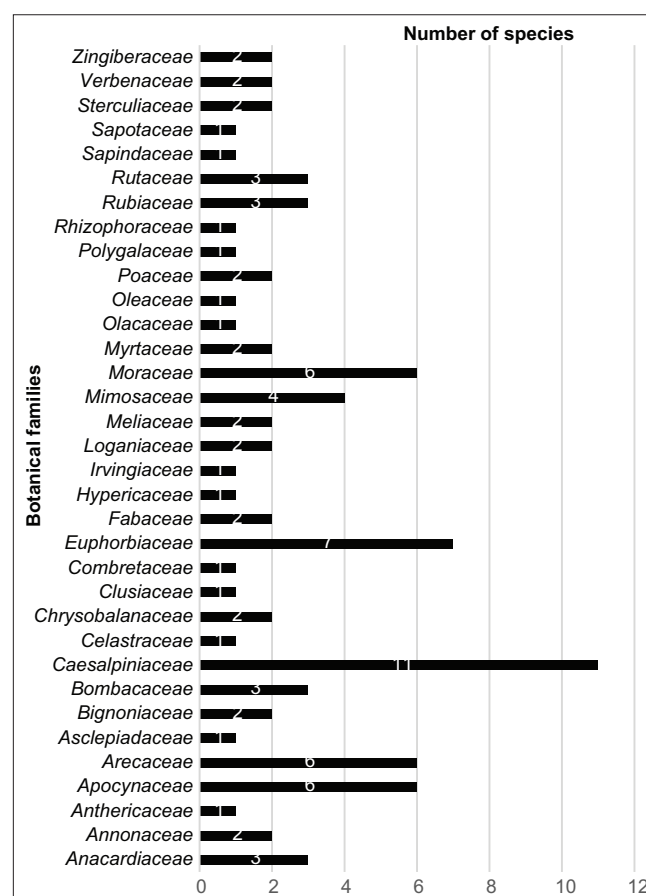


Figure 1: Distribution of the species by family

Table 1: Distribution of rare or threatened species by family

Families	N°	Scientific names	Vernacular names	
Anacardiaceae	1	<i>Lannea nigritana</i> (Sc. Elliot) Keay	Umaakuráánák (F)	
	2	<i>Pseudospondias microcarpa</i> (Engl.) Keay	Bujeykak (K)	
	3	<i>Spondias mombin</i> L.	M' pilen (M)	
Annonaceae	4	<i>Uvaria chamae</i> Beauv.	Bulew (F)	
	5	<i>Xylophia aethiopica</i> (Dunal) A. Rich.	Biew (B)	
Anthericaceae	6	<i>Chlorophytum immaculatum</i> (Hepper) Nordal	Eyas yas (K)	
Apocynaceae	7	<i>Alstonia boonei</i> De Wild.	Bantang faro (S)	
	8	<i>Landolphia dulcis</i> (Sabine ex G. Don) Pichon	Ebott (K)	
	9	<i>Landolphia heudelotii</i> A. DC.	Efemb (F)	
	10	<i>Landolphia hirsuta</i> (Hua) Pichon	Emuk (K)	
	11	<i>Landolphia owariensis</i> P. Beauv.	Etiok (K)	
	12	<i>Saba senegalensis</i> (A. DC.) Pichon	Bindip (F)	
	Arecaceae	13	<i>Borassus flabellifer</i> L.	Baaxab
		14	<i>Calamus deerratus</i> G. Mann & H. Wendl.	Kubax (K)
		15	<i>Cocos nucifer</i> L.	Bukoko (F)
		16	<i>Elaeis guineensis</i> Jacq.	Bubekel (F)
		17	<i>Phoenix reclinata</i> Jacq.	Bujukaay (F)
18		<i>Raphia pedunculata</i> P. Beauv.	Futanf (K)	
19		<i>Leptadenia hastata</i> (Pers.) Decne	Busumba amata (K)	
Asclepiadaceae	20	<i>Crescentia cujete</i> L.	Ubiin (F)	
Bignoniaceae	21	<i>Kigelia africana</i> (Lam.) Benth.	Buliman ti kááb (F)	
	22	<i>Adansonia digitata</i> L.	Bubak (F)	
Bombacaceae	23	<i>Bombax costatum</i> Pellegr. et Vuillet	Bujimb (F)	
	24	<i>Ceiba pentandra</i> (L.) Gaertn.	Busaana (F)	
Caesalpiniaceae	25	<i>Azelia africana</i> Sm. Ex Pers.	Bulew (F)	
	26	<i>Cassia occidentalis</i> L.	Kaputa (F)	
	27	<i>Cordyla pinnata</i> (Lepr. ex A. Rich.) Milne-Redh.	Butiw (F)	
	28	<i>Daniella oliveri</i> (Rolfe) Hutch. et Dalz.	Bubálin (F)	
	29	<i>Detarium microcarpum</i> Guill. et Perr.	Bupokotin (F)	
	30	<i>Detarium senegalense</i> J.F. Gmel.	Buflungut (F)	
	31	<i>Dialium guineense</i> Wild.	Bumanayab (F)	
