Ethnobotanical study of *Burkea africana* Hook. in the Reserves of Bontioli and the Classified Forest of Koulbi, Burkina Faso

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Research

Abstract

Background: Burkea africana Hook. is one of the species exploited throughout Africa, particularly in south-western Burkina Faso. However, this species has not been investigated at a community level. The aim of the study is to evaluate the ecosystem services provided by *B. africana* to three communities located around two protected areas, which will allow for the identification of strengths and weaknesses that can guide local conservation.

Methods: Data were collected using a semi-structured survey involving 360 respondents from 12 villages around the Reserves of Bontioli and the Classified Forest of Koulbi. Respondents were randomly selected, mainly among the three indigenous communities of Birifor, Dagara and Lobi. Informant diversity value, informant equitability value and consensus value of use types (CTU) were used to analyse the data.

Results: The best-informed respondents knew 14.7% of all uses, while the least informed respondents knew 4.0% of the uses of the plant. *Burkea africana* is used in the construction (CTU = 1.054) and the handicrafts trades (CTU = 0.824), as firewood (CTU = 0.714), medicine (CTU = 0.311), culture artifacts (CTU = 0.245), and as fodder (CTU = 0.096). Twenty-six medicinal uses were reported. Asthenia is treated by washing and drinking the decoction of leaves. Decoction and macerated roots treat hernia.

Conclusion: The use of this species in construction and culture is of great importance for the traditional life of the Birifor, Dagara and Lobi. The transition to modern housing construction materials should be encouraged so that the wood is used less, thus contributing to the conservation of *B. africana.*

Keywords: Construction wood, Distribution of knowledge, Informant diversity value, Plant conservation, Traditional drugs.

Background

Although forest cover loss has slowed significantly since 1990, forest degradation continues at an alarming rate, leading to a significant erosion of biodiversity (FAO & UNEP 2020). The immediate causes of deforestation in the tropical countries are the clearing of land for other uses due to demographic pressure and unsustainable logging as a result of economic and intervention failures (Brown & Pearce 2023). Recent research suggests that the context of land tenure change, and associated deforestation patterns varies across regions (Liao *et al.* 2024). In sub-Saharan Africa, certain biophysical factors such as climate change, exploitation of forest resources (Geist & Lambin 2002), and poor agricultural practices are at the root of the degradation of natural ecosystems (Kiage 2013). Degradation of forest resources are at the root of conflict, food insecurity (Thelma 2015) and migration (Naser 2015).

In the south-western region of Burkina Faso, Sanon *et al.* (2019a & 2019b) showed that the impact of villages adjacent to protected areas on forest fragmentation and degradation is increasing. Land use change and tree use are suspected as local causes of this forest degradation. Rural populations rely heavily on ecosystem goods and services for their vital needs such as food, shelter and health (Heubes 2012). It is therefore necessary to study these services in order to understand the practices that lead to their degradation and the socio-economic consequences for local people. This will lead to results that can be used to protect natural formations (Kristensen & Lykke 2003).

Burkea africana Hook. (Fabaceae family), a monotypic species (IPNI 2024) is one of the characteristic species of the Sudanian tree savannas of Burkina Faso (Traoré *et al.* 2012). Available research on the species has mainly focused on its phytochemistry (Mathisen *et al.* 2002, Ferreira *et al.* 2005, Mbatchou *et al.* 2011a) and ecology (Burke 2006). The uses of *B. africana* have only been documented through broader studies involving multiple plant species (Zizka *et al*. 2015). This undoubtedly has the disadvantage of not providing an exhaustive survey of the uses of a particular species by local populations. However, an exhaustive study of the uses of a species, within a given community, allows for the identification of strengths and weaknesses that can guide appropriate conservation decision making of that particular species.

The aim of the study is to evaluate the ecosystem services provided by *B. africana* to three communities (Birifor, Dagara, Lobi) around two protected areas in the south-western region of Burkina Faso. The objectives were: (i) to determine the distribution of knowledge about the uses of *B. africana* among three socio-cultural communities; (ii) to identify the uses of the species in different categories of ecosystem services; (iii) to report on the ethnomedicinal preparation of the plant organs.

