Assessment of endogenous knowledge on the state of vegetation by Logone valley's population in Far North region of Cameroon

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1 SUMMARY

Woody plants and their habitats are undergoing disturbance as a result of poor agricultural practices, climatic changes, the increase of the population and armed conflicts which are further degrading by the time. The study was to assess the endogenous knowledge of the population on the state of vegetation in Logone valley the state of vegetation of four divisions for sustainable management. 363 people were interviewed in Waza, Kousseri, Goulfey and Logone-Birni divisions on the state of vegetation found in their areas. The obtained results showed that socio-economic activities such agriculture (88.64 %) and livestock practice are the main activities. Twelve plant species are commonly consumed according to their availability and importance. As for traditional medicine, twenty-three (23) species are used for their therapeutic properties against various illnesses including jaundice, coughs, malaria, stomach ache, measles, typhoid, intestinal worms, chicken pox, hypertension, hemorrhoids through the use of leaves, roots, barks and fruits. Moreover, 83.80% of the interviewers confirm the degradation of the vegetation is declining in the study area. Vegetation in the valley is subject to intense activity. We are witnessing accelerated degradation of the plant cover, which is dynamic as a result of human activity and threatened by climate change.

2 INTRODUCTION

The sub-Saharan Africa ecosystems are considered to be fragile and unstable ecological systems that are permanently maintained by many climatic and anthropogenic constraints and disturbances (Donfack *et al.,* 1996; Diouf and Lambin, 2001). In recent years, sub-Saharan Africa has been confronted to numerous calamities such as natural ecosystems degradation. However, this situation is more alarming for agricultural, pastoral and forest ecosystems (Van Wilgen *et al.,* 2014). Similarly, human expansion as a result of globalisation has led to natural ecosystem changes, with significant pressures leading to biome isolation and fragmentation (Smith *et al.,* 2003). All these factors, both natural and man-made, are making it increasingly difficult to meet the needs of populations that are facing environmental and socio-economic problems. These woody flora resources produce fruits, seeds, tubers, flowers,

saps and other edible products used for human and animal consumption, traditional medicine, woodfuel, timber and services. They contribute directly to the diet and play a vital role in the economy of rural populations (Popoola, 2001). Therefore, Fontès and Guinko (1995) note that natural vegetation is a vital element and a capital for mankind, providing multiple needs of a fast-growing population. In Cameroon and more specifically in the Sudano-Sahelian zone, change in land use is reflected in deforestation and degradation of the plant cover, which is increasing at an unbridled and worrying rate (Agbanou *et al.,* 2018). However, this degradation is going ahead and poses a real threats to people from Logone Valley in Far North region of Cameroon. Woody plants and their habitats are being disturbed by poor farming practices, climatic disturbances, demographic explosion and armed conflicts. Faced with this problem, it is necessary to have precise knowledge of the environmental conditions, the pressing problems of the ecosystems, and the techniques and strategies likely to guarantee the sustainability and continuity of the functions of our resources. Hence, the present study aims to assess the state of the vegetation for sustainable management.

3 METHODOLOGY

3.1 Study area: The study area is located in the Logone et Chari, Division Far North Region, Cameroon. The capital of the Logone et Chari Division is Kousseri, with a surface area of 5689 Km², 88,800 inhabitants and a density of 15.6 inhabitants per Km², it was located between 12 ° North latitude, 15° East longitude. A total of four (04) subsdivisions out of ten (10) have been selected in the area. In the Logone et Chari division, we have chosed the subsdivisions of Kousseri, Goulfey, Waza and Logone-Birni. The choice of the site was based on the agropastoral conflict (Arabs and Musgoum) in the division and the different plant formations. The pressure of human activities, due to the establishment of the desert, the high demographic pressure in the far north of Cameroon, the population's exposure to poverty, the anarchic and illicit exploitation of non-timber forest products and timber forest products by the population to meet their needs and the expansion of agriculture.