	32	<i>Erythrophleum guineense</i> G. Don.	Burán (F)	
	33	<i>Guibourtia coppalifera</i> Benn.	Buwuntu (K)	
	34	<i>Ostryoderris stuhlmanii</i> (Taub.) Dunn. Ex Harms.	Bango kap (S)	
	35	<i>Piliostigma reticulatum</i> (DC.) Hochst.	Burekatoj (K)	
Celastraceae	36	<i>Salacia senegalensis</i> (Lam.) DC.	Sipumbás	
Chrysobalanaceae	37	<i>Parinari excelsa</i> Sabine	Biili (B)	
	38	<i>Parinari macrophylla</i> Sabine	Biel (B)	
Combretaceae	39	<i>Combretum glutinosum</i> Perr. ex DC.	Jambakatang (S)	
Clusiaceae	40	<i>Harungana madagascariensis</i> Poir.	Etoogno (K)	
Euphorbiaceae	41	<i>Alchornea cordifolia</i> (Schum. et Thonn.) Müll. Arg.	Wusubáw	
	42	<i>Anthostema senegalense</i> A. Juss.	Bufefendena (K)	
	43	<i>Bridelia micrantha</i> (Hoscht.) Baill.	Fulekir (F)	
	44	<i>Drypetes floribunda</i> (Müll. Arg.) Hutch.	Buxuuta (K)	
	45	<i>Euphorbia grandifolia</i> (Haw) Croizat	Bukoch (K)	
	46	<i>Jatropha curcus</i> L.	Bundoogn (K)	
	47	<i>Phyllanthus discoideus</i> (Baill.) Müll. Arg.	Buyilen (K)	
	Fabaceae	48	<i>Afrormosia laxiflora</i> (Benth.) Harms	Bukulukulu (K)
		49	<i>Pterocarpus erinaceus</i> Poir.	Bukon (F)
	Hypericaceae	50	<i>Psorospermum senegalense</i> Spach.	Katiniankuma (S)
	Irvingiaceae	51	<i>Klainedoxa gabonensis</i> Pierre ex Engl.	-
Loganiaceae	52	<i>Anthocleista nobilis</i> G. Don.	Bufaafay eniab (K)	
	53	<i>Strychnos spinosa</i> Lam.	Etibun (F)	
Meliaceae	54	<i>Carapa procera</i> DC.	Bukunum (F)	
	55	<i>Khaya senegalensis</i> A. Juss.	Buxol (B)	
Mimosaceae	56	<i>Acacia albida</i> Del.	Bibirik (F)	
	57	<i>Albizia</i> sp.	Busew karamba (F)	
	58	<i>Parkia biglobosa</i> (Jacq.) Benth.	Ejilaay (F)	
Moraceae	59	<i>Prosopis africana</i> (Guill. et Perr.) Taub.	Bulikab (F)	
	60	<i>Antiaris toxicaria</i> var. <i>africana</i> Scott-Elliot	Bufox (F)	
	61	<i>Chlorophora regia</i> (A. Chev.) C.C. Berg.	Bukant (K)	
	62	<i>Ficus ottoniifolia</i> Miq.	Bukunchul (F)	
	63	<i>Ficus</i> sp.	Bufox (F)	
	64	<i>Morus mesozygia</i> Stapf.	Bulinke surab (F)	
	65	<i>Treculia africana</i> Decne	Buyiták	

(Contd...)

