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Adaptation of Populations to the Degradation of Natural Resources in Tiéfora (Burkina Faso)

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ABSTRACT

The degradation of natural resources in Burkina Faso, particularly in rural areas, seems to be of greater concern on family farms. To this end, the question of combating the degradation of natural resources with adaptation strategies by the local population arises. The objective of this study is to analyse the strategies adopted by the local population to cope with the degradation of natural resources in the rural commune of Tiéfora. A qualitative and quantitative approach was adopted. Interviews were conducted with environmental service workers, village communities and structures in charge of natural resource management. The results show that six (06) water and land conservation techniques (stone barriers, crop rotation, crop association, agroforestry, organic manure and improved seeds) have been adopted by the local population. Perspectives such as community-based and integrated management for the sustainable management of natural resources are also defined.

Keywords: degradation, natural resources, adaptation strategies, sustainable management

INTRODUCTION

The degradation of the environment in general, and of natural resources in particular, is a development problem on a global scale, especially in the Sahelian countries. According to UNEP (2002) cited by Da et al. (2008, p. 306), 70% of the world's 2500 million hectares of drylands used for agriculture are already degraded. In agriculture-oriented countries, agriculture contributes an average of 29% to gross domestic product (GDP) and employs 65% of the labour force (World Bank, 2008, p. 3).

In Africa, the degradation of natural resources is becoming increasingly worrisome with rapid population growth and the effects of climate variability. Sub-Saharan African countries are currently facing demographic, ecological and economic challenges (Benkahla & Peter, 2013). Agriculture, which is one of the economic activities in Africa, requires farmers to develop adaptation strategies to mitigate the effects of natural resource degradation. Thus, these adaptation strategies contribute to improved yields and the protection of natural resources.

Burkina Faso, a landlocked country in the Sahelo-Sudan domain, faces problems of degradation of these natural resources (FAO, 2005, p. 8). For agro-pastoral activities, it accounts for 32% of GDP and employs 80% of the working population (Elodie, 2011, p. 13). The revision of the United Nations World Outlook estimated its population at 11.5 million in 2000 (cited in Da et al., 2008, p. 306). Burkina Faso is also subject to accelerated growth, the consequences of which are having an impact on natural resources. Its population, estimated at seventeen million, lives off the exploitation of natural resources, which are increasingly depleted (Yangouliba, 2016, p. 1).

Indeed, the seriousness and dynamics of the phenomenon have challenged decision-makers and political authorities. It is in this sense that the Burkinabe State has ratified international conventions, including that of the United Nations to combat desertification

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(Kékélé, 2011, p. 8). Today, our natural resources are disappearing not because of ignorance but rather because of a lack of funding to mobilize stakeholders in order to maintain sustainable management.

The municipality of Tiéfora is an agricultural municipality. Farmers are developing adaptation strategies to cope with the degradation of natural resources. The objective of this study is to analyse the strategies adopted by the local population following the degradation of natural resources.