Materials and Methods

Study area

The study was carried out in the south-western region of Burkina Faso (Figure 1). The south-western region is in the Sudano-Guinean zone. This region belongs to the phytogeographical domain of South Sudan. Agroforestry parks with *Vitellaria paradoxa* C. F. Gaertn. are the dominant landscape in areas outside classified forests. The region has five classified forests with a total area of 139,200 hectares (National Institute of Statistics and Demography 2023). The Bontioli Reserves and the Koulbi Classified Forest are the most important protected areas (National Institute of Statistics and Demography 2022). The pressure on the land is so great that in the past these two forest areas were inhabited by local people.

The Bontioli Reserves are made up of two units covering 42,000 hectares: the Bontioli Total Fauna Reserve (classified on 23 March 1957, 29,500 hectares) and the Bontioli Partial Fauna Reserve (classified on 29 March 1957, 12,500 hectares). The total reserve contains 71 tree species typical of tree savannah, shrub savannah and gallery forest. The main tree species are *Terminalia macroptera* Guill. & Perr. (11.7%), *Detarium microcarpum* Guill. & Perr. (9%), *Vitellaria paradoxa* C.F. Gaertn. (8.9%) and *Entada africana* Guill. & Perr. (6.7%) (Tia 2007). For this reason, these reserves are classified by the IUCN (International Union for Conservation of Nature) as categories I.and IV protected areas, respectively for the Total Fauna Reserve and the Partial Fauna Reserve (UICN/PACO 2010).

The Koulbi Classified Forest (KCF) covers an area of 40000 hectares (classified in August 1955). The main vegetation types are shrub savannahs with *Combretum fragrans* F.Hoffm., *Detarium microcarpum* Guill. & Perr. and *Piliostigma thonningii* (Schumach.) Milne-Redh., wooded savannahs with *Vitellaria paradoxa* C.F. Gaertn., *Burkea africana* Hook. and *Pterocarpus erinaceus* Poir., as well as wooded savannahs with *Khaya senegalensis* (Desr.) A.Juss., *Isoberlinia doka* Craib & Stapf and *Daniellia oliveri* (Rolfe) Hutch. & Dalziel. (Kabore *et al*. 2015). There are also gallery forests with *Mitragyna inermis* (Willd.) K.Schum. and *Cola laurifolia* Mast., and a few patches of open forest with *Anogeissus leiocarpa* Guill. & Perr. (Sanon, 2015).

Extensive subsistence farming is the main agricultural activity of the population, with cereals (sorghum, millet), cowpeas, peanuts, yams, cotton and cashew nuts the main crops (National Institute of Statistics and Demography 2023).

The study was carried out in 12 villages located in four provinces of the south-western region of Burkina Faso: Bougouriba, Ioba, Noumbiel and Poni. Most of these villages are located around the Total and Partial Reserves of Fauna of Bontioli (TPRFB) and the Koulbi Classified Forest (KCF): Balingnar, Bontioli, Diourao, Djikologo, Sibteon and Tovor for the TPRFB and Bonfateon Fadio, Gangalma, Mebar, Medicateon and Titenateon for the CFK (Figure 1). These villages belong to the three socio-cultural groups Dagara, Lobi and Birifor, the indigenous peoples of the region.

