JOURNAL OF NATURAL RESOURCES AND DEVELOPMENT

Tree tenure and its implications for sustainable land management: The case of *Parkia biglobosa* in the Northern Region of Ghana

Esther E. Amoako[a]*, W. J. Asante[b], S. Cobbinah[a], C. J. W. Kuuder[a], R. Adongo[a] and E. A. Lawer[c]

[a] Department of Ecotourism and Environmental Management, Faculty of Renewable Natural Resources, University for Development Studies, Nyankpala campus, Ghana.

[b] Department of Forest and Forest Resources Management, Faculty of Renewable Natural Resources University for Development Studies, Nyankpala Campus, Ghana.

[c] Department of Range and Wildlife, Faculty of Renewable Natural Resources. University for Development Studies, Nyankpala Campus, Ghana. Email :lawereric@yahoo.com

*Corresponding author: ekubee@yahoo.com / eamoako@uds.edu.gh

The research was funded by the UNU-LRT, Iceland.

Article history

Received 19/05/2014
Accepted 20/05/2015
Published 15/07/2015

Keywords

Tenure systems
Land management
Traditional areas
Tree chiefs
Ghana

Abstract

Parkia biglobosa is a multipurpose species found in Savannah agroforestry parklands of West Africa. The species is important as it prevents against land degradation while providing food and other products. This study focuses on how land and tree tenure arrangements affect tree populations in three traditional areas in the Northern Region of Ghana (Dagomba, Gonja and Mamprusi) and the implications that these arrangements have for sustainable land management. Focus group discussions and key informant interviews were held in the three communities to provide information on the tenural arrangements of Parkia biglobosa. A tree census was conducted to estimate the densities of *Parkia biglobosa* in crop and fallow fields. The study shows that differences in tenure systems in the three traditional areas have implications for *Parkia biglobosa* populations and also for sustainable land management. It is concluded that traditional tenure systems along with regulation protect the trees from destruction as observed in the Dagomba and Gonja areas compared to the open access system identified in Kperiga in the Mamprusi area.

1. Introduction

Discrepancies between tree tenure and land tenure have constantly been an issue of considerable concern for sustainable land management in Ghana. This is particularly important in the management of economically important and multipurpose indigenous tree species, more so because 78% of the total land area in Ghana belongs to traditional land owners according to Damnyag *et al.*[1]. In the Northern Region of Ghana, traditional tenure systems separate land tenure from tree tenure rights; this may affect different land users and also cause destruction of the resources within. Damnyag *et. al.*[1] observed that land and tree tenure arrangements are among the major causes of the depletion of land resources and deforestation in Ghana and most probably in agroforestry parkland in the Northern Region.

Ownership and usufruct rights regarding trees take various forms. In some areas and among certain ethnic groups, such as the Dagomba, all trees are owned by a title holder referred to as the *Dohinaa* (literally translated as 'dawadawa tree chief'; Dohi = dawadawa trees, naa = chief). The *Dohinaa* has the right to harvest the fruits of all dawadawa trees in his area of jurisdiction, regardless of the ownership of the land itself. With the exception of community chiefs and some elders who normally own some trees, other community members require permission from the Dohinaa if they want to harvest these fruits. This contrasts with other useful tree species, such as the shea nut tree (*Vitellaria paradoxa*), which are communally owned. The usufruct right also confers some responsibilities to the *Dohinaa* for managing the trees and thus ensuring their protection from destruction [2]. This system of ownership is not prevalent among other major ethnic groups in the Northern region, such as the Mamprusi and Gonja. Tree tenure systems are thus complex and diverse and have enormous implications for sustainable land management.

Nonetheless, community control and tenure over land, and presumably trees, is in most cases extensive. In Ghana, the National Land Policy declares the government's intention to collaborate with traditional authorities and other stakeholders to promote ecosystem maintenance and biodiversity conservation [3]. The policy thus recognizes that land tenure rights have implications for the management of trees and other natural resources. It has been observed that even though farmers in all areas of Ghana retain economic and multipurpose trees on their farms as in the case of *Parkia biglobosa*, the norm is that the traditional owner of the land has rights over the products of these trees, unless the owner has specifically transferred this right ([4]; [5]).