METHODS AND MATERIALS

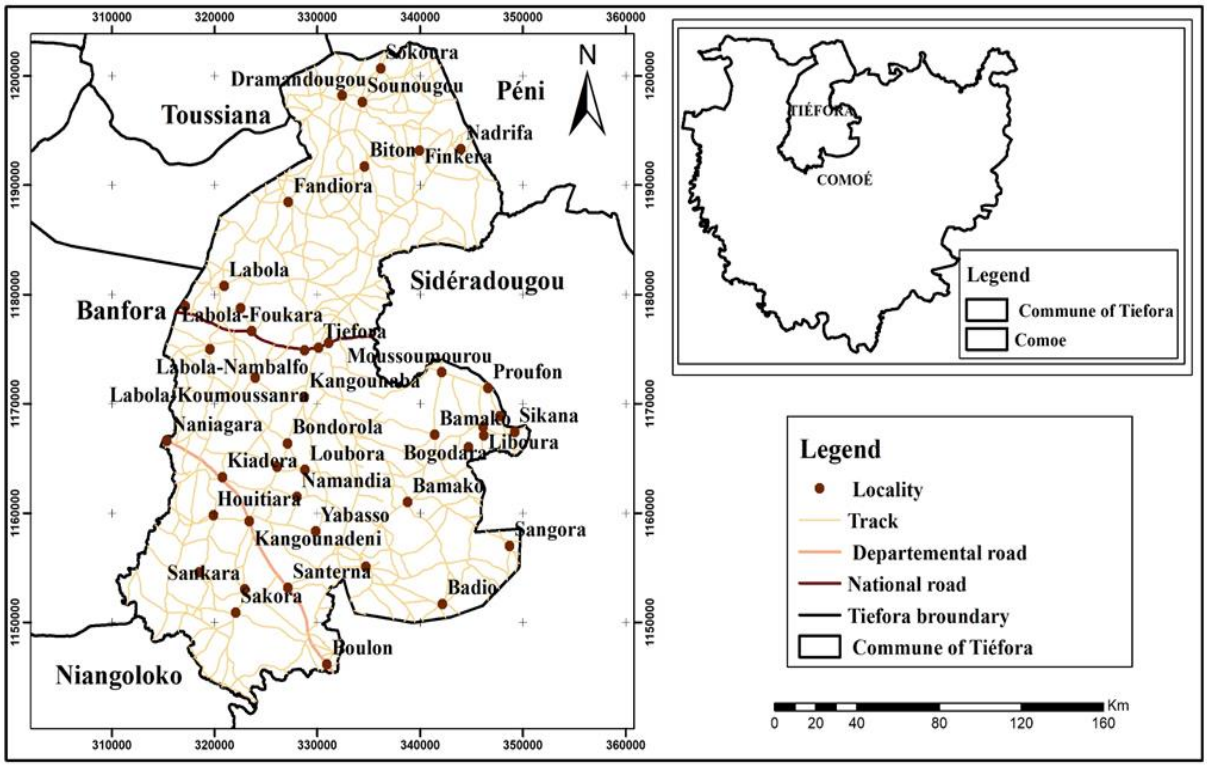
To achieve the objectives of this study, a methodological approach was adopted. It involved documentary research to develop a literature review, the presentation of the approach used, the technique used, the tools for data collection, processing and analysis as well as sampling.

Methods

Tiéfora is a commune in Burkina Faso located between 10°37'59" north latitude and 4°33'00" west longitude. This rural commune is located in the province of Comoé and the region of the waterfalls. Tiéfora, which is the capital of the rural commune, is located 25 km from Banfora. The municipality covers a total area of 1073 km2, or 6.77% of the total area of the province. It has (30) villages and is limited to:

- The east by the rural commune of Sidéradougou,
- The west by the communes of Banfora and Bérégadougou,
- South by the commune of Niangoloko,
- North by the Hauts-Bassins region.

The commune of Tiéfora has 30 villages, of which the village of Tiéfora, which is divided inside the village into three small villages (Tiéfora 1, Tiéfora 2, Tiéfora 3) has been retained. This village was chosen taking into account certain criteria including the population, the presence of the dam for development and the dynamics of economic activities such as agriculture, livestock, fishing and trade. Agricultural techniques such as the use of ploughs and tractors, the way in which fields are cleared, and the use of chemicals adopted by farmers in the study area linked to climate variability lead to the degradation of natural resources. Figure 1 shows the location of the study area.



Source: IGB (BNDT, 2012) SCR WGS 84-UTM Zone 30N Date: 09-10-2023 Author :COMPAORE A.