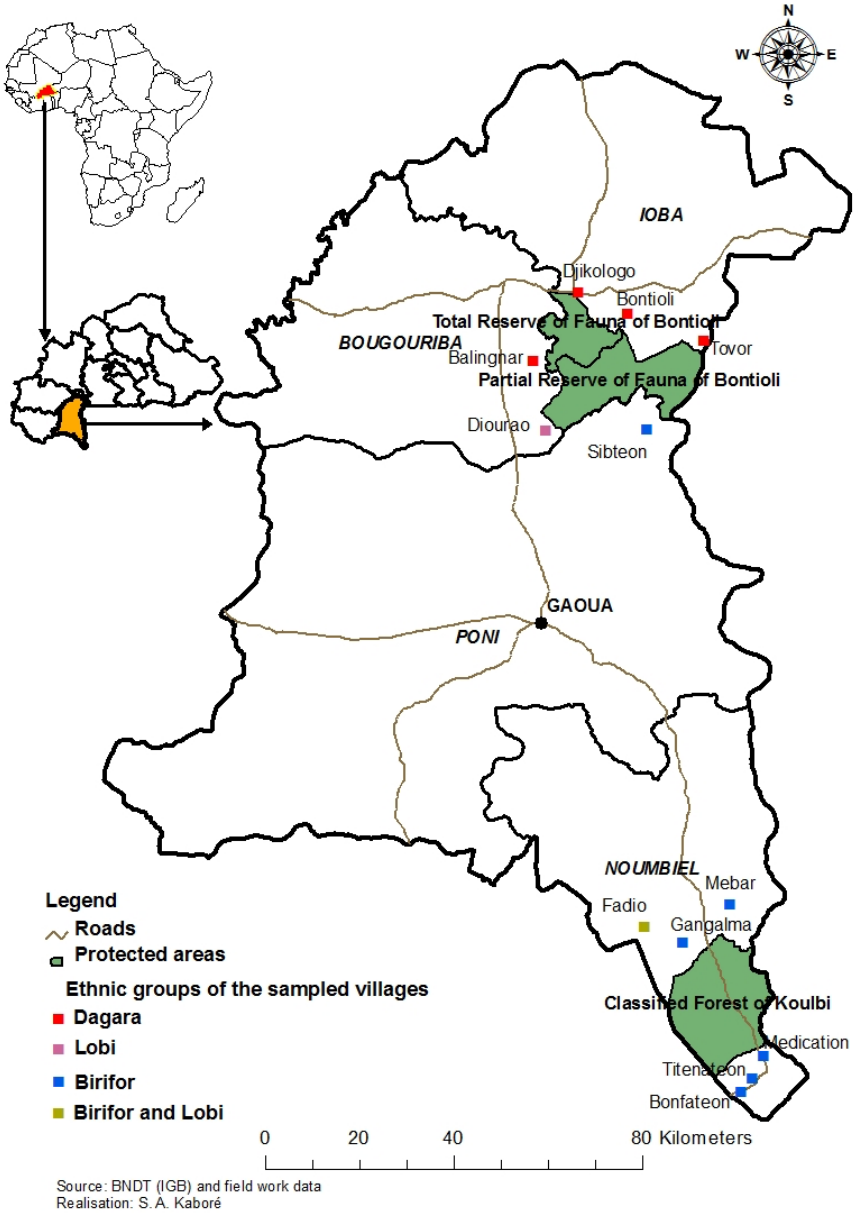

Figure 1. Location of the study site and the socio-cultural communities within the sampled villages.

Data collection and processing

The villages were randomly selected from those surrounding the two protected areas. In each village, 30 respondents were randomly selected from those over 18 years of age who agreed to participate in the survey, free of charge. However, respondents from the same household were not retained.

The study consisted of administering a semi-structured questionnaire to 360 respondents: 221 men and 139 women. The study involved 175 Birifors, 122 Dagara, 43 Lobi, 10 Fulani, 5 Mosse and 5 Dioula. The average age of respondents was 43.8 with a minimum of 18 years and a maximum of 90 years.

The questions were developed following a preliminary survey carried out in seven villages: Kamseo, Zambo, Gbogbozodoum (around the Bontioli reserves), Téhini-Sud, Ponikinkere, Donsere and Kpuere (around the Koulbi Classified Forest). Seventy respondents participated in the pre-survey, i.e. 10 per village. The ethno nomenclature of the species was studied during this preliminary survey. The questionnaire used in the large-scale survey was organised around seven themes: food, medicine, crafts, construction, wood fuel, fodder and culture. A voucher specimen of *B. africana* has been collected and deposited at the herbaria of Nazi Boni University.

Three ethnobotanical indices were used to analyse the data (Table 1): The informant diversity value (ID), which measures the number of respondents using the species and how this knowledge is distributed among them. The informant equitability value (IE), which measures the degree of homogeneity of respondents' knowledge, and the consensus value of use types (CTU), which indicates the degree of agreement between respondents. These indices have already been used by other authors such as Schumann *et al.* (2012) on *Adansonia digitata* L. in Burkina Faso, and Akouehou *et al*. (2014) on *Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg. in Benin. Excel was used to capture and analyse data.