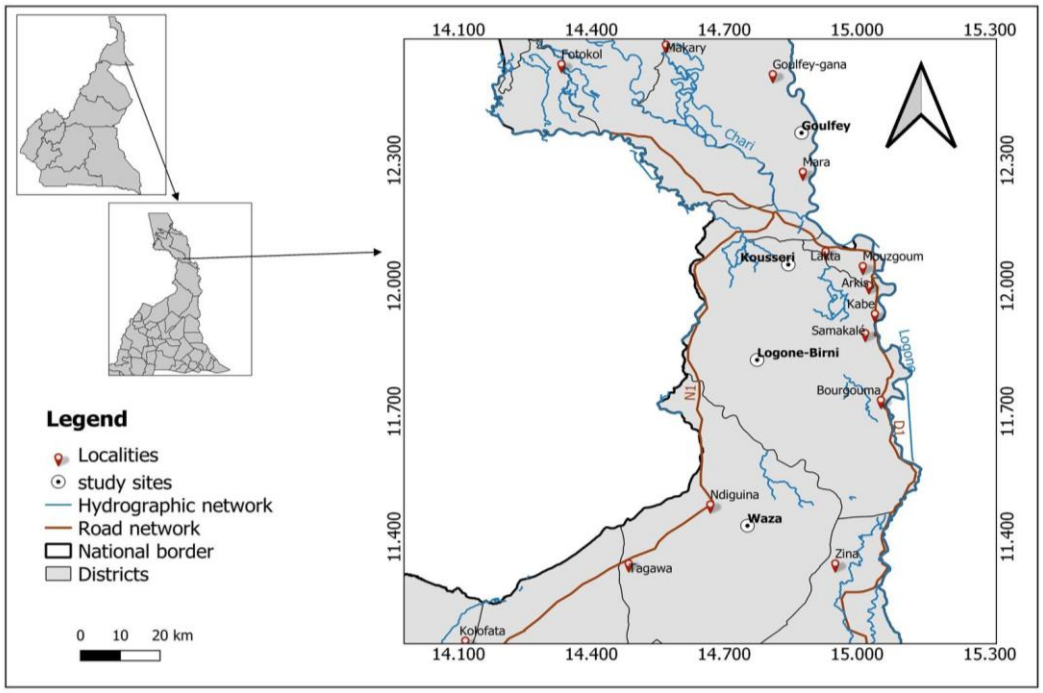


Figure 1: Study area

3.2 Survey: Semi-structured (individual) interviews were carried out using questionnaires. These interviews were based on human activities, the causes and consequences of changes in vegetation degradation, strategies for the sustainable management of adapted biodiversity, and the difficulties and expectations of local people for its more sustainable management (Martin, 1995). The questionnaire includes variables for identifying the respondents and those relating to their activities. The survey is structured and semi-structured with closed questions, open questions and guided questions.

The sample size was calculated using the proportional choice technique. This rate was calculated on the basis of the target population statistics for each village in the various divisions in the study area, as set out in the Communal Development Plan report (CDPKou., 2013; CDPLog., 2014; CDPGou., 2011 and CDPWaz., 2013) according to the following formula:

$n = \frac{T^2\,(1-p)}{e2}$ where n= population size, t= confidence rate, p= proportion of the target population and e= exponential.

Table 1: Breakdown of respondents by district

Subdivisions	KOUSSERI	LOGONE-BIRNI	GOULFEY	WAZA	TOTAL
Interviewers	81	96	103	83	363

3.3 Observations: Field observations are a means of collecting data from an individual or a group of individuals through direct observation by the researcher who, using an observation grid, notes and describes the behavior of actors as well as the course of events observed around him (N'da *et al.,* 2008). Direct observation was therefore chosen as a complementary method for data collection because it enables the researcher to verify the activities carried out by the stakeholder himself.

3.4 Statistical analysis of the data: The data collected during this study were recorded in an Excel sheet, which was used to calculate percentages and plot histograms. Graphpad software was also used to plot the histograms.

4 RESULTS AND DISCUSSION

4.1 Endogenous knowledge of the state of vegetation in the study area

4.1.1 Economic activities of the population: Figure 2 shows the economic activities carried out in the study area. So, seven activities are carried out by the population in the studied areas (agriculture, livestock farming, fishing, handicrafts, hunting, trade and woodcutting). However, agriculture (88.42%) is the main activity performed by the studied population. According to specific sites, it varied in respect of studied areas in the following order: Goulfey (93.20%), Waza (88.64%), Kousseri (86.42%) and Logone-Birni (85.42%). Moreover, 77.38% of the population practice livestock farming while Waza division recorded the high percentage (78.41%) followed by Goulfey (77.67%), Logone-Birni (78.13%) and Kousseri (75.31%). However, handicrafts activity was only practiced by the population of Logone-Birni (5.11%) and Goulfey (1.94%). With regards of hunting, Waza division (5.68%) highlighted the high percentage followed by Kousseri (2.47%) and Goulfey (0.97%) while in Logone-Birni, this activity was not observed (0.00%). The high rate of farming is explained by the fact that Sahelian zone of Cameroon is mainly made up of farmers. The low rate of people involved in handicrafts, woodcutting and hunting can be explained by the presence of the Ecoguards and the Vigilance Committee, who work to preserve the flora and fauna. These