Parkia biglobosa is one of the most dominant tree species in the Northern Region of Ghana and plays an important role in the lives of the people. The tree provides food, medicine, wood for building and fuel, and is very important in soil amelioration and environmental protection. It is commonly found in cultivated fields, bush fallows and settlements [4]. A unique user-right tenure arrangement exists for *Parkia biglobosa*.

Studies have revealed that tenant farmers do not take good care of *Parkia biglobosa* trees on farms in the Dagomba traditional area [6]. Land tenure arrangements by leasehold and customary freehold apparently deny farmers and private owners in the Dagomba area control and restrict access to these important trees. The consequence is a reduction in tree populations and increased land degradation, as the trees are not actively protected from destruction, Damnyag et al. [1].

The research reported here aims to analyze the different ownership and management systems of *Parkia biglobosa* and assess the implications of different management systems for tree density and sustainable land management. This research was guided by the following specific research questions: 1) What systems of "Parkia biglobosa" ownership exist in the Dagomba, Gonja and Mamprusi traditional areas and what are the relationships between the systems of ownership and tree population densities? and 2) What are the implications of tree tenure for sustainable land management?

2. Study area and methods

2.1 Study area

Three communities were selected on the basis of a previous study by the principal author, conducted to ascertain the impact of ownership and management on *Parkia biglobosa* production in the Dagomba area. A comparison of this management system with those of two other traditional areas was seen as a fruitful way to extend this study. The communities selected were Damongo Zongo in the Gonja Traditional Area, Nafarang in the Dagomba traditional area, and Kperiga in the Mamprusi traditional area. Brief characteristics of each community are summarized in **Table 1**.

Table 1: Selected communities and districts. Each community in this study represents a traditional area. 'Land pressure' refers to the demand for land for other uses other than leaving it in the original state.

Community	District	Traditional area	Land pressure	Ethnic Diversity
Nafarang	Tolon-Kumbungu	Dagomba	Very low	Low
Damongo Zongo	West Gonja	Gonja	Low	High
Kperiga	West Mamprusi	Mamprusi	High	Moderate

2.2 Methods

2.2.1 Key informant interviews and Focus group discussions

Interview guides were used to solicit information about the systems and management of the trees in each of these communities (**Table**

1). Purposive sampling was used to select respondents for the key informant interviews. In Nafarang, one *Dohinaa* and one *magazia (women's leader)* were interviewed. Two community leaders, female and male, were interviewed in Kperiga and also in Damongo. Thus a total of six key informants were interviewed in the three communities. A total of six focus groups, each comprising a group of 6–12 people, were held in all three communities. Discussion guides, essentially an outline of the key issues, were used in the focus group discussions. They yielded qualitative data about the systems of management of the dawadawa trees, the role of the tree in sustainable land management, and people's views on the management systems. Discussions were held separately for women and men. The method was used to explore the systems of ownership in the three traditional areas, and to assess whether the various systems of tenure have implications for tree populations and how they affect community members at large. Data from the focus group discussions and key informant interviews were interpreted using standard qualitative data analysis methods, Laws *et al.***[7]**.

2.2.2 Tree Census

Enumeration of *Parkia biglobosa* was conducted to examine the impact of the different tree tenure systems on tree densities. The sampling was designed so as to give an estimate of the tree densities under two land-use types (crop fields and fallow fields) within the three communities. Areas of 10,000 m^2 (1 hectare) of each land use, 1 km away from the community, were selected and four 20x20 m quadrats were located within these areas. The number of *Parkia biglobosa* trees was recorded in each quadrat, taking into account both saplings (trees less than 12 meters in height) and mature trees. A total of 24 quadrats were laid in both crop fields and fallow fields in the three communities. The total number of trees in each quadrat and each land-use type were extrapolated as a measure of density for the communities. The data were then used to compare the relationship between the communities and systems of ownership. The vegetation data is presented in graphs.