Table 1. Ethnobotanical indices used to measure knowledge of the uses of *Burkea africana* among populations in the south-western region of Burkina Faso.

Ethnobotanical Index	Equations	Description	References
Informant diversity value (ID)	$ID = U / U_{xt}$ Number of reports of use of species by informant (U_x) divided by the total number of reports of use of species (Ut)	Measures how many informants use a species and how its use is distributed among them. Values range between 0 and the number of informants using it.	Byg & Baslev (2001)
Informant equitability value (IE)	$IE = ID/ID_{max}$ Informant diversity value (ID) divided by the highest value diversity index found $(ID)_{max}$	Measures how the use of a species is distributed among informants independently of the number of informants using it.	Byg & Baslev (2001)
Consensus value of use types (CTU)	$CTU = (TU/U_t)/S$ Number of times in which a given use is reported (TU) divided by the total number of uses (U_t). This value is then divided by the types of use separated within each category (food, medicine...) (S)	Measures the degree of concordance among the interviewees in regards to the uses of a given species.	Monteiro *et al.* (2006)

Results

Ethno nomenclature of *Burkea africana*

The Birifor use two names with apparently similar connotations, **broun'tié** and **brhéman**. The name **broun'tié** is used both by Birifor and Dagara (Table 2).

Table 2. Ethno-nomenclature of *Burkea africana* by the different socio-cultural communities.

Ethnic groups	Language	Name
Birifor	Birifor	**broun'tié, brhéman**
Dagara	Dagara	**broun'tié**
Lobi	Lobiri	**seiguê**
Fulani	Fulfuldé	**saïga-yéh**
Mosse	Mooré	**kasi-sané**

Distribution of knowledge on the uses of *B. africana* in the population

The informant diversity and equitability values are reported in table 3. The highest value of informant diversity is 0.147, while the lowest value is 0.044. This means that the most informed respondent knows 14.7% of all the uses listed, compared to only 4% for the person who listed the fewest uses. Among the three main ethnic groups, the results showed that knowledge of the plant is fairly similar among the Lobi and the Birifor, but higher among the). Men have more knowledge about the use of the species than women (Table 3).

Table 3. Informant diversity and equitability values.

	Survey indicators (Mean ± Standard error)	
	Diversity (ID)	**Equitability (IE)**
Villages		
Djikologo	0.097 ± 0.022	0.660 ± 0.152
Bontioli	0.074 ± 0.024	0.500 ± 0.166
Tovor	0.042 ± 0.013	0.287 ± 0.088
Diourao	0.049 ± 0.023	0.330 ± 0.157
Balingnar	0.056 ± 0.023	0.383 ± 0.157
Sibteon	0.039 ±9 0.016	0.267 ± 0.111
Gangalma	0.059 ± 0.017	0.400 ± 0.115
Fadio	0.057 ± 0.012	0.387 ± 0.081
Mebar	0.059 ± 0.023	0.400 ± 0.159
Bonfateon	0.046 ± 0.017	0.313 ± 0.115
Medicateon	0.045 ± 0.023	0.307 ± 0.157
Titenateon	0.041 ± 0.019	0.281 ± 0.130
All the villages	0.055 ± 0.025	0.377 ± 0.173
Ethnic groups		
Birifor	0.050 ± 0.020	0.337 ± 0.137
Dagara	0.067 ± 0.029	0.454 ± 0.200
Lobi	0.053 ± 0.022	0.358 ± 0.148
Dioula	0.034 ± 0.018	0.233 ± 0.125
Mossé	0.056 ± 0.022	0.380 ± 0.147
Fulani	0.038 ± 0.021	0.256 ± 0.142
Ages		
Respondents with an age ≤ 45 years	0.055 ± 0.024	0.371 ± 0.162
Respondents aged > 45	0.057 ± 0.027	0.385 ± 0.186
Sex		
Women	0.048 ± 0.023	0.326 ± 0.159
Men	0.060 ± 0.025	0.408 ± 0.173

Uses of *B. africana*

Burkea africana has a wide range of uses (Table 4). The most common use of wood is in the construction of traditional houses called *soukana* in Birifor (Table 5). The Dagara, Lobi and Birifor build houses with soil and wood panels, with *B. africana* (Figure 2 a & b) being one of the main species used (Figure 2 c & d). To gain access to the top of the slab, the trunk of the *B. africana* tree is usually cut away and used as a staircase.

