

Peasant perception of provisioning ecosystem services of Nafourgo and Dassissé community forests in the Central-West of Burkina Faso

Perception paysanne de la fourniture des services écosystémiques des forêts communautaires de Nafourgo et Dassissé dans le Centre-Ouest du Burkina Faso

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Abstract

Forest ecosystems are of global importance and vital to local communities. These communities depend on forests for their livelihoods, even their survival. The aim of this study was to identify the categories of ecosystem services that benefit local people and to measure the level of consensus around these services. Data were collected through questionnaires and interviews, primarily focusing on the ecosystem services provided by the forests studied. Household surveys, interviews, and field observations were used to gather information on the ecosystem services provided by these forests to local people. The results revealed a rich assemblage of 34 species representing 32 genera and 20 families. These forest species contribute to the provision of three provisioning ecosystem services with an informant consensus factor ranging from 0.8 to 0.97. These services are food (68%), traditional medicine (28%), and wood energy (4%). These findings confirm that local populations how important forest resources are for their basic needs. To ensure the availability of these resources in the long term, it remains necessary to provide them sustainable management practices.

Keywords: Local perception, ecosystem services, informant consensus factor, use value, Burkina Faso

Résumé

Les écosystèmes forestiers sont cruciaux à l'échelle mondiale et vitaux pour les populations locales. Ces communautés dépendent des forêts pour leur existence, voire leur survie, mais leurs activités peuvent menacer la durabilité de cette ressource. Il est donc essentiel d'évaluer le consensus de ces populations quant à l'importance de ces ressources pour elles, afin de promouvoir des pratiques d'exploitation plus durables. La présente étude avait donc pour objectif d'établir les catégories de services écosystémiques dont bénéficient les riverains et de mesurer le degré de leur consensus autour de ces services. Les données ont été collectées via des questionnaires et guides d'entretien et ont porté essentiellement sur les services écosystémiques fournis par les forêts étudiées. Pour ce faire, des enquêtes ménages, des entretiens et observations terrains ont permis de collectées des informations sur les services écosystémiques rendus par ces forêts au profit des

populations locales. Les résultats ont révélé un cortège de 34 espèces riche de 32 genres, 20 familles. Ces essences forestières participent à la fourniture de trois services écosystémiques d'approvisionnement avec un facteur de consensus informateur allant de 0,8 à 0,97. Ces services sont, par ordre d'importance du pourcentage d'expression d'usages : l'alimentation (68%), la médecine traditionnelle (28%) et le bois énergie (4%). Ces résultats confirment que les populations locales sont bien conscientes de l'importance des ressources forestières dans la satisfaction de leur besoins vitaux. Il reste donc à leur proposer des pratiques d'exploitation durable afin de pérenniser la disponibilité de ces ressources.

Mots clés : Perception locale, services écosystémiques, Facteur de consensus informateur, Valeur d'usage, Burkina Faso

1. Introduction

Forest ecosystems represent a multifaceted challenge for the entire planet (Kouagou et al., 2015). This challenge is ecological, economic, social, and cultural all at once. It becomes even more urgent and critical when it concerns communities living in proximity to these areas.

Indeed, populations living near forests depend on forest resources for their energy, food, medicine, and various essential products. For many farmers lacking resources, the use of Non-Timber Forest Products (NTFPs) represents a real lifeline (Tchatat and Ndoy 2006). Ouédraogo et al. (2013) emphasize that Non-Timber Forest Products (NTFPs) are essential for subsistence during dry periods in the Sahel and serve as a dietary supplement during periods of abundant rainfall. In tropical Africa, to mitigate poverty and agricultural yield instability, both rural and urban populations turn to NTFPs as a means of livelihood and income generation (Wotto et al., 2017; Noufe et al., 2023). This observation is also a reality in Burkina Faso, where a significant portion of the population, especially in rural areas, directly derives their subsistence from natural resources, including forest resources (Tiamiyu, 2020). It is therefore established and undeniable that forest ecosystems provide essential ecosystem services for the survival of populations living in their vicinity.

However, each ecosystem has its own distinct functions and services, which are intrinsically linked to the health of the ecosystem, the pressures imposed upon it, and how societies use them within a specific biogeographic and economic context (Ngom et al., 2014). Ouattara et al. (2016) have noticed that rural populations engaged in agriculture are more concerned about deriving financial benefits from the environment than preserving it, which poses a serious threat to the sustainability of the remaining forests. Agbahungba et al. (2001) also observed that the use of species by local populations can both contribute to the degradation of wild populations and serve as a preservation method for certain species. There is, therefore, a need to promote sustainable practices for the exploitation of these resources among these populations.