results are in agreement with the findings of Hamawa (2005) in the Galim-Tignère area of Cameroon, Tchobsala (2011) in the peri-urban area of Ngaoundéré, Cameroon, and Haiwa (2017), who showed that farmers are t the main actors in the loss of biodiversity. Similarly, Wafo (2008) stated that agriculture is harmful to biodiversity due to demographic growth. Populations exploit natural ecosystems to satisfy these needs. The increase in demand for survival needs generates pressure on the ecosystem (Milleville and Serpantié, 1994; Ibrahima *et al.,* 2009).

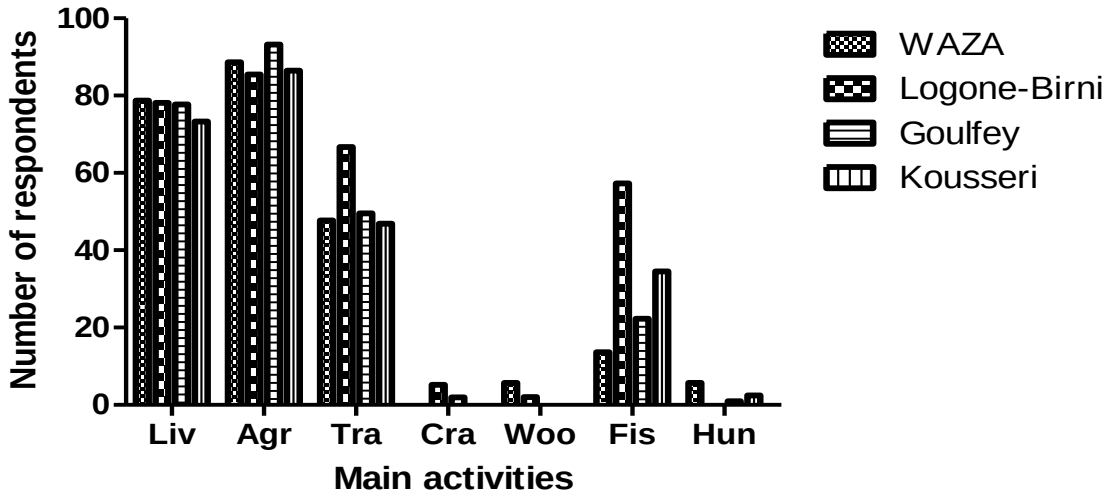


Figure 2: Socio-economic activities of the population
Liv= Livestock; Agr = Agriculture; Tra= Trade; Cra= Crafts; Woo= Woodcutting; Fis= Fishing and Hun= Hunting.

4.2 Use of plant species and their importance

4.2.1 Species used for food: Twelve (12) plant species were used for food in this zone (Table 2). The rate of use varies between species and divisions. In Waza zone, *Balanites aegyptiaca* (90.36%), *Ziziphus mauritiana (*89.16, %) and *Borassus aethiopum* (77.11%) species were dominantly used while in Logone-Birni area, the most commonly used species are *Borassus aethiopum* (88.54%), *Adansonia digitata* (88.54%) and *Balanites aegyptiaca* (88.33%). In Goulfey division, *Balanites aegyptiaca* (80.58%), *Tamarindus indica* (78.64%) and *Borassus aethiopum* (72.84%) were found to be the most used plant species. According to Kousseri division, *Phoenix dactylifera* (87.65%), *Balanites aegyptiaca* (76.54%), *Ziziphus mauritiana* (72.84%), *Tamarindus indica* (72.84%) were used. Globally, *Balanites aegyptiaca*, *Ziziphus mauritiana*, *Borassus aethiopum*, *Adansonia digitata* and *Phoenix dactylifera* were used in the whole studied zones and could be justified by the availability of these species in the study area. These results are similar to those of Froumsia in the Logone valley, who found that the most commonly species used for food were *Balanites aegyptiaca*, *Ziziphus mauritiana* and *Borassus aethiopum* (Froumsia *et al.,* 2019).