The hardness of the wood, its resistance to termites and mould, and the forked shape of the trunk are the main advantages of using this species, as cited by respondents. The use of the plant in construction and culture was reported more by men, while the use of wood as a source of energy was reported more by women. Culturally, the main use of *B. africana* is to represent the dead. The plant is considered as a totem, as such it is prohibited to use its wood as firewood and building material (Table 4). For this reason, people don't even allow it into their homes and won't eat a meal prepared with its wood. In the case of construction, it is believed that disregarding the ban will cause the building to collapse. For all uses, wood is the most widely used part and root is the least used (Table 5).

Figure 2. Natural stands (top left) of *Burkea africana* in the south-western region of Burkina Faso; *B. africana* cut for construction purpose (top right); Traditional house roof built with *B. africana* wood (bottom left); A village with traditional houses (bottom right).

Table 4. Consensus value of use types (CTU) of *Burkea africana* cited by the population of the south-western region of Burkina Faso.

Categories of use		**CTU**
	Uses in the categories	
Medicine (36)		**0.311**
	Bark used for/to treat:	
	Stomach aches	0.017
	Malaria	0.015
	Toothache	0.015
	Coughing	0.007
	Haemorrhoids	0.004
	Chickenpox	0.002
	Wounds	0.002
	Constipation	0.002
	Earaches	0.002
	General ailments	0.002
	Kpor (a disease that attacks children and causes a hard lump on one side of the stomach)	0.002
	Fortifying yourself	0.002
	Leaves used for/to treat:	
	Fortifying yourself	0.027
	Fever	0.012
	Purifying the woman who has just given birth	0.012
	Kidney problems	0.005

	Joint pain	0.002
	Bleeding gums	0.002
	Dysentery	0.002
	Roots used for/to treat:	
	Hernia	0.020
	Stomach aches	0.010
	Toothaches	0.005
	Rheumatism	0.002
	Snake bites	0.002
	Chest pains	0.002
	Coughing	0.002
	Wounds	0.002
	Headaches in babies due to teething development	0.002
	Epilepsy	0.002
	Gonorrhoea	0.002
	Stimulating milk production of women who have just given birth	0.002
	Vomiting	0.002
	As a tonic	0.002
	Twig used:	
	As a toothpick	0.100
	To treat coughs	0.002
	Young shoots used to treat:	
	Toothaches	0.002
Crafts (17)	**Wood used to make:**	**0.824**
	Handles for *daba*s and axes	0.466
	Pestles	0.135
	Stools	0.083
	Sticks	0.042
	Checkers	0.020
	Mortars	0.020
	Benches	0.012
	Balafons	0.010
	Flutes	0.005
	Statuettes	0.005
	Feeders	0.005
	Gun handles	0.005
	Tam-tams	0.005
	Chairs	0.005
	Plough coupling	0.002
	Doors	0.002
	Spatulas	0.002
Construction (3)	**Wood used to build:**	**1.054**
	Homes	0.797
	Hangars	0.132
	Attics	0.125
Wood energy (2)		**0.714**
	Firewood	0.645
	Charcoal	0.069
Fodder (1)		**0.096**
	Tasty leaves	0.096
Culture (7)		**0.245**
	Wood used as a representation of a deceased person	0.086
	Wood placed behind the idols	0.025
	Root used by parents of twins	0.007

Totem pole: use and cutting prohibited	0.096
Plant used in sacrifices	0.017
Plant used to make talismans	0.012
Plant is a habitat for genies	0.002

Daba is a small traditional ploughing material.

Table 5. Consensus value of use types (CTU) of the various organs and the top ten uses of *Burkea africana* in the south-western region of Burkina Faso.