3. Results

3.1 Systems of Tenure in Dagomba, Gonja and Mamprusi Traditional Areas and Densities of Parkia biglobosa

In Nafarang (Dagomba traditional area), the tree chief system prevails and has not changed over many years. The *Dohinaa* is responsible for the management of the trees in their areas of jurisdiction, which normally end at the boundaries of their community lands. The chiefs ensure the protection of the trees from destruction by fire and humans. They are also responsible for the pacification of the tree (incantations made to the gods of the land to make peace with the trees for good fruits and bumper harvest. This is normally done at the beginning of the fruiting season). They supervise and monitor the harvesting of fruits during the fruiting season. They have the authority to sanction individuals who are found destroying or cutting down trees, by confiscating the product and demanding the payment of fines. Culprits found cutting the trees are fined according to the size of the log or lumber. The present study revealed that the *Dohinaa* performs these duties with the assistance and support of the community chiefs, sub-chiefs and elders who are specifically assigned to assist in the protection of the trees against destruction. Farmers who have trees on their farms are however expected to also assist in the protection of the tree.

Unlike Nafaranga, in the Damongo Zongo (Gonja traditional area), this study revealed that the trees are owned by traditional landowners, who are the chiefs, sub-chiefs and family elders, and that there are no tree chiefs. There are no particularly strict rules or restrictions, especially as far as one can collect the fruits of the tree from the wild. Even though the traditional landowners have some level of control, and can sanction people who are found cutting the tree by demanding the payment of fines, there are no strong boundaries as to where to harvest or not, especially if fruits are harvested from the wild, which is more common where there is little control in terms of ownership. The only restriction is that a person cannot harvest fruits from another person's farm without permission. Perpetrators who are not indigenes are said to pay higher fines.

The care for the trees on the farms, the informants maintained, is purposely based on self-interest; the farmer's motive for protection is to secure fruits (for seeds and pulp) for the family, whereas herbalists protect the tree for it medicinal usefulness. This self-interest, they commented, is not directly economic, as the returns from the sales of dawadawa are meager when compared to the shea nut trees, the product of which is sold in both local and international markets. A major role for protection and care, mentioned in the key informant interviews and iterated in the discussions, is the announcements made by the chiefs every year to remind and warn people to refrain from deliberately cutting down or burning the trees, especially during the dry season. Nevertheless, both the landowners and farmers are responsible for tending to and protecting the trees.

Interviews and focus group discussions in Kperiga (Mamprusi traditional area) revealed that trees on farmlands are owned by the traditional landowners, and trees within the settlement are owned by the chiefs. Everybody, including traditional landowners, settler migrants and tenant farmers, have free access to trees growing in the wild. These groups of people have the right over the use of the trees and are responsible for their protection. Similar to Damongo Zongo and Nafarang, tenant farmers are not allowed to harvest fruits from trees on farm lands. They will always need permission from the landowner to harvest from the farm.

The study observed that negative tree-crop interactions as a result of the broad canopy, high demand for charcoal, especially in Kperiga with a fast growing population, and the use of modern farm implements which mostly destroy saplings, are other major causes of tree decline besides tenure arrangements.

Densities of *Parkia biglobosa*

This section illustrates tree densities in each community comparing

the total number of trees per hectare in crop fields and fallow fields. Densities of Parkia biglobosa were higher in fallow fields than in crop fields.

Nafarang had the highest density of Parkia biglobosa (the difference between Nafarang and the other two area is obvious, but not so for Damongo Zongo and Kpreiga). *Parkia biglobosa* densities of saplings and mature trees were observed to be higher in crop fields in Damongo Zongo and Nafarang than the estimates in Kperiga. Again, in fallow fields, the density of mature trees and saplings were the highest in Nafarang, followed by Damongo Zongo, with Kperiga having the lowest number of trees (**Figure 1**).

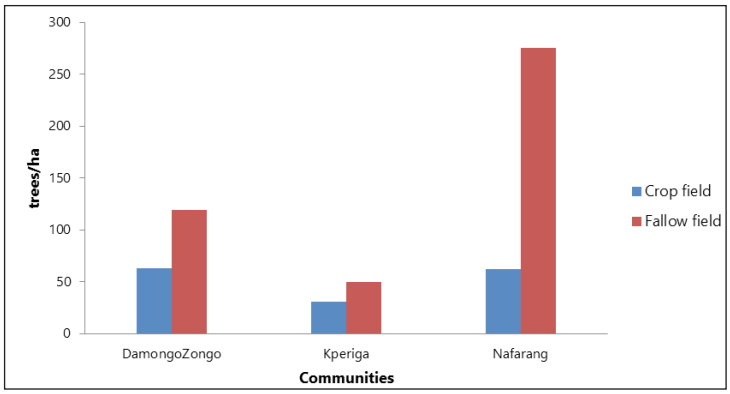

Figure 1: Densities of *Parkia biglobosa* according to land use in the three study communities.