Table 2: Species used in feed

Espèces	Portion Consumed	Waza	Log-birni	Goulfey	Kousseri
Balanites aegyptiaca	Fru, Lea	90,36	83,33	80,58	76,54
Ziziphus mauritiana	Fru	89,16	84,38	69,90	72,84
Borassus aethiopum	Hyp, Fru	62,65	88,54	65,05	70,37
Tamarindus indica	Flo, Lea, Fru	55,42	62,50	78,64	72,84
Moringa oleifera	Lea,	49,40	53,13	52,43	70,37
Adansonia digitata	Fru, Lea	77,11	88,54	72,82	75,31
Phoenix dactylifera	Fru	49,40	52,08	60,19	87,65
Ficus phatyphylla	Fru	18,00	15,30	8,00	10,67
Sclerocarya birrea	Fru	45,78	/	/	/
Vitex doniana	Fru	42,17	/	/	/
Ximenia americana	Fru	36,14	/	0,97	/
Diospyros mespiliformis	Fru	55,42	60,42	59,22	22,22

Flo= Flower; Lea= Leaf; Hyp= Hypocotyl; Fru= Fruit.

4.2.2 Species used in traditional medicine: Amongst the identified plant species in Logone Valley, 23 woody plant species were used to treat several diseases (Table 3). The parts of plant used are barks, roots, leaves and fruits. In Waza division, the most commonly species used are *Anogeissus leiocarpus* (68.67%), which treats jaundice and coughs through the use of bark and young leaves, and *Acacia albida* (62.65%) which treats rum and intestinal worms. In Logone-Birni, *Acacia nilotica* (69.79%) is effective in wounds healing and intestinal worms using its bark and fruit, respectively while the bark of *Balanites aegyptiaca* (54.17%) is used to treat angina. In Goulfey, the species used by the local population are the use of *Acacia nilotica* (71.84%) leaves against wounds and intestinal worms, while *Azadirachta indica* (69.96%) for malaria. Finally, in Kousseri, the leaves of *Azadirachta indica* (62.96%) treat malaria, while *Acacia nilotica* (61.00%) is effective in treating wounds and intestinal worms. The high percentage of these species used in the treatment of several diseases found everywhere in the different studied sites could be justified by their availability. These results corroborate those of Toirambe (2017), who shows that nature is endowed with a mosaic of medicinal plants that people can use for health care, and those of Mapongmetsem *et al.,* (1997), in their study on the use of NTFPs in the SudanoGuinean savannahs, who showed that there is a multitude of species of local and international importance.

Table 3: Species used in traditional medicine

Especies	Disease	Part used	Waza	Log-birni	Goulfey	Kousseri
Anogeissus leiocarpus	Jaundice, Cough	Bar, Lea	68,67	/	30,10	/
Azadirachta indica	Malaria	Lea	44,58	41,67	67,96	62,96
Khaya senegalensis	Stomach ache	Bar	43,37	/	20,39	/
Acacia albida	Rhu, Intestinal Worms	Bar	62,65	52,08	59,22	59,26
Stereospermum kunthianum	Poisoning	Bar	45,78	45,83	/	17,28

Piliostigma thonningii	Measles	Lea	45,78	/	/	6,17
Moringa oleifera	Nerve/ Typhoid	Rac	48,19	54,17	/	20,99
Acacia nilotica	Injury/ Stomach ache	Bar	48,19	69,79	71,84	61,00
Balanites aegyptiaca	Angina	Bar	51,81	54,17	/	48,15
Guiera senegalensis	Hypertension	Rac	54,22	/	8,74	/
Borassus aethiopum	Hypertension	Tub	44,58	50,54	59,22	30,00
Prosopis africana	Stomach ache	Bar	44,58	/	/	/
Bauhinia rufescens	Typhoid	Lea	40,96	51,04	69,90	20,99
Tamarindus indica	Varicella	Lea	32,53	50,00	66,02	14,81
Boscia angustifolia	Tooth decay	Lea+ rac	/	31,25	61,17	33,33
Phoenix dactylifera	Energy	Lea	54,22	51,04	55,99	60,72
Ficus platyphylla	Malaria /Injury	Rac	14,46	18,75	7,77	/
Diospyros mespiliformis	Haemorrhoids	Bar	18,07	3,13	34,95	11,11
Mitragyna inermis	Intestinal Worms	Lea	37,35	8,33	27,18	17,28
Eucalyptus camaldulensis	Rhu	Lea	36,14	25,00	39,81	23,46