Table 1: (Continued...)

Families	N°	Scientific names	Vernacular names
Myrtaceae	66	<i>Psidium guajava</i> L.	Bugoyab (F)
	67	<i>Syzygium aromaticum</i> (L.) Merr. et Perry.	Xorom polle (W)
Oleaceae	68	<i>Ximenia americana</i> L.	Burifinia (F)
Oleaceae	69	<i>Schrebera arborea</i> A. Chev.	Buyuupa (F)
Poaceae	70	<i>Pobeguinea arrecta</i> (Stapf) Jac.-Fel.	Niantang (S)
	71	<i>Sporobolus robustus</i> Kunth.	Eselley (F)
Polygalaceae	72	<i>Atromixa afzeliana</i> (Oliv.) Stapf	Bumitonaab (F)
Rhizophoraceae	73	<i>Rhizophora racemosa</i> G.F.W. Mey	Bibej (B)
Rubiaceae	74	<i>Gardenia erubescens</i> Stapf et Hutch.	Kaleen (F)
	75	<i>Morinda geminata</i> DC.	Bulokonia (F)
Rutaceae	76	<i>Nauclea latifolia</i> Sm.	Fu munjuluk (F)
	77	<i>Citrus aurantium</i> L. var. <i>dulcis</i> L.	Busorans (F)
	78	<i>Citrus grandis</i> (L.) Osbeck	Bupamplomus (F)
	79	<i>Citrus limon</i> (L.) Osbeck	Bujaba (K)
Sapindaceae	80	<i>Aphania senegalensis</i> Juss. ex Poir.	Buuláb (K)
Sapotaceae	81	<i>Synsepalum brevipes</i> (Baker F.) T.D. Penn.	Bundukul (K)
Sterculiaceae	82	<i>Cola cordifolia</i> (Cav.) R. Br.	Bubám (K)
	83	<i>Cola nitida</i> (Vent.) Scott et Endl.	Buguru (F)
Verbenaceae	84	<i>Avicennia africana</i> P. Beauv.	Umankena (K)
	85	<i>Vitex doniana</i> Sweet	Bujink (F)
Zingiberaceae	86	<i>Aframomum sceptrum</i> (Oliv. Haub.) K. Schum.	Sixefay (K)
	87	<i>Costus afer</i> Ker-Gawl	Sumayas (F)

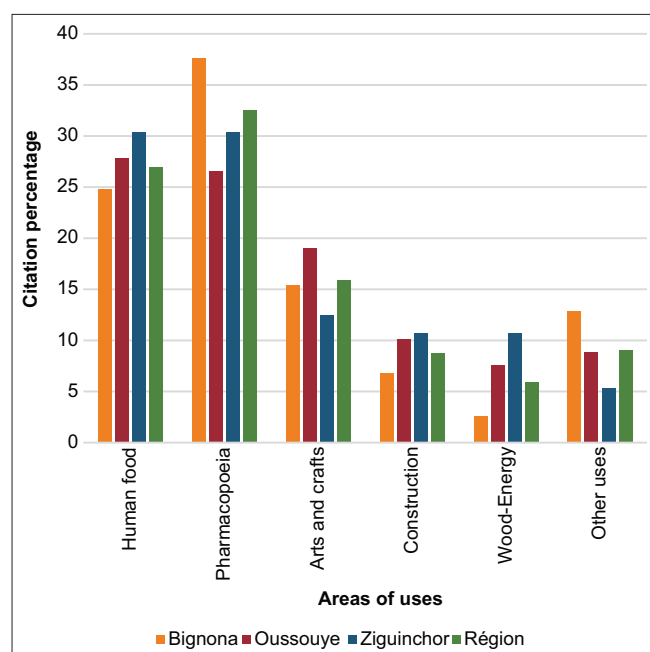


Figure 2: Areas of use of rare or endangered plants

citations). The main causes mentioned are the rainfall deficit (75.33% of citations) and the overexploitation of species for industrial, artisanal or medical uses (68.99% of citations) (Figure 4).