The total number of saplings estimated in crop fields was highest in Nafarang, much lower in Damongo Zongo, and no saplings were recorded in Kperiga (**Figure 2**). All three communities had mature trees in the crop fields. Damongo Zongo had the highest density of mature trees; the same densities were estimated for both Kperiga and Nafarang.

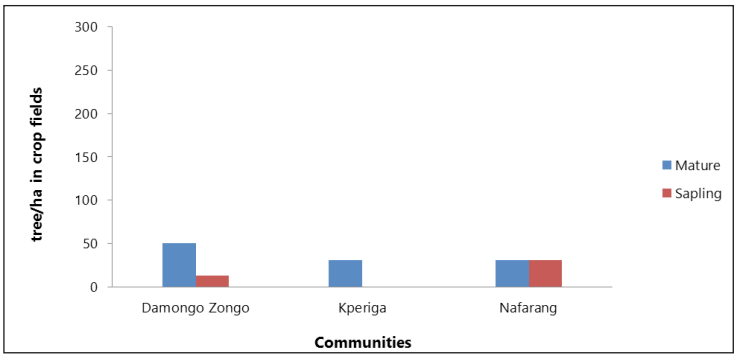

Figure 2: Densities of saplings and mature trees in crop fields in the three study communities

Densities of saplings estimated in fallow fields in Nafarang were much higher than in Damongo Zongo and Kperiga. All three communities, however, had fairly similar numbers of mature trees in fallow fields (**Figure 3**)

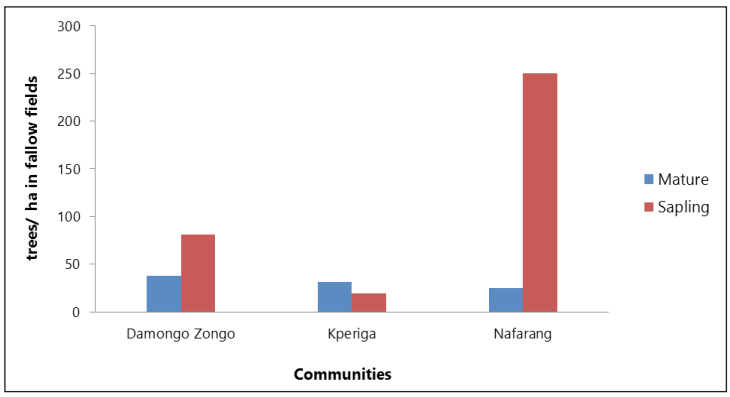

Figure 3: Densities of saplings and mature trees in fallow fields in the three study communities

4. Discussion

4.1 The systems of ownership in the Dagomba, Gonja and Mamprusi traditional area in relation to *Parkia biglobosa* densities

Three different systems of tree tenure determine the management of Parkia biglobosa in the three traditional areas studied. The *Dohinaa* system in the Dagomba Traditional Area is restrictive in access to and control over the trees and their products, whereas the system in the Gonja Area allows access but partial control and a less restrictive tenure system prevails in the Mamprusi area, approximating open access. The Gonja and Mamprusi systems have provision of access to fruits in the wild by tenant and non-native farmers. However, the Dohinaa system in Dagomba prohibits access especially for non-natives to the trees and tree products, both on farms and outside farms. Natives have access only with the permission from the *Dohinaa*; Blench and Dendo **[5]**; Poudyal **[6]**.

Again in the Mamprusi traditional area, the traditional authorities however, have no hard-and-fast rules for the protection of the trees. The absence of regulations has most probably resulted in the low densities of samplings and mature trees (**Figure 1**). Like any common-pool resource in any part of the world, the absence of regulation can lead to depletion of the resource, cf Ostrom **[8]**; Ratner **[9]**.