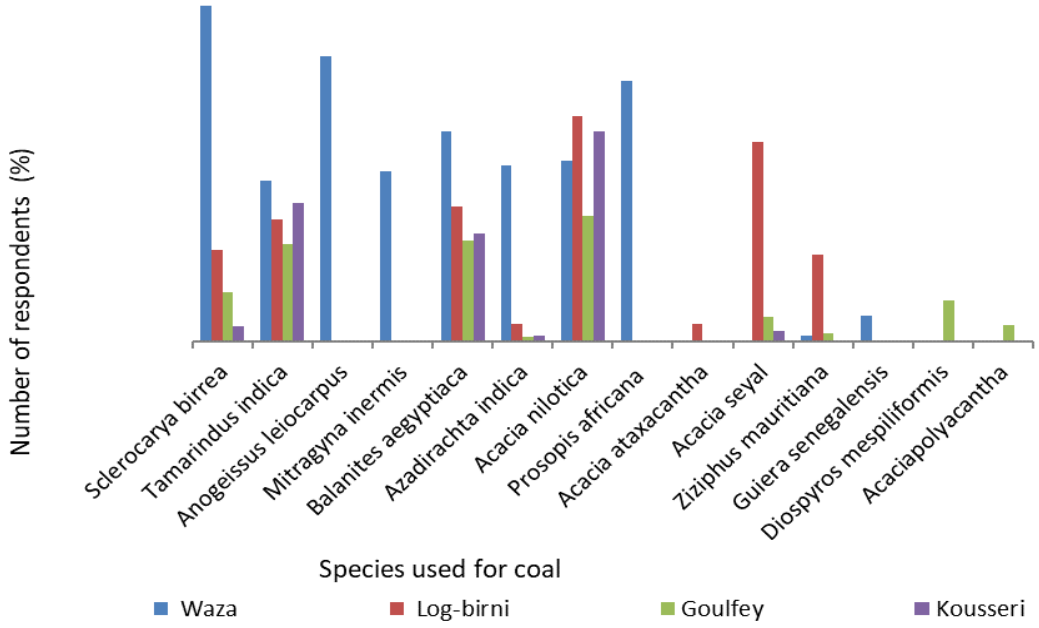
Bar= Bark; Lea= Leaf ; Fr=Fruit, Rac= Racine, Tub= Tuber

4.2.3 Species used for firewood: In Logone Valley, 20 woody species are used as firewood (Table 4). In Waza area, the species most commonly used for fuelwood are *Acacia seyal* (81.93%), *Balanites aegyptiaca* (71.08%) and *Sclerocarya birrea* (62.65%) whereas the use of *Acacia seyal* (88.33%), *Acacia nilotica* (88.33%) and *Balanites aegyptiaca* (70.83%) in Logone-Birni was observed. In Goulfey, *Acacia nilotica* (79.61%), *Azadirachta indica* (70.31%) and *Acacia ataxacantha* (56.31%) are taking into account while in Kousseri, *Acacia seyal* (56.70%), *Acacia nilotica* ()54.27% and *Azadirachta indica* (42.93%) are commonly used. This result is similar to those reported by Haiwa *et al.,* (2016) in the Sudano-Sahelian zone where they observed the used of the same plant species for fuelwood. Fact, Mapongmetsem & Akagou (1997) argued that fuelwood situation is already worrying in the Sudano-Guinean zone.

Table 4: Species used as fuelwood in the study area

Espèces	Waza	Log-birni	Goulfey	Kousseri
Acacia seyal	81,93	83,33	34,95	56,70
Acacia polyacantha	46,99	57,29	30,10	32,40
Acacia nilotica	57,83	83,33	79,61	54,27
Acacia sieberiana	48,19	33,33	39,81	28,35
Acacia albida	46,99	63,54	28,74	34,83
Acacia ataxacantha	50,60	/	56,31	/
Balanites aegyptiaca	71,08	70,83	50,00	18,63
Anogeissus leiocarpus	61,45	/	/	/
Sclerocarya birrea	62,65	/	48,54	/
Tamarindus indica	54,22	37,50	38,00	37,26
Guiera senegalensis	44,58	/	12,82	/
Azadirachta indica	44,58	62,50	70,31	42,93
Prosopis africana	51,81	/	/	/