However, it is essential that these populations be convinced of the ecosystem services provided by these forest areas. Thus, the present study aims to identify the categories of ecosystem services that benefit the local communities and measure the degree of consensus among them regarding these services. The question that deserves to be asked is the following: what ecosystem services are provided by the community forests of Nafourgo and Dassissé to their residents? The anticipated answer to this question could be that these forests offer a diverse range of ecosystem services to their residents.

2. Materials and Methods

2.1. Study Area

This study focused on two community forests: community forest of Dssissé and community forest of Nafourgo. Both are located in the rural commune of Siglé, in the Boulkiemdé Province in the Central-West region of Burkina Faso (Figure 1). The commune is situated between the coordinates 12° 33' 26" North latitude and 1° 53' 13" West longitude. It is bordered to the North by the communes of Boussé and Nanoro, to the East by the communes of Boussé and Laye, to the South by the rural commune of Sourougbila, and to the West by the rural communes of Kindi and Pella.

2.2. Data Collection

Data were collected from households living near the two study forests. The distance from the nearest household to the forests is estimated at 200 meters, while that of the farthest household is 1,000 meters. These data primarily concern the ecosystem services they benefit from woody species of the forests adjacent to them. To obtain this data, the following questions were addressed to them: which species do you extract from the forest? which parts of this species do you use? for what purposes are these parts used? Proximity to the forests and the utilization of forest resources were the primary criteria for selecting the surveyed households. The population size to be surveyed was determined by the formula of Bruno and Jean Pierre (2003), which is suitable for small sample sizes. This led to surveys of 75 households near the Dassissé Forest and 95 households near the Nafougo Forest, resulting in a total sample of 170 households. Data were collected through a semi-structured questionnaire and focus-group, primarily focusing on the ecosystem services provided by the woody species of studied forests.