Figure 1: Presentation of the municipality of Tiéfora

The method used for this study is the systemic method. It is a global approach that consists of observing the relationships between the elements. It emphasizes the importance of interactions between the phenomena of various kinds that form the specificity of a space (Dipama, 1997, p. 17). Indeed, this analysis of interactions is combined with biophysical (climate, soil, vegetation) and societal components. This study requires a combination of qualitative methods (field observations) and quantitative methods (surveys, interviews and interviews). The qualitative method is used to compare and validate the data that has been collected. It makes it possible to analyse and understand the phenomena and behaviours of groups or facts. A set of data processing and analysis tools were taken into account. Data collection consists of collecting information from institutions, services, individuals or by observation. The techniques used for data collection are: interviews with institutions, questionnaire surveys and direct field observations.

Materials

Data collection and processing were carried out using various tools:

- Kobocollect for data collection.
- The interview guide which made it possible to collect information from farmers, actors in the fight against the degradation of natural resources, and the Directorates of Environment and Agriculture which are essential to our study.
- The field questionnaire which collected information from the local population, land farmers and households on the issues to be addressed, namely the evolution of agricultural practices, the degradation of natural resources, the indices of climatic variations and the strategies put in place to preserve and properly manage natural resources in the commune of Tiéfora.
- The camera was used to take pictures.
- The software (ArcMap 10.8) for the elaboration of maps with the BNDT database (2012),

– The analysis, processing and analysis of the data collected was carried out using Microsoft software such as: Excel 2019 for creating graphics and Word 2019 for typing.

As far as the surveys are concerned, not all categories of individuals in the study localities were taken into account. 40 people were interviewed in Tiéfora 1, 25 people in Tiéfora 2 and 25 people in Tiéfora 3. This number of people was taken into account because of the insecurity in the area. For the choice of respondent, these persons were surveyed according to their availability according to the interest they attach to answering the questionnaire.

RESULTS

Degradation of Natural Resources

The municipality of Tiéfora is a long-standing agricultural municipality where almost the entire population depends on agriculture. Natural resources have been degraded by the use of certain techniques such as tractors, ploughs, pesticides and the way in which fields are cleared by felling and burning trees, shrubs and grasses. This could pose a danger to humans.

50% of the producers surveyed say that the use of chemicals has a negative impact on natural resources. They contribute to the destruction of the fertility of arable land, water contamination, loss of arable land.

The loss of fertility of arable land pushes farmers to always use chemicals in order to improve their yields.

Also, agricultural machinery and ploughs used for ploughing turn over fertile land and make room for non-fertile land. In fact, 75% of producers find that the use of ploughs and tractors for ploughing makes the surface layer disappear, exposing the soil to dehydration and ultraviolet rays from the sun, reducing the quality and quantity of organic matter on the surface, destroying surface vegetation and surface amendments. For them, the use of agricultural machinery pushes them to massively use chemicals since organic matter is destroyed. It is necessary to bring fertilizer in order to have good yields.

25% of respondents say that the use of ploughs and tractors cannot affect natural resources. The clearing of fields by felling and burning trees, shrubs and grasses before cultivation is often done by the growers themselves in order to free up enough space for cultivation.

Logging is usually done in natural formations and is used as an energy source for the local population. Often, these fires are accidentally caused by humans themselves. This situation is confirmed by 10% of the producers surveyed. According to 85% of producers, these methods make it possible to destroy micro-organisms in the land leading to loss of fertility, destruction of vegetation leading to the disappearance of certain plant species, the presence of bare soil.

However, 15% of these producers do not find any impact caused by these methods. They just think they're making space for their crops and cleaning up their fields. For them, this method is a source of cleaning and fertility of the soil through the layer of ash obtained.

The Strategies Adopted and the Changes Observed by the Local Population

The local population of Tiéfora has implemented adaptation strategies as shown in Figure 2.