The study revealed that the decrease or increase in tree population depends or how people under a particular system of ownership identified in the three traditional areas are motivated to care for the trees and guided against their destruction. Hence, the system of tenure and management is probably reflective of the tree densities estimated in Damongo Zongo and Nafarang, and Kperiga (**Figure 1**).

In all three areas, fallow fields recorded considerable tree (mature and saplings) densities as against low densities on farm lands. Thus the fallow periods allow for regeneration of the species and also the chiefs annual caution to communities in the Damongo area could be serving a useful purpose to the conservation of the trees both within farmland and fallow fields in Damongo Zongo. The generally low tree

densities recorded on farm lands could be attributed to the fact that many saplings are destroyed during the cropping period through the use of tractor-drawn ploughs, burning during land preparation, particularly in Kperiga with its high land pressure, and therefore no saplings are recorded. This confirms Songsore's **[10]** earlier findings that these factors are a threat to natural regeneration of trees, hence ecosystem functions.

Also, the unwillingness of some people to take care of trees (mature trees and saplings) because they neither own nor have direct control over them may be another reason for the lower trees densities estimated for crop fields in the study areas (**Figure 2** and **Figure 3**) (Poudyal **[6]**).

Nonetheless, the tree densities estimated in the three study communities cannot exclusively be attributed to the systems of ownership, since the number of years of cropping of each sampled crop field and fallow field were not considered in this study. Zinck and Farshad **[11]** explain that sustainability considers time factors for regeneration of land resources. Moreover, the diversity within agricultural systems, from one ethnic group to another and even among individual households, cannot be overemphasized **[3]**.

4.2 The implications of tree tenure systems for sustainable land management

The Dagomba and Gonja systems apparently provide some form of protection for the trees against destruction, thus minimizing reduction in tree populations. The reason behind these actions is most probably based on the multipurpose benefits of the tree, cf. Fifanou et al. **[12]**. The estimated tree densities (**Figure 2** and **Figure 3**) reflect to a large extent the systems of tenure and management identified. The systems of ownership and management in Gonja and Dagomba both hold some promise for sustainable land management, which cannot be said about the open access system in Mamprusi.

Population pressure may probably be another factor leading to the continuous cropping of the land, resulting in the low density of mature trees and no saplings in crop fields in Kperiga (**Table 1**). The intensification of cropping on a piece of land for a long period of time, and reduced fallow periods, is most probably a strategy to cope with the increasing population pressure on agricultural land, and also a way of claiming rights of ownership to a piece of farmland; Boserup **[13]**; Mikkelsen & Langohr **[14]**.

5. Conclusion

The research sought to determine the influence of tree tenure on the conservation of *Parkia biglobosa*. The study revealed that in the Dagomba and Gonja areas, where the traditional controls for tree tenure were in place and also enforced, the abundance of *Parkia biglobosa* was high. It was also found that fallow fields maintained higher abundance of *Parkia biglobosa* than farmlands. The systems of ownership and management in the Dagomba and Gonja areas can be harnessed to increase tree populations for sustainable land management.

It appears therefore that traditional systems of tree tenure in Dagomba and Gonja are important for the survival and conservation of indigenous multipurpose trees for both their use and non-use values.

5.1 Recommendations

This study indicates that some traditional forms of tree tenure systems as practiced in the Dagomba and Gonja areas are important for the survival and maintenance of important multipurpose tree species like *Parkia biglobosa*, these cultural structures should therefore be maintained.

A follow-up study is also needed to monitor the growth of saplings in the fallow fields in all three areas as a way of promoting the conservation of the trees identified in the communities.

6. Acknowledgements

I want to express my sincere appreciation to my supervisor Professor Karl Benediktsson of the University of Iceland, whose constructive criticism and guidance made this research complete. I am very grateful to Dr. J. Yidana (Department of Horticulture, UDS) for introducing to me the concept of tree tenure systems, communities who participated in the focus group discussions and key informant interviews, for sharing their knowledge and bringing to light this useful information for the research. I would also like to extend my heartfelt gratitude to the research assistants particularly Shamsudeen Abdulai (Dept. of Resource Economics,UDS) who assisted in data collection. I thank Mr. Amos Seidu and Kofi Abdulai, contact persons for the Damongo and Nafarang communities respectively.