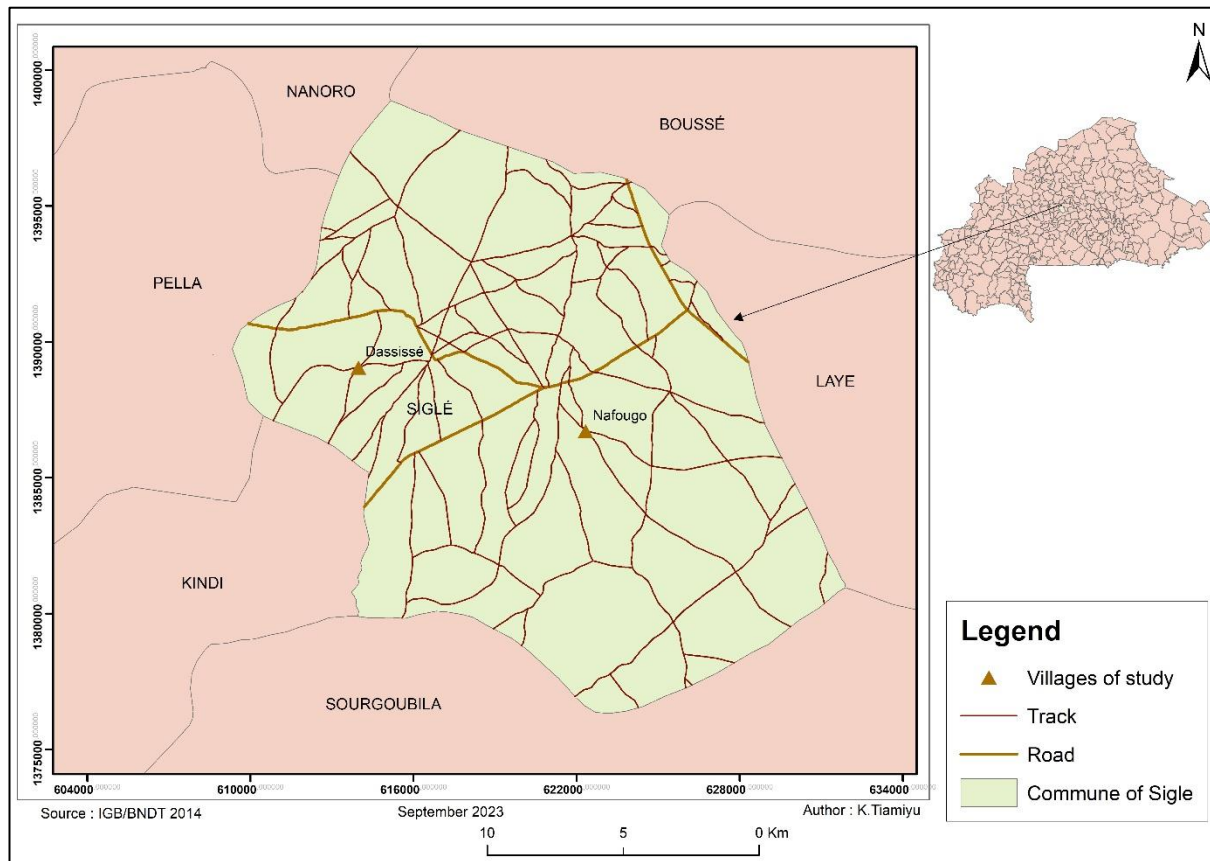


Figure 1. Geographic location of the study area

2.3. Data processing and analysis

The survey data were initially manually processed, then entered and analysed using Excel spreadsheet. The concept of "Consensus Informant" (IAR) by R. Trotter and M. Logan (1986), later revised by Heinrich et al. (1998) as the "Factor of Consensus Informant" (Fic) was employed to assess the degree of consensus among the respondents regarding the use of forest products from the studied forests. The Fic, in fact, provides the means to gauge the coherence of perception or information shared by a group of individuals concerning a specific fact or practice (Molares and Ladi, 2009). Therefore, in this study, it is used to evaluate the level of consensus among local residents regarding the use of forest products while determining the most widely perceived usage category by the respondents. The citation frequency was calculated for each usage category. Additionally, the use value of each species was determined, allowing for the estimation of the relative importance of species for the population in terms of provisioning services (Ayantunde et al., 2009; Sop et al., 2012).