## DISCUSSION

The objectives of our study were to identify rare and/or endangered species, their different uses, the parts used of these plants as well as the probable causes of their disappearance.

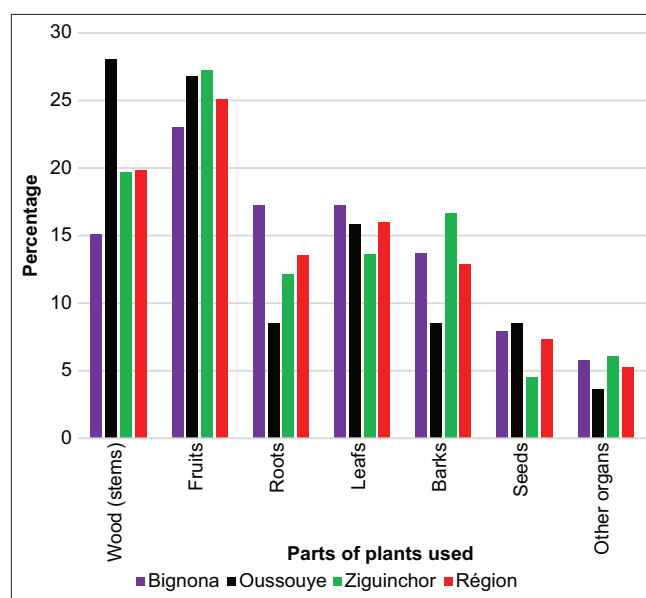


Figure 3: Parts of rare or endangered plants used

## Rare or Endangered Species

Out of 87 species listed, 19 of them have been cited in the three departments (Table 5), 12 of which are on the list of species partially or fully protected by the Senegalese Forest Code [11]. The work of Sambou [12] has shown the rarity of two species in this area; these are *Nelsonia canescens* and *Newbouldia laevis*. These species were not mentioned in our study, however. Similarly, *Cryptolepis sanguinolenta*, considered by Senghor [13] as a rare species in the area, was not listed in our survey either. On the other hand, Ndiour [14] estimates that the food species, the most exploited fruit trees, are ten in number. All of these species are on our list. Finally, an assessment

Table 2: List of rare or endangered species in the department of Bignona in order of importance of citation