Stereospermum kunthianum	40,96	/	16,50	/
Eucalyptus camaldulensis	15,00	23,00	54,37	28,35
Ziziphus mauritiana	45,00	53,13	28,70	29,97
Khaya senegalensis	/	10,42	/	/
Parkinsonia aculeata	/	39,58	23,30	25,11
Diospyros mespiliformis	/	/	33,98	/
Bauhinia rufescens	/	/	/	25,92



4.2.4 Species used as charcoal: The use of species for charcoal varies according to each locality (Figure 3). In Waza, the most species used for charcoal are *Sclerocarya birrea* (80.72%), *Anogeissus leiocarpus* (68.67%), and *Prosopis africana* (62.65%). In Logone-Birni, *Acacia nilotica* 54.17%, *Acacia seyal* (47.92%) and *Balanites aegyptiaca* (32.29%) are the species mostly and mainly used for charcoal. In Goulfey, *Acacia nilotica* (30.10%), *Balanites aegyptiaca* (24.27%) and *Tamarindus indica* (23.30%) are used while in Kousseri zone, *Acacia nilotica* (50.62%), *Tamarindus indica* (33.33%) and *Balanites aegyptiaca* (25.93%) are source of charcoal. The criterion for choosing these species is the hardness and thickness of the wood, which is capable of producing good embers that burn well and slowly, and do not produce too much ash, sparks or smoke. Charcoal production requires fresh, dry wood with a large diameter. **Figure 3:** Different species used for charcoal by district

4.2.5 Species used as wood services: Fifteen (15) species were identified in the various study areas as being used as fuelwood. In Waza division, the most commonly used species were *Azadirachta indica* (77.11%) followed by *Tamarindus indica* (59.04%) and *Anogeissus leiocarpus* (55.42%) while in Logone-Birni site, *Azadirachta indica* (84.38%) followed by *Acacia nilotica* (67.71%) and *Borassus aethiopum* represent the main plants used for this issue (64.58%). In Goulfey area, *Acacia nilotica* (89.32%) followed by *Azadirachta indica* (69.90%) and *Borassus aethiopum* (57.28%) were observed to be the most used. Finally, in Koussseri zone, *Azadirachta indica* (80.25%) followed by *Acacia nilotica* 64.20% and *Borassus aethiopum* 50.62% were used. The

high rate of demand for these species as service wood could be justified by their hardness.

Table 5: Species used for fuelwood, by district

Species	Waza	Log-birni	Goulfey	Kousseri
Azadirachta indica	77,11	84,38	69,90	80,25
Anogeissus leiocarpus	55,42	/	/	/
Acacia nilotica	44,58	67,71	89,32	64,20
Tamarindus indica	59,04	54,17	50,49	45,68
Balanites aegyptiaca	49,40	5,21	55,34	48,15
Guiera senegalensis	49,40	/	/	/
Borassus aethiopum	42,17	64,58	57,28	50,62
Sclerocarya birrea	45,78	/	/	/
Prosopis africana	53,01	/	/	/
Eucalyptus camaldulensis	18,07	38,54	39,81	35,80
Acacia seyal	6,02	10,42	7,77	2,47
Ziziphus mauritiana	3,61	42,71	14,56	23,46
Acacia albida	/	2,08	/	/
Diospyros mespiliformis	/	/	33,98	27,16
Senna siamea	2,41	/	/	14,81

4.2.6 Species used for handicrafts: The species used for handicrafts vary from one study area to another. Fourteen (14) species were identified in the four districts (table 6). The species most commonly used in Waza area are *Prosopis africana* (69.88%), *Anogeissus leiocarpus* (67.47%) and *Tamarindus indica* (66.22%) while in Logone-Birni, *Tamarindus indica* (67.71%), *Acacia nilotica* (62.50%) and *Ziziphus mauritiana* (57.29%) were noticed. In Goulfey site, the most commonly used species are *Balanites aegyptiaca* (60.19%), *Tamarindus indica* (52.43%) and *Acacia nilotica* (48.00%). In the Kousseri district, *Balanites aegyptiaca* (75.31%), *Acacia nilotica* (71.60%) and *Tamarindus indica* (50.62%). Several parts of these plants are used in handicrafts, either to process a craft raw material or to make certain tools. The most visible form of the use of plant essences for craft purposes is wood.