Rank	Organs	CTU	Rank	Uses	CTU
1	Wood	2.701	1	Wood used to build houses	0.797
2	Leaves	0.159	2	Firewood	0.645
3	Branches	0.103	3	Wood used to make the handles of *daba*s and axes	0.466
4	Bark	0.081	4	Wood used to make pestles	0.135
5	Root	0.069	5	Wood used to make sheds	0.132
			6	Wood used to build granaries	0.125
			7	Twigs used as toothpicks	0.100
			8	Palatable leaves	0.096
			9	Totem pole: use and cutting prohibited	0.096
			10	Wood used to make stools	0.086

Ethno-medicinal uses of *B. africana*

Twenty-six ailments were listed as being treatable with *B. africana*. Stomach aches, coughs and wounds, can be treated with at least two different organs. Among these ethnomedicinal uses, four are the most widely accepted. These are (1) leaf used for fortification; (2) root used to treat hernia; (3) bark used to treat stomach pain; (4) twig used as a toothpick to treat or prevent gingivitis (Table 5).

For 10 diseases (including toothache, malaria and cough), respondents were asked how the treatment was administered. Treatments were administered by drinking the decoction or macerated plant, rinsing, washing or applying the decoction directly to the area to be treated (Table 6).

Table 6. Preparation and administration of decoctions.

Diseases/care	Preparation and administration
Asthenia	Wash and drink the decoction of leaves
Hernia	1. Prepare a decoction of bark and grain flour to make an emetic. 2. Drink the decoction or macerated roots
Hemorrhoids	Purge with bark decoction
Postpartum hygiene and stimulating women's milk production	Take a bath with leaves decoction
Toothache/dental caries	1. Keep the decoction of bark, leaves or roots in the mouth for 10-15 minutes; 2. Apply a fragment of crushed root to the tooth.
Kidney pain	Drink a decoction of the young leaves
Stomach aches	1. Purge with a decoction of the bark; 2. Drink a decoction of the young leaves.
Malaria	Take a bath of and drink the decoction of leaves
Wound	1. Apply a fragment of crushed bark to the wound; 2. Apply a fragment of dried, crushed bark to the wound
Cough	Use one of the shoots as a toothpick as you swallow the juice

Discussion

Ethno nomenclature

In West Africa, it is common that local plant species received two or more vernacular names from indigenous peoples (Berhaut 1974). In this study, only the Birifor community give two names for *Burkea africana* (**broun'tié** and **brhéman)** It is very important to document the different vernacular names of studied species in native language. In Senegal, referring to Berhaut (1974) *B. africana* (Wild syringa tree in English) is called **siri** or **géléba** in bambara, **dakan dakan** or **kussion** in Mandingue and **dororkidigahi** or **kokobi** in Fulani. In this study the name **saïga-yéh** in Fulani seem to be close to the name **dororkidigahi** given by Berhaut (1974). The name **kasi-sané** (mooré) is the same as reported by Zizka *et al.* (2015). In Tanzania (East Africa), the species is called **mpuga** in Ngind and **mkarati** in Swah (Tanga 2022). Recording vernacular names is important as Hayova *et al.* (2023) proposed using these indigenous names in formulating scientific names of new plant species. In order to promote inclusion and make science more accessible, publishing on vernacular names can be very helpful. (Marinho & Scatigna 2022). This can also help people to recognize endangered species, thereby aiding in clarifying the conservation message.

Distribution of knowledge on the uses in the population

Sustainable conservation measures based on target groups (women, elders, etc.) can be developed by understanding how ethnobotanical knowledge is distributed among indigenous communities (Caro 2004). The fact that respondents under and over 45 years of age have almost the same CTU and IE suggests a good transfer of knowledge between generations. The mean Diversity Index on the use of *B. africana* in this study (0.055) is close to that found by Akouehou *et al.* (2014) on *Artocarpus altilis* (Parkinson ex F.A.Zorn) Fosberg in Benin (0.060), suggesting a similar distribution of ethnobotanical knowledge between the two communities surveyed. This means that both species need to be given the same attention when conservation measures are taken, as they are likely to be of equal importance in both communities. Men have more knowledge about the use of the species than women, because the species is most used in categories involving male labour like house construction and handicrafts (such as making gun handles), while women are involved in activities such as taking care children's health (babies' headaches, chickenpox, etc.), as reported in this study. Schumann *et al.* (2012) also found gender differences in the use of *Adansonia digitata* L. in eastern Burkina Faso. Other studies highlighted the role of gender in the differential distribution of ethnobotanical knowledge (Voeks 2007, Ali *et al.* 2023). This suggests that policy makers need to consider the gender specificity of uses when implementing conservation measures for a widely used species.