N°	Latin names	Families	PC
1	<i>Khaya senegalensis</i>	Meliaceae	45,57%
2	<i>Pterocarpus erinaceus</i>	Fabaceae	37,97%
3	<i>Elaeis guineensis</i>	Arecaceae	27,85%
4	<i>Carapa procera</i>	Meliaceae	24,05%
5	<i>Detarium senegalense</i>	Caesalpiniaceae	21,52%
6	<i>Azelia africana</i>	Caesalpiniaceae	20,25%
7	<i>Ceiba pentandra</i>	Bombacaceae	20,25%
8	<i>Borassus flabellifer</i>	Arecaceae	18,99%
9	<i>Landolphia hirsuta</i>	Apocynaceae	17,72%
10	<i>Parinari excelsa</i>	Chrysobalanaceae	17,72%
11	<i>Cordyla pinnata</i>	Caesalpiniaceae	16,46%
12	<i>Detarium microcarpum</i>	Caesalpiniaceae	16,46%
13	<i>Antiaris toxicara var. africana</i>	Moraceae	15,19%
14	<i>Saba senegalensis</i>	Apocynaceae	8,86%
15	<i>Daniella oliveri</i>	Caesalpiniaceae	7,59%
16	<i>Prosopis africana</i>	Fabaceae	7,59%
17	<i>Treculia africana</i>	Moraceae	7,59%
18	<i>Cola cordifolia</i>	Sterculiaceae	6,33%
19	<i>Acacia albida</i>	Mimosaceae	5,06%
20	<i>Chlorophora regia</i>	Moraceae	5,06%
21	<i>Landolphia heudelotii</i>	Apocynaceae	5,06%
22	<i>Morinda geminata DC.</i>	Rubiaceae	5,06%
23	<i>Salacia senegalensis</i>	Celastraceae	5,06%
24	<i>Dialium guineense</i>	Caesalpiniaceae	3,80%
25	<i>Erythrophleum guineense</i>	Caesalpiniaceae	3,80%
26	<i>Vitex doniana</i>	Verbenaceae	3,80%
27	<i>Costus afer</i>	Zingiberaceae	2,53%
28	<i>Albizia sp.</i>	Mimosaceae	2,53%
29	<i>Atromixa afzeliana</i>	Polygalaceae	2,53%
30	<i>Bombax costatum</i>	Bombacaceae	2,53%
31	<i>Bridelia micrantha</i>	Euphorbiaceae	2,53%
32	<i>Cocos nucifera</i>	Arecaceae	2,53%
33	<i>Parkia biglobosa</i>	Mimosaceae	2,53%
34	<i>Phoenix reclinata</i>	Arecaceae	2,53%
35	<i>Schrebera arborea</i>	Oleaceae	2,53%
36	<i>Syzygium aromaticum</i>	Myrtaceae	2,53%
37	<i>Adansonia digitata</i>	Bombacaceae	1,27%
38	<i>Alchornea cordifolia</i>	Euphorbiaceae	1,27%
39	<i>Anthocleista nobilis</i>	Loganiaceae	1,27%
40	<i>Aphania senegalensis</i>	Sapindaceae	1,27%
41	<i>Avicennia africana</i>	Verbenaceae	1,27%
42	<i>Cassia occidentalis</i>	Caesalpiniaceae	1,27%
43	<i>Citrus aurantium var. dulcis</i>	Rutaceae	1,27%
44	<i>Citrus grandis</i>	Rutaceae	1,27%
45	<i>Cola nitida</i>	Sterculiaceae	1,27%
46	<i>Ficus sp.</i>	Moraceae	1,27%
47	<i>Gardenia erubescens</i>	Rubiaceae	1,27%
48	<i>Kigelia africana</i>	Bignoniaceae	1,27%
49	<i>Lannea nigritana</i>	Anacardiaceae	1,27%
50	<i>Nauclaea latifolia</i>	Rubiaceae	1,27%
51	<i>Parinari macrophylla</i>	Chrysobalanaceae	1,27%
52	<i>Psorospermum senegalense</i>	Hypericaceae	1,27%
53	<i>Sporobolus robustus</i>	Poaceae	1,27%
54	<i>Uvaria chamae</i>	Annonaceae	1,27%
55	<i>Morua americana</i>	Olacaceae	1,27%
56	<i>Morus mesozygia</i>	Moaraceae	1,27%

PC: percentage of citation

of the flora made by USAID/SENEGAL [15], identified a good number of threatened and/or protected species in Casamance, 13 of which are included in our list. The various works cited confirm the vulnerability in which several species listed in our study are found. However, our list is wider than that of other authors, which allows us to consider the presence of other plants

Table 3: List of rare or endangered species in the department of Oussouye in order of importance of citation