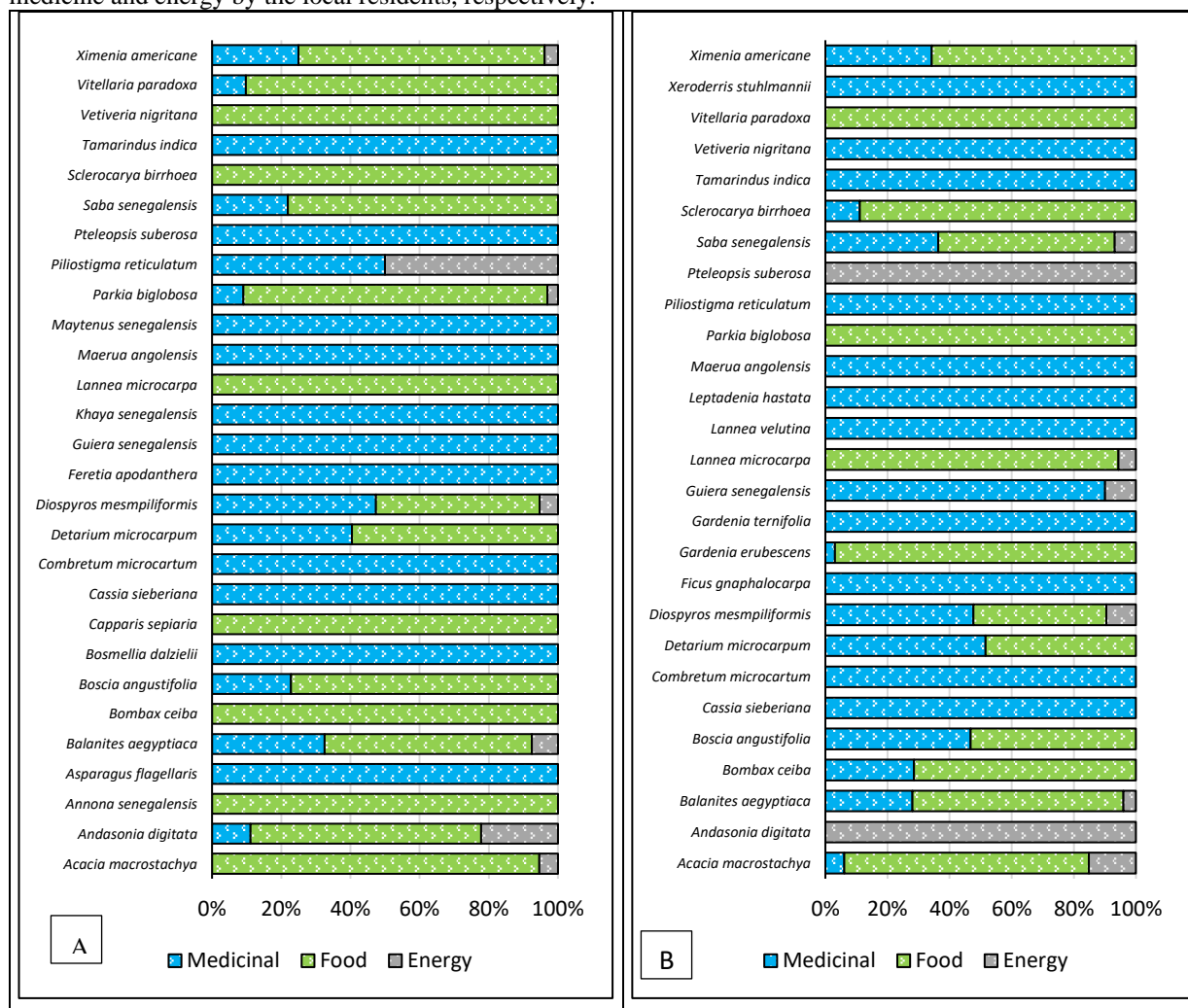
3. Results

3.1. Species Assemblage Contributing to Ecosystem Service Provision

A total of 34 woody species, distributed across 32 genera and belonging to 20 families, participate in providing ecosystem services to local populations. These species are the most reported: *Lannea microcarpa* Engl. & K.Krause, *Ximenia americana* L., *Vitellaria paradoxa* C.F.Gaertn., *Balanites aegyptiaca* (L.) Delile and *Saba senegalensis* (A.DC.) Pichon, with respective citation frequencies of 9.45%, 9.26%, 8.81%, 8.17%, and 7.72%.

Categories of Provided Ecosystem Services

The inventoried woody species among the population contribute to the provision of three types of uses, all belonging to the category of provisioning ecosystem services. These include food use, medicinal use, and energy use (Figure 2). A total of 21 species, 16 species, and 7 species respectively used in medicine, food, and as a source of energy by the residents of the Dassissé Forest. This corresponds respectively to 61.76%, 47.06%, and 20.58% of the recorded species. For the residents of the Nafourgo Forest, the number of species used for different types of purposes is 22 for medicine, 13 for food, and 8 as a source of energy, representing respective percentages of 64.71%, 38.24%, and 23.52% of the recorded species. Some species are utilized in all three types of purposes, while others are used in two or one type of purpose. This figure shows that *Lannea microcarpa* is the most commonly used species for food, while *Detarium microcarpum* and *Piliostigma reticulatum* are more commonly used for medicine and energy by the local residents, respectively.



Legend: A= Community Forest of Dassissé; B= Community Forest of Nafourgo

Figure 2. Importance of species for each type of ecosystem service

Source: Field Data Processing

The use value of the species, which highlights the importance of the species in providing ecosystem services across all types, is documented in Figure 3. Figure 3 reveals the species with the highest UV values, ranked in descending order as follows: *Ximenia americana* (0.69), *Lannea microcarpa* (0.68), *Detarium microcarpum* (0.56), *Saba senegalensis* (0.55), and *Vitellaria paradoxa* (0.55) for the Dassissé Forest. As for the Nafourgo Forest, these species are *Ximenia americana*, *Vitellaria paradoxa*, *Lannea microcarpa*, *Balanites aegyptiaca*, and *Boscia angustifolia* with respective UV values of 0.74, 0.59, 0.56, 0.53, and 0.49.