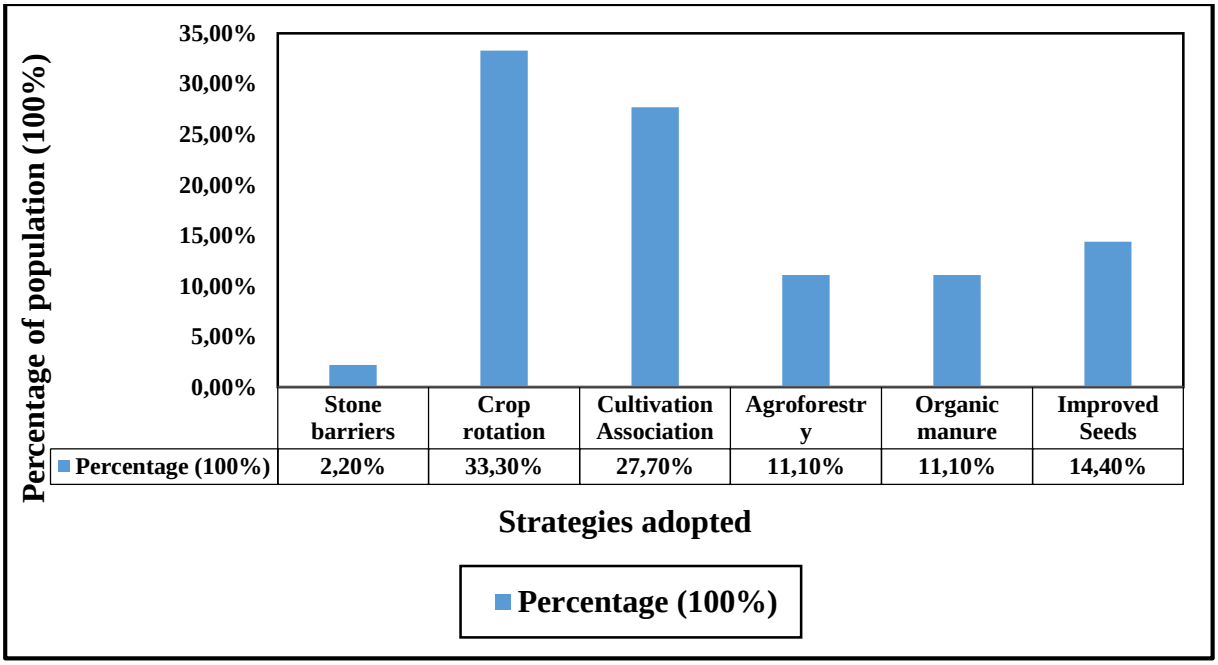


Figure 2: Water and Land Conservation Techniques Adopted

Figure 2 shows that in the commune of Tiéfora, the use of stone barriers has not been well developed in the last three years, only 2.2% of respondents use them.

Stone barriers are anti-erosion structures. Many believe that this type of practice is not appropriate because the ground is not on a slope, the rainwater that falls on the ground is absorbed directly and for others the elaboration of the stone barrier requires enough energy. This practice is only observed at the edge of the dam or flood zones on hydromorphic land for rice crops. Figure 3 shows the stone ridges in a rice field.

Figure 3: Stone barriers in a rice field in Tiéfora 1

Source: Photo by A. COMPAORE, June 2022

Organic manure is not overused, only 11.1% of the population uses it.

Agroforestry occupies 11.1% of the population, the developed species is the cashew tree which is produced in high mass by producers since it is also a source of income gain.

Crop rotation is the cultivation technique that consists of growing crops on the same field by changing crops every year. It's more adopted in the area. In fact, 33.3% of the population apply it. It allows the soil to be used sustainably. The combined seeds are maize, groundnut, millet and cotton.

Crop association is a technique that combines several crops on the same field. To this end, 27.7% of the sampled population practice this technique. They combine groundnuts and cowpeas, often with vegetables.

Improved seeds are also useful for good yields and to cope with climatic hazards. Only maize varieties are more in demand. But many farmers point out that it is very difficult to get hold of these varieties. It is the agents of the ZAT (Technical Support Zone) who take care of this, and you will have to be registered on the list to be able to take possession. Changes observed by the local population in the implementation of strategies adopted by the local population.