N°	Latin names	Families	PC
1	<i>Carapa procera</i>	Meliaceae	38,36%
2	<i>Parinari excelsa</i>	Fabaceae	26,03%
3	<i>Landolphia hirsuta</i>	Apocynaceae	20,55%
4	<i>Ficus ottoniifolia</i>	Moraceae	15,07%
5	<i>Khaya senegalensis</i>	Meliaceae	15,07%
6	<i>Treculia africana</i>	Moraceae	12,33%
7	<i>Cola cordifolia</i>	Euphorbiaceae	10,96%
8	<i>Synsepalum brevipes</i>	Sapotaceae	10,96%
9	<i>Azelia africana</i>	Caesalpiniaceae	9,59%
10	<i>Drypetes floribunda</i>	Euphorbiaceae	6,85%
11	<i>Pterocarpus erinaceus</i>	Fabaceae	6,85%
12	<i>Uvaria chamae</i>	Annonaceae	6,85%
13	<i>Phoenix reclinata</i>	Arecaceae	5,48%
14	<i>Detarium senegalense</i>	Caesalpiniaceae	5,48%
15	<i>Afromosia laxiflora</i>	Fabaceae	4,11%
16	<i>Daniella oliveri</i>	Caesalpiniaceae	4,11%
17	<i>Dialium guineense</i>	Caesalpiniaceae	4,11%
18	<i>Ficus sp.</i>	Moraceae	4,11%
19	<i>Guibourtia coppalifera</i>	Caesalpiniaceae	4,11%
20	<i>Harungana madagascariensis</i>	Clusiaceae	4,11%
21	<i>Anthostema senegalense</i>	Euphorbiaceae	2,74%
22	<i>Borassus flabellifer</i>	Arecaceae	2,74%
23	<i>Chlorophora regia</i>	Moraceae	2,74%
24	<i>Citrus aurantium var. dulcis</i>	Rutaceae	2,74%
25	<i>Citrus limon</i>	Rutaceae	2,74%
26	<i>Euphorbia grandifolia</i>	Euphorbiaceae	2,74%
27	<i>Gardenia erubescens</i>	Rubiaceae	2,74%
28	<i>Leptadenia hastata</i>	Asclepiadaceae	2,74%
29	<i>Parinari macrophylla</i>	Chrysobalanaceae	2,74%
30	<i>Piliostigma reticulatum</i>	Caesalpiniaceae	2,74%
31	<i>Saba senegalensis</i>	Apocynaceae	2,74%
32	<i>Vitex doniana</i>	Verbenaceae	2,74%
33	<i>Acacia albida</i>	Mimosaceae	1,37%
34	<i>Adansonia digitata</i>	Bombacaceae	1,37%
35	<i>Afromomum sceptrum</i>	Zingiberaceae	1,37%
36	<i>Albizia sp.</i>	Mimosaceae	1,37%
37	<i>Anthocleista procera</i>	Loganiaceae	1,37%
38	<i>Aphania senegalensis</i>	Sapindaceae	1,37%
39	<i>Avicennia africana</i>	Verbenaceae	1,37%
40	<i>Calamus deerratus</i>	Arecaceae	1,37%
41	<i>Ceiba pentandra</i>	Bombacaceae	1,37%
42	<i>Chlorophytum immaculatum</i>	Anthericaceae	1,37%
43	<i>Cola nitida</i>	Sterculiaceae	1,37%
44	<i>Crescentia cujete</i>	Bignoniaceae	1,37%
45	<i>Erythrophleum guineense</i>	Caesalpiniaceae	1,37%
46	<i>Prosopis africana</i>	Fabaceae	1,37%
47	<i>Jatropha curcas</i>	Euphorbiaceae	1,37%
48	<i>Klainodoxa gabonensis</i>	Irvingiaceae	1,37%
49	<i>Landolphia heudelotii</i>	Apocynaceae	1,37%
50	<i>Phyllanthus discoides</i>	Euphorbiaceae	1,37%
51	<i>Pseudospondias microcarpa</i>	Anacardiaceae	1,37%
52	<i>Psidium guajava</i>	Myrtaceae	1,37%
53	<i>Raphia pedunculata</i>	Arecaceae	1,37%
54	<i>Landolphia dulcis</i>	Apocynaceae	1,37%
55	<i>Landolphia ovariensis</i>	Apocynaceae	1,37%
56	<i>Salacia senegalensis</i>	Celastraceae	1,37%

whose precariousness has not been formally established. A total of 38 species have been identified in at least two departments. The information concerning these species, with regard to the comments of El Rhaffari *et al.* [9], can be considered consistent. Indeed, these authors believe that information can be judged as consistent when it is reported at least twice in two different localities and by different people.

## Different uses and used Parts of Rare or Endangered Plants

The listed species and the parts used have multiple uses, especially as medicinal plants, in food and crafts (Figure 2).