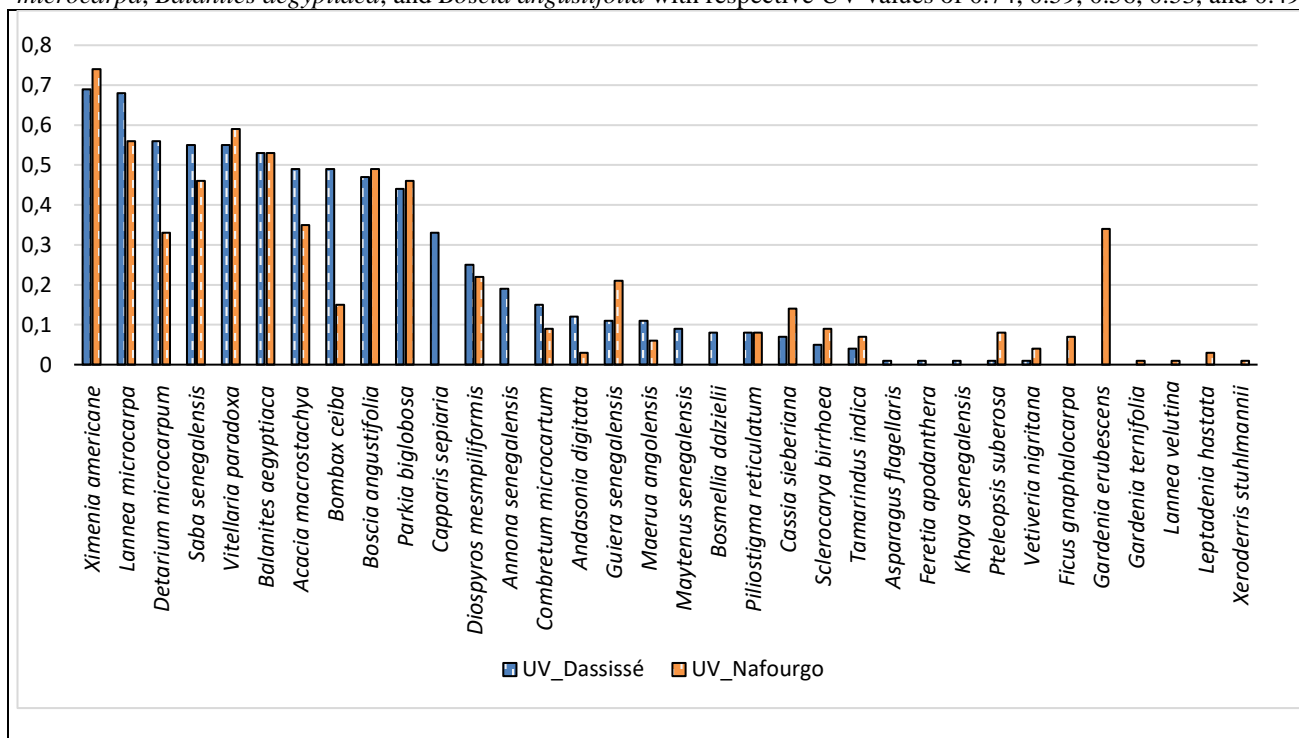


Figure 3. The use value (UV) of the species per villages

Source: Field Data Processing

Food Use

Among residents of both forests reveals a total of 24 species contributing to their diet. These edible species are dominated by *Lannea microcarpa*, *Vitellaria paradoxa*, *Ximenia americana*, *Parkia biglobosa*, and *Senegalia macrostachya* with respective citation frequencies of 12.92%, 11.89%, 10.61%, 9.34%, and 7.80%. On a forest scale, 16 species contribute to the diet of the residents near the Dassissé forest. These species, in order of importance, include *Lannea microcarpa* (12.98%), *Bombax ceiba* (9.41%), *Vitellaria paradoxa* (9.41%), and *Ximenia americana* (9.41%). In the case of the Nafourgo forest, 13 species contribute to the diet of the residents. These species are dominated by *Vitellaria paradoxa* (14.78%), *Lannea microcarpa* (13.19%), *Ximenia americana* (12.14%), and *Parkia biglobosa* (11.61%). Some of these species are consumed raw (such as *Ximenia americana* fruits), while others are prepared before consumption (like *Senegalia macrostachya* leaves). The populations harvest parts of these species, which can be fruits (89.41%), leaves (69.41%), or seeds (61.76%).

Traditional Medicine

A group of 33 species is used by residents in medicinal recipes to treat certain illnesses. The most frequently cited species for this purpose are, in order of importance, *Ximenia americana* (11.56%), *Detarium microcarpum* (10.31%), *Boscia angustifolia* (9.38%), *Balanites aegyptiaca* (8.44%), and *Guiera senegalensis* (8.13%). On a forest scale, 21 species are utilized by the residents near the Dassissé forest for medicinal purposes. *Lannea microcarpa*, *Bombax ceiba*, and *Vitellaria paradoxa* are the most commonly used species for this purpose, with respective citation frequencies of 12.88%, 9.85%, and 9.85%. On the other hand, 22 species are used by the residents near the Nafourgo forest for medicinal purposes. These species are dominated, in terms of citation frequency, by *Lannea microcarpa* (12.77%), *Ximenia americana* (11.70%), and *Parkia biglobosa* (9.57%). The parts of these species, such as the roots, leaves, seeds, and bark, are harvested and processed to serve as remedies for various illnesses, including diarrhoea, body aches, stomachaches, malaria, and coughs.