Figure 4: Cashew reforestation site at Tiéfora 1
Source: Photo by A. COMPAORE, June 2022

The agricultural strategies adopted are aimed at improving yields and combating the degradation of natural resources.

Thus, the population attests that these strategies have been adopted in order to adapt to climate change and combat the degradation of natural resources. They also fought against famine and ensured food security in the area.

Prospects for Good Sustainable Management

Community-based management of natural resources

The right to property

The commune of Tiéfora is a rural commune that belongs to the Karaboros who are the indigenous people. The land is owned by the natives and most (80%) of the land is inherited.

To dispose of it with a view to making it a family farm, it is necessary to have a right of ownership either by inheritance (80%), by gift (12%) or by purchase (8%). Only non-natives benefited by purchase or donation.

Community action

In Tiéfora, the population depends on agriculture, fishing, hunting, fruit harvesting and also woodworking. This pushes the population to exploit natural resources for their survival. This population also remains aware of the degradation of natural resources. It has put in place actions to protect these natural resources. In the area, the population forms groups with the aim of protecting natural resources. Ten (10) co-operatives (Toquiné-paan, Sorgban, Sorgne, Tokolewi, Scoops-Labolanambalfo, Scoops-benkadi 1 and 2, Scoops-gestion forestièreewapiyang, Yereta, Wapiyang) exploit NTFPs (Non-Timber Forest Products) which impose on them the protection of forests (more than 42ha are under surveillance) with the intervention of forest security officers. The NTFPs exploited are (honey, néré, wax, shea) (Directorate of the Environment, 2022).

Five (05) groups (Yolé, Chinikénéya, Kinaipan, Laien, Toowizigui) in the village of Tiéfora (Tiéfora 1, Tiéfora 2, Tiéfora 3) are involved in agriculture (Table 1).

Table 1: Groups involved in agriculture

	Village names				
	Tiéfora 1			Tiéfora 2	Tiéfora 3
Names of the groups	Yolé	Kinaipan	Laien	Toowizigui	Chinikénéya
Focus areas	Rice cultivation	Cotton cultivation	Cotton cultivation	Soybean cultivation	Cotton cultivation

Source: Field Survey, June-July 2022

Integrated management of natural resources

This management aims to improve livelihoods, agroecosystem resilience, agricultural productivity and environmental services. It also solves real-world problems affecting the natural resources of ecosystems. In Burkina Faso since 1990, the IWRM programme (Integrated Water Resources Management) intervenes in the management of water resources with the adoption of Law No. 002-AN/2001 on the orientation law on water management and numerous implementing texts, the formulation and implementation of an Action Plan for the Integrated Management of Water Resources (PAGIRE). In addition to PAGIRE, the National Programme for Integrated Water Resources Management (PNGIRRE) has been adopted for the period 2016-2030, the overall objective of which is to "contribute sustainably to the satisfaction of the freshwater needs of users and aquatic ecosystems". The NGIRP proposes ten actions to contribute to the achievement of the 2016-2030 results. These ten actions are: water policing, the financial contribution to water (CFE), the institutional framework and management instruments, capacity building for water agents and other stakeholders, the national water information system (SNIEau), research and development in the field of water, protection of surface and groundwater against pollution, protection of water bodies against filling in and invasive aquatic plants, integration of cross-cutting aspects in water management, communication and advocacy for water resources management.

Structures involved in the management of natural resources

There are non-governmental organizations and development associations that operate in the municipal territory with a view to the proper management of natural resources.