Uses of *Burkea africana*

The number of medicinal uses found in this study is significantly higher than that reported by Zizka *et al*. (2015) (36 vs. 9). The difference is due to the fact that our study focused on *B. africana* uses, while Zizka *et al*. (2015) results were compiled from fragmented studies on many plants uses. In general, the use of wood in construction is by far the most important use, and the majority of respondents acknowledged this. This is because the construction of traditional houses requires very hard woods, such as *B. africana,* for durability. In fact, *B. africana* is included in a list of the most resistant species in the world (Scheffer & Morrell 1998). In fact, *B. africana*'s Janka side hardness is 6490 N while its Janka end hardness is 7605 N. (PROTA4U 2024a). The exceptional hardness of the heartwood is partly related to its fungicidal and germicidal properties but may also be related to the hydrophobic nature of the wood, and its high dimensional stability (Neya *et al.* 2004).

The use of *B. africana* trunks involves the complete felling of individuals. This practice has a negative impact on its population structure and conservation. Wilson and Witkowski (2003) showed that the fruiting age of *B. africana* is 29 years. At this age, individuals reach approximately 12.7 cm in diameter (or 40 cm in circumference) at 20 cm above the ground. Unfortunately, it is these mature plants that are actively exploited.

One solution would be to plant and maintain the trees close to human settlements, so that residents of villages are no longer dependent on natural populations for construction needs. Industrial exploitation of *B. africana* plantations could also provide a profitable outlet and a solution for maintaining natural stands. The problem is the slow growth of *B. africana* and also it is a very difficult tree to propagate, but not impossible (Wildflower Nursery 2024). *B. africana* is comparable to *Colophospermum mopane* (Benth.) J. Léonard, a monotypic species of Southern Africa which is also a slow-growing plant but widely used for house construction (PROTA4U 2024b). These two species are not planted by locals, but they can be propagated by seeds (PROTA4U 2024a, b).

Firewood is the second most important use of this species. This can be explained by the high energy contents (lower calorific value of 19.5 MJ/kg) and the high fixed carbon levels (24.90% based on dry density) of *B. africana* wood (Fagbemi *et al.* 2020) and the relative abundance (between 44 to 116 tree/ha) of the species in the region (Kabore *et al.* 2015). The promotion and

dissemination of improved stoves and solar cookers should help to minimize the use of firewood. As *B. africana* is also a sought-after species for charcoal production, it will be necessary to increase monitoring of its use to prevent massive and fraudulent exploitation of this valuable resource.

The use of *B. africana* wood to make *daba* (aka hoe) and axe handles is the main craft use because the wood is heavy (air dry density of 1,155 kg/m^3) and hard, making it suitable for joinery (Tanga 2022). In order to conserve the species, it would therefore be necessary to popularize the use of the plough in the south-western region. Indeed, we have observed that the *daba* is widely used in the region, whereas in other parts of the country, such as the center, the animal-drawn plough tends to replace the *daba* among people with better incomes.

In terms of culture, the uses of *B. africana* in construction and in the representation of the dead are two important and special elements of the Birifor, Dagara and Lobi communities. Naah (2020) reported that *B. africana* is second only to *Vitellaria paradoxa* in cultural importance among 43 species used by the indigenous people of northwestern Ghana, adjacent to the study site of our research. The present study reported that the wood of *B africana* is used to represent a deceased person, and is also placed behind the idols. This result corroborates the study of Savadogo *et al.* (2018), who reported that the Lobi use its wood to support fetishes in dwellings. The durability of *B africana* (Neya *et al.* 2004; Tanga 2022) (and probably because of religious beliefs about the properties of this species.) can explain these uses of the wood in representation of the dead and others cultural uses because it can be used for a long time.