Energy Source

Only 10 species are mentioned by the residents of the study forests as being used as an energy source for cooking. *Piliostigma reticulatum* is the most commonly used species for this purpose, with a citation frequency of 23.91%. It is followed by the species *Senegalia macrostachya* and *Lannea microcarpa*, each with a citation frequency of 15.22%. On a forest scale, 7 species serve as a source of energy for the residents near the Dassissé forest. The most commonly used species for this purpose are *Balanites aegyptiaca* (21.43%), *Piliostigma reticulatum* (21.43%), and *Ximenia americana* (14.29%). On the other hand, the residents near the Nafourgo forest rely on a total of 8 species as a source of energy. *Pteleopsis suberosa*, *Senegalia macrostachya*, and *Lannea microcarpa* are the most frequently used species for this purpose, with respective citation frequencies of 28.57%, 17.86%, and 10.71%. The preference for these species primarily depends on their accessibility. These species are sometimes pruned and/or cut to preserve the base.

3.2. Consensus among Households on Provided Ecosystem Services

The values of the Informant Consensus Factor (Fci) calculated for each type of ecosystem service reveal a strong consensus among residents of the studied forests regarding the ecosystem services provided by the listed species. The degree of consensus is very high for food and medicinal species, with respective Fci values of 0.97 and 0.90 (Table 1). As for energy source species, the degree of consensus is high, with an Fci value of 0.80.

Table 1. Informant Consensus Factor by types of ecosystem services

Types of services	Number of citations	Number of species	Fci
Food	782	24	0.97
Medicinal	320	33	0.90
Energy	46	10	0.80

Source: Field Data Processing

The listed species play a more significant role in the diet of local residents, with a citation frequency of over 60%. Results also highlights that these residents rely less on woody species from the studied forests as an energy source, with a relatively low citation frequency of less than 5%.

4. Discussion

Results on species assemblage contributing to ecosystem service provision are somewhat consistent with those of Sop et al. (2014), Ngom et al. (2014), Maroyi (2012) and Samarou et al. (2023) in Burkina Faso, Senegal, Zimbabwe and Togo, respectively. In Burkina Faso, in the sub-Saharan phytogeographic sector, Sop et al. (2014) identified a group of 90 species recognized by local populations as participating in the provision of ecosystem services. These species are grouped into 64 genera and 32 families, dominated by the Mimosoideae, Caesalpinioideae, Combretaceae, Capparaceae, and Anacardiaceae families. They contribute to the provision of 6 types of provisioning ecosystem services, including the three types revealed in this study. *Balanites aegyptiaca*, *Pterocarpus lucens*, *Anogeissus leiocarpa*, *Sclerocarya birrea*, and *Combretum micranthum* are the species with the highest UV values. This difference can be explained by the divergent size of the study areas. The study conducted by these authors covered 20 villages, while ours only considered two villages. In the northern part of Senegal, Ngom et al. (2014) identified a group of 44 woody species, belonging to 36 genera and 20 families, contributing to 6 types of provisioning ecosystem services. In the Nhema communal area in the Midlands province of Zimbabwe, Maroyi (2012) revealed a group of 46 woody species used by local populations to meet various needs. These species are distributed across 40 genera and 24 families, dominated by Fabaceae, Combretaceae, and Poaceae. This difference could be linked to the fact that the present study only focused on the species found within the boundaries of the studied forests. However, Maroyi (2012) focused on the entire communal landscape.

These results of food use are partially consistent with those of Guigma et al. (2012), who demonstrated that *Parkia biglobosa* (fruits, seeds), *Tamarindus indica* (fruits and leaves), *Adansonia digitata* (fruits and leaves), *Vitellaria paradoxa* (fruits and seeds), *Annona senegalensis* (fruits and flowers), *Vitex doniana* (fruits and leaves), *Hibiscus cannabinus* (leaves), *Bombax costatum*, *Saba senegalensis* (fruits), and *Detarium microcarpum* (fruits) are the species with the highest consumption indices in the villages of Pighyiri, Thorem, and Tiakané in southwestern Burkina Faso. The number of edible species identified in this study is lower than that found by Tatak et al. (2020) in arid areas in Ethiopia, who identified 88 species consumed by local communities. This difference in the number of species could be attributed to dietary habits that vary from one area to another and from one