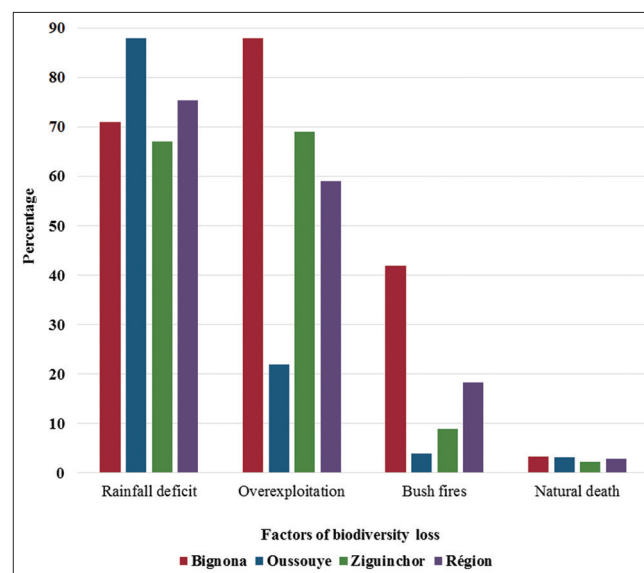
**Table 4: List of rare or endangered species in the department of Ziguinchor in order of importance of citation**

N°	Latin names	Families	PC
1	<i>Landolphiahirsuta</i>	Apocynaceae	38,48%
2	<i>Pterocarpuserinaceus</i>	Fabaceae	31,48%
3	<i>Parinariexcelsa</i>	Chrysobalanaceae	29,63%
4	<i>Treculiaafricana</i>	Moraceae	27,78%
5	<i>Carapaprocera</i>	Meliaceae	25,93%
6	<i>Khayasenegalensis</i>	Meliaceae	25,93%
7	<i>Afzeliaafricana</i>	Caesalpiniaceae	16,67%
8	<i>Borassusflabellifer</i>	Arecaceae	11,11%
9	<i>Parkiabiglobosa</i>	Mimosaceae	11,11%
10	<i>Prosopisafricana</i>	Fabaceae	11,11%
11	<i>Parinarimacrophylla</i>	Chrysobalanaceae	9,26%
12	<i>Salaciasenegalensis</i>	Celastraceae	9,26%
13	<i>Alstoniaboonei</i>	Apocynaceae	7,41%
14	<i>Combretumglutinosum</i>	Combretaceae	7,41%
15	<i>Elaeisguineensis</i>	Arecaceae	7,41%
16	<i>Ficus</i> sp.	Moraceae	7,41%
17	<i>Sabasenegalensis</i>	Apocynaceae	7,41%
18	<i>Detariumsenegalense</i>	Caesalpiniaceae	5,56%
19	<i>Dialiumguineense</i>	Caesalpiniaceae	5,56%
20	<i>Landolphiaheudelotii</i>	Apocynaceae	5,56%
21	<i>Acaciaalbida</i>	Mimosaceae	3,70%
22	<i>Adansoniadigitata</i>	Bombacaceae	3,70%
23	<i>Bombaxcostatum</i>	Bombacaceae	3,70%
24	<i>Brideliamicrantha</i>	Euphorbiaceae	3,70%
25	<i>Detariummicrocarpum</i>	Caesalpiniaceae	3,70%
26	<i>Gardeniatriacantha</i>	Rubiaceae	3,70%
27	<i>Strychnosspinosa</i>	Loganiaceae	3,70%
28	<i>Antiaristoxicariavar.africana</i>	Moraceae	1,85%
29	<i>Citrusaurantiumvar.dulcis</i>	Rutaceae	1,85%
30	<i>Cordylapinnata</i>	Caesalpiniaceae	1,85%
31	<i>Ostryderrisstuhlmanii</i>	Caesalpiniaceae	1,85%
32	<i>Pobeguineaarrecta</i>	Poaceae	1,85%
33	<i>Rhizophoraracemosa</i>	Rhizophoraceae	1,85%
34	<i>Spondiasmombin</i>	Anacardiaceae	1,85%
35	<i>Xylopiaaethiopica</i>	Annonaceae	1,85%

In Lower Casamance, plants occupy a preponderant place in the life of the populations. Indeed, they are found in almost all socio-cultural activities [5]. In the three departments, fruits are the most used organs, especially in food (Figure 3). This observation seems to confirm the work of Ndiour [14] which shows that the ten most exploited species in Bignona are fruit.