Ethno-medicine

The use of *Burkea africana* for headache corroborates the findings of Sandberg (1965). In fact, the stem bark extract of the plant has been found to exert central and peripheral analgesic activity (Musa *et al.* 2018) and antinociceptive effects (Jibira *et al.* 2022), justifying its traditional use against headache.

Burkea africana is also a well-known medicinal plant in other countries. It is used to treat scabies in Central African Republic and Republic of Congo (Sandberg 1965), retained placenta in cattle in Botswana (Moreki *et al.* 2012), opportunistic HIV/AIDS infections (herpes, rashes) in Namibia (Chinsembu & Hedimbi 2010) and mental disorders in Nigeria (Abubakar *et al.* 2022). Its bark contains antioxidants (Mathisen *et al.* 2002). Antioxidants are known to help the body prevent diseases such as atherosclerosis, cancer, diabetes neurodegenerative illness, stroke and rheumatoid arthritis (Burle *et al.* 2023). Root extracts have been shown to inhibit the growth of *Salmonella typhi* (Mbatchou *et al.* 2011b). This can justify the use of the plant against stomach aches and fever, one of the symptoms of typhoid scaused by *S. typhi* (Crump *et al.* 2015). Recent studies have shown that root extracts (Namadina *et al*. 2020) and bark extracts (Jibira *et al.* 2022) are safe for human consumption. This may justify the use of decoction and macerate in the treatments in this study. Although barks are often harvested with care, studies such as Delvaux *et al.* (2009) have shown that the species is not very tolerant of debarking. This practice should therefore be restricted, if not banned. Although the use of snake bites only received a low CTU (0.002), this use was also reported by Yaro *et al*. (2015) in Nigeria. Burkea *africana* extract has antiplasmodial constituents (Ezenyi et al. 2021) justifying its use against malaria reported in this study. Finally, based on its usefulness, it would be beneficial to consider in-situ conservation for this monotypic species, which is endemic to African deciduous woodlands and wooded savannas (PROTA4U 2024). This could involve protection against fire and cutting.

Conclusion

This study has compiled and analyzed all the ecosystem goods and services provided by *Burkea africana* to the people of south-western Burkina Faso. In our opinion, the uses of this species in construction and in the representation of the dead are the two most important elements that characterize the culture of the Birifor, Dagara and Lobi. Beyond the ecological aspect of protecting the species for the balance of ecosystems and the well-being of future generations, the preservation of this plant is also part of a philosophy of maintaining and affirming the traditional roots of a whole part of the social history of three related ethnic groups. The transition to modern housing can be encouraged so that the wood is used less, thus contributing to the conservation of *B. africana.* The therapeutic indications of the plant mentioned in this study can serve as hypotheses and guidelines for pharmacological studies. The introduction of the species in areas where the species is absent is highly recommended for its ex-situ conservation.

Declarations

List of abbreviations: TPRFB: Total and Partial Reserves of Fauna of Bontioli; KCF: Koulbi Classified Forest; ID: Informant diversity value; IE: Informant equitability; CTU: Consensus value of use types. UNDESERT: Understanding and combating desertification to mitigate its impact on ecosystem services.

Ethics approval and consent to participate: The work was carried out following the code of ethics of the Nazi Boni University where the project was hosted. All respondent consented orally to participate to the survey.

Consent for publication: Not applicable.

Availability of data and materials: All the data are summarized in the tables of the paper. Data are available with the corresponding author. The questionnaire was semi-structured.

Competing interests: The authors declare no competing interests.

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Authors' contributions: SAK designed the study, collected and analyzed the data, and drafted the manuscript. RD collected and analyzed the data. JTY designed the study and revised the manuscript. PO designed the study and revised the manuscript. HM designed the study and revised the manuscript. IS designed the study, coordinated the project and revised the manuscript. KH designed the study, coordinated the project, revised the manuscript and give final approval. HBN designed the study, supervised the work revised the manuscript and give final approval.

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