culture to another. It could also be explained by the relatively small size of the forests in this study. These same authors revealed higher species UV values (>2) than those calculated in this study (<1). This can be explained by the fact that the species listed in the woody stands of the Ferlo Biosphere Reserve provide more ecosystem services than the species inventoried in the context of this study. Ouattara et al. (2016) also highlighted several uses associated with woody species in northern Côte d'Ivoire in the Tengrela Department, including therapeutic, dietary, and other uses. 50.44% of the cited species are used for medicinal purposes, while 20.35% are used for human consumption, and 29.20% of these species are used for various purposes (energy, artisanal, construction). Souaré et al. (2020) revealed 5 types of NTFP uses by residents of the Zamay forest reserve in Cameroon. Medicinal use came first with a frequency of 50.79%, followed by dietary use with a frequency of 31.75%.

The use of forest tree organs for healing purposes was also reported by Souaré et al. (2020) in Cameroon by residents of the Zamay forest reserve. Yanogo et al. (2023) found that the leaves, bark, roots, unripe fruits, young branches, flowers, and ripe fruits of forest species are used by the population of the Siglé commune in Burkina Faso to treat certain illnesses such as stomachaches, malaria, ulcers, body pains, post-childbirth pains, and diarrhoea.

Regarding the use of woody plants as a source of energy, Ngom et al. (2014) also noted that out of the 44 species listed by respondents living near the Ferlo Biosphere Reserve in Senegal, only 7 are used as firewood or charcoal by local residents. They preferentially use species such as *Grewia bicolor*, *Combretum glutinosum*, and *Pterocarpus lucens*. The reasons for this preference, according to the authors, include the physical characteristics of the wood, convenience, availability, and the production of a by-product which is charcoal.

The broad consensus on the use of woody species in provisioning ecosystem services, as revealed in this study, is also reported in the Ferlo Biosphere Reserve in Senegal by Ngom et al. (2014). In fact, these authors calculated Fci values ranging from 0.92 to 0.7. This result is further partially supported by the findings of Gning et al. (2013) in the Malinke region of Senegal. They indeed revealed a strong consensus regarding the use of woody plants in six clearly identified categories of usage, with a consensus level exceeding 0.8 for all categories of usage

5. Conclusion

This study has highlighted the importance of plant species for households living near the Dassissé and Nafourgo forests in Boulkiemdé, Burkina Faso. These forest resources contribute to the provision of three types of provisioning ecosystem services with an informant consensus factor ranging from 0.8 to 0.97. These services, in order of importance by the percentage of usage expression, are food (68%), traditional medicine (28%), and wood energy (4%). These results confirm that local populations are well aware of the importance of forest resources in meeting their basic needs. Therefore, it remains necessary to offer them sustainable exploitation practices to ensure the long-term availability of these resources.

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Authors contribution's

References

- Agbahungba G, Sokpon N, Gaoué OG (2001). Situation des ressources génétiques forestières du Bénin. Atelier sous-régional FAO/IPGRI/ICRAF sur la conservation, la gestion, l'utilisation durable et la mise en valeur des ressources génétiques forestières de la zone sahélienne (Ouagadougou, 22-24 sept. 1998). Note thématique sur les ressources génétiques forestières. Document FGR F, 12p.
- Ayantunde AA, Hiernaux P, Briejer M, Udo H, Tabo R (2009). Uses of local plant species by agropastoralists in South-western Niger, *Ethnobotany Research et Applications* 7, pp. 53-66.
- Bruno M, & Beaud J (2003). Guide pratique pour l'utilisation de la statistique en recherche : le cas des petits échantillons.
- Gning ON, Sarr O, Gueye M, Akpo LE, Ndiaye PM (2013). Valeur socio-économique de l'arbre en milieu malinké (Khossanto, Sénégal). *Journal of Applied Biosciences*, 70, pp. 5617– 5631. <https://doi.org/10.4314/jab.v70i1.98765>
- Heinrich M, Ankli A, Frei B, Weimann C, Sticher O (1998). Plantes médicinales au Mexique : Consensus des guérisseurs et importance culturelle. *Sciences sociales et médecine*, 1998, vol. 47, n° 11, p. 1859-1871