Table 6: Species used for handicrafts

Species	Waza	Log-birni	Goulfey	Kousseri
Anogeissus leiocarpus	67,47	5,21	/	/
Tamarindus indica	66,27	67,71	52,43	50,62
Balanites aegyptiaca	49,40	54,17	60,19	75,31
Acacia nilotica	40,96	62,50	48,00	71,60
Sclerocarya birrea	40,96	/	/	/
Gardenia ternifolia	24,10	/	/	/
Guiera senegalensis	39,76	/	/	/
Azadirachta indica	6,02	50,00	27,18	45,68
Stereospermum kunthianum	37,35	/	/	/
Prosopis africana	69,88	/	/	/
Ziziphus mauritiana	/	57,29	/	39,51
Acacia albida	/	2,08	/	/
Diospyros mespiliformis	/	/	18,45	/

Khaya senegalensis	/	/	1,94	/

4.2.7 Animal breeding species: The livestock rearing system ensures that the animals live at the limit of nature's possibilities and suffer from the slightest climatic accident. They graze in the fields, taking crop residues, and use woody and grassy species as fodder in the bush. Breeders are sometimes forced to transhumance during the dry season. With the price of "tourteau" skyrocketing and sometimes scarce on the market, pastoralists are sometimes forced to cut down tree branches to feed their herds. Woody vegetation plays an essential role in feeding herds, especially during the dry season when the foliage and pods of trees and shrubs provide a supply of protein-rich green matter, as well as phosphorus and carotene, which are essential for the animals. In the Far North in general and in the Logone Valley in particular, during the dry season and even during the rainy season, animal feed becomes very difficult. The leaves and fruit of species such as *Acacia albida*, *Stereospermum kunthianum*, *Piliostigma thonningii*, *Khaya senegalensis*, *Azadirachta indica*, *Ziziphus mauritiana*, *Acacia nilotica*, Guiera senegalensis and *Balanites aegyptiaca* are cut by farmers as animal fodder, and some tree stumps are sold to farmers to prune for their animals. Table 7 shows that in Waza, the most commonly used species are *Acacia albida* (96.39%), followed by *Ziziphus mauritiana* (91.57%) and *Guiera senegalensis* (46.60%). In Logone-Birni district, *Acacia albida* (93.75%) is used followed by *Ziziphus mauritiana* (78.13%) and *Balanites aegyptiaca* 51.04%. In Goulfey, *Acacia albida* 86.41%, followed by *Ziziphus mauritiana* 82.52% and *Balanites aegyptiaca* 37.86%. In the Kousseri zone, it is *Acacia albida* 82.72%, followed by *Ziziphus mauritiana* 80.25% and *Balanites aegyptiaca* 25.93%. This result is similar to that of Sandjong, (2018), in Mozogo-Gokoro Park, who identified 11 forage species.

Table 7: Distribution of forage species by district

Espèces	Waza	Log-birni	Goulfey	Kousseri
Ziziphus mauritiana	91,57	78,13	82,52	80,25
Acacia seyal	40,96	31,25	16,50	14,81
Acacia albida	96,39	93,75	86,41	82,72
Acacia nilotica	44,58	12,50	20,39	22,22
Balanites aegyptiaca	40,96	51,04	37,86	25,93
Acacia polyacantha	48,19	8,33	/	11,11
Stereospermum kunthianum	49,40	/	/	/
Acacia ataxacantha	46,63	9,38	/	/
Khaya senegalensis	49,40	/	8,74	6,17
Anogeissus leiocarpus	45,78	/	/	/
Guiera senegalensis	49,40	/	/	/
Piliostigma thonningii	43,37	/	/	/
Azadirachta indica	44,58	/	11,65	8,64
Prosopis africana	49,40	/	/	/
Parkinsonia aculeata	/	/	35,92	25,93

4.3 State of vegetation by population: Figure 4 shows the state of the vegetation in the study area. The figure shows that the state of the vegetation is in total regression in each study site: Goulfey 88.35%, Waza 84.34%, Logone-Birni 82.29% and Kousseri 80.25%.