## Causes of Disappearance of Plants

In our survey, the rainfall deficit was identified as the main cause of biodiversity loss in Basse Casamance. As such, studies have shown that this rainfall deficit has had direct impacts on the modification of ecosystems such as salinity and very extensive acidification of the soil, phenomena unknown in Lower Casamance until 1972 [16, 17]. The effects induced by these disturbances are the clearing of forests to compensate for the loss of cultivable land.



**Figure 4: Causes of the scarcity or threat of disappearance of plants**

**Table 5: Plants commonly cited in the three departments in order of importance of percentage of citation**

No.	Latin names	Citation percentage			
		Bignona	Oussouye	Ziguinchor	Region
1	<i>Carapa procera</i>	25,05%	38,36%	25,93%	29,78%
2	<i>Khaya senegalensis</i>	45,57%	15,07%	25,93%	28,86%
3	<i>Pterocarpus erinaceus</i>	37,97%	6,85%	31,48%	25,43%
4	<i>Parinari excelsa</i>	17,72%	26,03%	29,63%	24,46%
5	<i>Landolphia hirsuta</i>	17,72%	20,55%	31,48%	23,25%
6	<i>Treculia africana</i>	7,59%	12,33%	27,78%	15,90%
7	<i>Afzelia africana</i>	20,25%	9,59%	16,67%	15,50%
8	<i>Borassus flabellifer</i>	18,99%	2,74%	11,11%	10,95%
9	<i>Detarium senegalense</i>	21,52%	5,48%	5,56%	10,85%
10	<i>Prosopis africana</i>	7,59%	1,37%	11,11%	6,69%
11	<i>Saba senegalensis</i>	8,86%	2,74%	7,41%	6,34%
12	<i>Salacia senegalensis</i>	5,06%	1,37%	9,26%	5,23%
13	<i>Dialium guineense</i>	3,80%	4,11%	5,56%	4,49%
14	<i>Parinari macrophylla</i>	1,27%	2,74%	9,26%	4,42%
15	<i>Ficus</i> sp.	1,27%	4,11%	7,41%	4,26%
16	<i>Landolphia heudelotii</i>	5,06%	1,37%	5,56%	4,00%
17	<i>Acacia albida</i>	5,06%	1,37%	3,70%	3,38%
18	<i>Adansonia digitata</i>	1,27%	1,37%	3,70%	2,11%
19	<i>Citrus aurantium var. dulcis</i>	1,27%	2,74%	1,85%	1,95%

Concerning the overexploitation of plants, it aims at the production of lumber intended for certain industrial units, the craft industry and the construction of houses. It also targets the production of charcoal and the supply of products from the traditional pharmacopoeia. This phenomenon is more widespread in the department of Bignona where, 86% of the people questioned think that it contributes strongly to the degradation of ecosystems. This overexploitation is one of the consequences of the deterioration of the economic conditions of rural people, implying predatory behavior with regard to natural resources [18]. In the Oussouye department, the situation is less worrying because only 22% of those surveyed cited it (table). This low rate can be explained by the fact that in Oussouye traditions (sacredness, totems) have a strong imprint on the conservation of natural resources [13]. Regarding the impact of bush fires on plant biodiversity, Bignona with a citation percentage of 42% is the department where this practice is more frequent; the departments of Oussouye and Ziguinchor recorded only 4% and 9% of citations respectively. These results are confirmed by the report of the Center for Ecological Monitoring (CSE) [19]. Indeed, according to this report, the department of Bignona recorded between 2000 and 2012, 36,314 hectares of burned area, which places it in 6<sup>th</sup> place nationwide.

## CONCLUSION

The study reveals that 87 species are considered rare or endangered in lower Casamance. These species whose fruits, wood, leaves and roots are mainly used in pharmacopoeia, food and crafts, are threatened. The causes of this threat are climatic and anthropogenic.

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