- Kouagou SR, Toyi MS, Mama A (2015). Perception paysanne sur la fragmentation du paysage de la Forêt classée de l'Ouémé Supérieur au nord du Bénin. *VertigO - la revue électronique en sciences de l'environnement* [En ligne], Volume 15 Numéro 2 URL : <http://vertigo.revues.org/16477> ; <https://doi.org/10.4000/vertigo.16477>
- Maroyi, A. (2012). Local plant use and traditional conservation practices in Nhema communal area, Zimbabwe. *International Journal of African Renaissance Studies-Multi-, Inter-and Transdisciplinarity*, 7(1), 109-128.
- Molares S, Ladi A (2009). Ethnobotanical review of the Mapuche medicinal flora: Use pattern on a regional scale. *Journal of Ethnopharmacology*, 34: 75-80. <https://doi.org/10.1016/j.jep.2009.01.003>
- Ngom D, Charahabil MM, Sarr O, Bakhoum A, Akpo LE (2014). Perceptions communautaires sur les services écosystémiques d'approvisionnement fournis par le peuplement ligneux de la Réserve de Biosphère du Ferlo (Sénégal). *VertigO*, 14(2).
- Noufe F, Yameogo J, Ouoba P et Somda I (2023). Analyse des facteurs influençant la dynamique des ligneux dans la forêt classée de Kuinima en zone périurbaine dans l'ouest du Burkina Faso. *Rev Écosystèmes et Paysages (Togo)*, 03(1): 32–47, e-ISSN (On-line): 2790-3230 doi: <https://doi.org/10.59384/recopays2023-3-1>
- Ouattara D, Kouame D, Tiebre M, Kouadio YJC, N'guessan KE (2016). Biodiversité végétale et valeur d'usage en zone soudanienne de la Côte d'Ivoire. *Int. J. Biol. Chem. Sci.* 10(3): 1122-1138. DOI : <http://dx.doi.org/10.4314/ijbcs.v10i3.18>
- Ouédraogo M, Ouédraogo D, Thiombiano T (2013). Dépendance économique aux produits forestiers non ligneux : cas des ménages riverains des forêts de Boulon et de Koflandé, au sud-ouest du Burkina Faso. *Journal of Agriculture and Environment for International Development - JAEID*, 107 (1), pp. 45 – 72
- Samarou M, Lekeriba N, Atakpama W, Kanda M, Dourma M, Batawila K, Akpagana K (2023). Diversité et importance économique des plants forestiers utilisés dans la restauration des paysages dans la région Maritime au Togo. *Rev Écosystèmes et Paysages (Togo)*, 03(1): 149–166, e-ISSN (Online): 2790-3230
- Sop TK, Oldeland J, Bognounou F, Schmiedel U, Thiombiano A (2012). Ethnobotanical knowledge and valuation of woody plants species: a comparative analysis of three ethnic groups from the sub-Sahel of Burkina Faso, *Environment, Development and Sustainability* 14 (5), pp. 627-649.
- Souaré K, Froumsia M, Hamawa Y, Sassouang EMT, Ibrahima A (2020). Diversity and local uses of tree species of non-timber forest products in Zamay forest reserve in Cameroon. *International Journal of Environment* Volume-9, Issue-2, 2019/20 ISSN 2091-2854, p146-171 DOI: <http://dx.doi.org/10.3126/ije.v9i2.32685>
- Tatek D, Mohamed SA, Dolores A, Pablo M (2020). «Ethnobotanical Survey of Wild Edible Fruit Tree Species in Lowland Areas of Ethiopia» *Forests* 2020, 11, 177; <https://doi.org/10.3390/f11020177>. p.17
- Tiamiyu K (2020). Les forêts villageoises de la commune rurale de Siglé : entre dynamique et retombées socio-économiques pour les populations locales. Mémoire de Master, Département de Géographie, Université Norbert ZONGO, Burkina Faso, 127p.
- Tchatat M, Ndoye O (2006). Étude des produits forestiers non ligneux d'Afrique centrale : réalités et perspectives. *Bois et forêts des tropiques*, 2006, N° 288 (2). Pp. 27-39
- Trotter RT, Logan MH, Etkin NL (1986). Plants in indigenous medicine and diet. *Behavioural approaches*, 91, 112.
- Wotto A, Gbaguidi AHU, Vissoh AS (2017). Importance Socioculturelle Des Produits Forestiers Non Ligneux Du Massif Forestier d'Agoua au Bénin. *European Scientific Journal*. <https://doi.org/10.19044/esj.2017.v13n14p123>
- Yanogo PI, Rouamba S, & Tiamiyu K (2023). Neglected communal forest with unsuspected socioeconomic benefits: case of the commune of Sigle, in the central-western region in Burkina Faso. *DJIBOUL Special*, 9, 96–111.