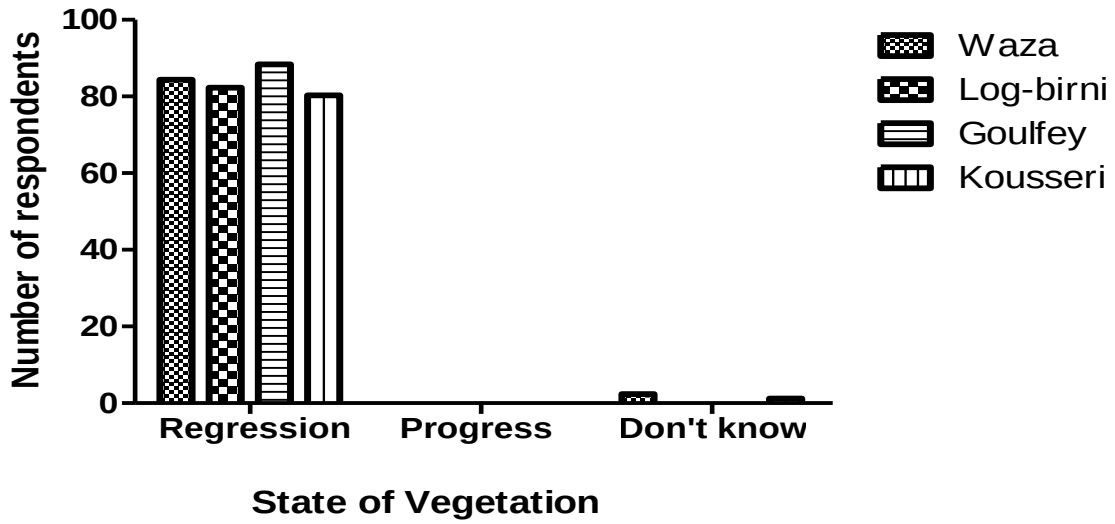


Figure 4: State of vegetation

4.4 Species protected during land clearing: 17 species are protected during clearing in the study areas, varying from site to site. In Waza, the species protected during clearing are *Acacia albida* (73.49%) followed by *Anogeissus leiocarpus* (60.24%) and *Tamarindus indica* (57.83%). Whereas, in Logone-Birni site, *Acacia albida* (85.42%), *Tamarindus indica* (70.83%) and *Ziziphus mauritiana* (69.79%) and in Goulfey site, *Acacia albida* (83.50%), *Zizyphus mauritiana* (51.46%) and *Tamarindus indica* (39.81%) are under protection. *Acacia albida* 82.72%, *Ziziphus mauritiana* 60.49%, *Balanites aegyptiaca* 41.98% were found in Kousseri.

Table 8: Species protected during clearing in the study area

Espèces	Waza	Log-birni	Goulfey	Kousseri
Acacia albida	73,49	85,42	83,50	82,72
Anogeissus leiocarpus	60,24	42,71	19,42	/
Acacia seyal	12,05	18,75	17,48	13,58
Ziziphus mauritiana	55,42	69,79	51,46	60,49
Ficus platyphylla	42,17	33,33	10,68	9,88
Tamarindus indica	57,83	70,83	39,81	20,99
Stereospermum kunthianum	42,17	17,71	/	/
Piliostigma thonningii	42,17	31,25	/	/
Balanites aegyptiaca	46,99	51,04	33,98	41,98
Prosopis africana	49,40	/	/	/
Mitragyna inermis	38,55	/	20,39	9,88
Bauhinia rufescens	24,10	/	/	/
Sclerocarya birrea	37,35	/	/	/
Khaya senegalensis	6,02	26,04	3,88	14,81
Adansonia digitata	24,10	/	14,56	20,99
Acacia nilotica	/	3,13	9,71	9,88
Borassus aethiopum	/	/	24,27	41,98

5 CONCLUSION

The surveys have shown that the population of the Logone valley is aware of the state of the vegetation. The population uses these species for a variety of purposes, including food, fodder and wood for services (houses, sheds, and fences), charcoal, firewood and handicrafts. Species are harvested according to their availability, size and durability. The management method is based on protecting useful or endangered species when clearing land for agro-pastoral purposes. However, these intensive and selective practices pose a major threat to the species concerned. It is feared that these plant resources will disappear in the future. The results of the study on endogenous knowledge of the state of the vegetation in the Logone Valley therefore confirm the need for sustainable management of natural resources to combat the degradation of the plant cover.

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