7. References

[1] L. Damnyag, O. Saastamoinen , M. Appiah , A. Pappinen, . "Role of tenure insecurity in deforestation in Ghana's high forest zone" *J. Forest Policy and Econ.* Vol. 14, no. 1, pp. 90-98, Jan. 2011. Doi: http://dx.doi.org/10.1016/j.forpol.2011.08.006

[2] P. Sarfo-Mensah and W. Oduro, "Traditional natural resources management practices and biodiversity conservation in Ghana: A review of local concepts and issues on change and sustainability", SSRN Electronic Journal, FEEM Working Paper, no. 90, pp. 1 – 19, Sep. 2007. Doi: http://dx.doi.org/10.2139/ssrn.1017238

[3] S. Berry, "Building for the future? Investment, land reform and the contingencies of ownership in contemporary Ghana". *J. World Devpt*. vol. 37, no. 8, pp. 1370-1378, Aug. 2009. Doi: http://dx.doi.org/10.1016/j.worlddev.2008.08.017

[4] J. M. Boffa, "Agroforestry parklands in sub-Saharan Africa", Food and Agriculture Conservation guide United Nations, Rome, 1999. Available: http://www.fao.org/docrep/005/x3940e/x3940e00.htm

[5] R. Blench . and M. Dendo, "Cultural and biological interactions in the savanna woodlands of Northern Ghana: sacred forests and management of trees", *Trees, Rain and Politics in Africa Conf.*, Oxford, Oct. 2004. Available: http://rb.rowbory.co.uk/Ethnoscience/Plants/Trees/Oxford%20paper%202004.pdf

[6] M. Poudyal, "Chiefs and Trees: Tenures and Incentives in the Management and Use of Two Multipurpose Tree Species in Agroforestry Parklands in Northern Ghana". *J. Society & Nat. Res.* vol. 24, no. 24, pp 1063-1077, Oct. 2011. Doi**:** http://dx.doi.org/10.1080/08941920.2010.523059

[7] S. Laws, C. Harper , R. Marcus, "Research for development: a practical guide", Sage Publications Ltd. 2003.

[8] E. Ostrom, "Governing the commons: The evolution of institutions for collective action", Cambridge University Press, Cambridge, United Kingdom, 1990. ISBN 0-521-40599-8

[9] B. D. Ratner, "Common-pool resources, livelihoods, and resilience: Critical challenges for governance in Cambodia", International Food Policy Research Institute (IFPRI), Washington DC, Dec. 2011. Available: http://www.ifpri.org/sites/default/files/publications/ifpridp01149.pdf

[10] J. Songsore, "Population growth and ecological degradation in Northern Ghana: Myths and realities", Institute of African Studies Research Review (NS), vol. 12, no. 1 & 2, pp. 51-66, 1996. Available: http://archive.lib.msu.edu/DMC/African%20Journals/pdfs/Institue%20of%20African%20Studies%20Research%20Review/1996v12n1&2/asrv012001&2007.pdf

[11] J. Zinck and A. Farshad, "Issues of sustainability and sustainable land management". *Canadian J. Soil Sci.* vol. 75, no. 4, pp. 407-412, Nov. 1995. Doi: http://dx.doi.org/10.4141/cjss95-060

[12] V. Fifanou , C. Ousmane , B. Gauthier, S. Brice, "Traditional agroforestry systems and biodiversity conservation in Benin", *J. Agrof. Syst.,* vol. 82, no. 1, pp 1-13, Feb. 2011. Doi: http://dx.doi.org/10.1007/s10457-011-9377-4

[13] E. Boserup, "Population and technological change: a study of long term trends", University of Chicago Press, Chicago, pp. 255, 1981. Available: http://www.popline.org/node/389788

[14] J. H. Mikkelsen and R. Langohr , "Indigenous knowledge about soils and a sustainable crop production, a case study from the Guinea Woodland Savannah (Northern Region, Ghana)", Geografisk Tidsskrift-Danish Journal of Geography, vol. 104, no. 2, pp. 13–26, Jan. 2004. Doi: http://dx.doi.org/10.1080/00167223.2004.10649515