The municipality of Tiéfora benefits from the intervention of several projects and programs with the support of technical services such as ZAT (Tiéfora Technical Support Zone), and the departmental service of the environment, green economy and climate change, the majority of which have a national scope. These partners work in a variety of fields, including

village hydraulics, sanitation, capacity building, financial support, livestock, the environment, agriculture and nutrition. The structures involved in the management of natural resources are: the Rural Drinking Water Supply and Sanitation Project (PEAPA-4R), the Agro-Sylvo-Pastoral Sector Support Project (PAFASP), the National Productive Rural Development Project (PNDRP), the Catholic Organization for Development and Solidarity (OCADES), the Inter-Village Association for the Management of Natural Resources and Wildlife of Comoé-Léraba (AGEREF), the Rainfed Rice Project (PRP), the Dutch Development Organization (SNV), Small-scale Irrigation in the Great West (PIGO), the Local Water Committee (CLE), the Agricultural Production and Food Security Project (PAPSA), The Resilience Project the Contract Farming for Sustainable and Equitable Development of the Cashew Nut Sector (PACFA) project.

All these structures have the same vision, the proper management of natural resources. These structures have set up projects accompanied by good actions with the participation of the local population in order to achieve their objectives.

The objectives of the implementation of these actions

All of these structures have diverse and very specific objectives. For structures such as:

- The CLE, which is involved in the integrated management of natural resources. It ensures access to and protection of water with the implementation of Law No. 002-2001/AN of February 2001 on the Orientation Law on Water Management (Water Law). This law marks a step in the in-depth renovation of the approach to water management. The CLE contributes to the development and implementation of water development and management plans (SAGE), develops a synergy of consultation and action between other water management bodies, implements solutions to water development and management problems in the management area (conflicts and competition over the use, protection and conservation of water);
- PACFA, this project intervenes in the field of agriculture while promoting the cashew nut sector. PACFA contributes to the modernization of the cashew nut sector at the local level and to the professionalization of actors through contract farming and agro-ecological intensification of the private market;
- OCADES, which is a Catholic organization working in the field of flora. It provides training and awareness-raising to stakeholders in order to properly manage plant resources. It contributes to the protection and demarcation of spaces.
- PRP is active in the field of rice. It ensures the good quality and quantity of rice production in the commune;
- SNV is involved in the agricultural sector in the municipality. It ensures food security and resilience;
- PAPSA is active in the field of agriculture and food security. This project aims to improve the capacity of the poor producer to increase food production and ensure a better availability of food products on the market;
- PRéCA operates in the agricultural sector. This project contributes to increasing the productivity of the agricultural sector;
- PIGO, which operates in the field of irrigation. It contributes to improving the food security of rural populations around developed lowlands and small irrigated areas and to increasing their incomes to contribute to the reduction of poverty in rural areas;
- PNDRP contributes to increasing rural populations' access to basic social and production infrastructure;
- PAFASP intervenes in the field of agriculture, its objective is to increase agricultural production and reduce poverty in terms of increasing the competitiveness of the forestry and pastoral agricultural sectors.

DISCUSSION

The degradation of natural resources due to agricultural techniques has led the local population to put in place strategies to combat this degradation and to adapt to climatic variations. They have always contributed to raising the level of soil fertility and rehabilitating degraded land, as confirmed (Lompo, 2003, p. 111) in his analyses. Stone barriers are less used than zai which is totally absent in the area that requires hard work. The same remark is made by Ouédraogo (2011, p. 74), who confirms in his study the total absence of zaï in the Songondin terroir in north-central Burkina Faso where he states that "Zaï requires difficult physical work due to the lack of equipment". For the long-term conservation of natural resources in the municipality of Tiéfora, good management of these natural resources is required.

The management of natural resources depends on the support of government authorities, the intervention of NGOs but also the intervention of the local community. Community-based management is one of the most important forms of management for the preservation of In Tiéfora, despite the massive exploitation of natural resources, the population remains aware of the preservation of these natural resources. To this end, it intervenes in the management of natural resources in the form of groups and cooperatives. The population participates in groups or cooperatives in the management of natural resources through the actions they take (water preservation, soil protection and vegetation protection). This result is confirmed by Ratsiazo et al. (2017, p. 34) in their study in Madagascar, where they state that "the participation of the populations in the establishment of a management committee in the establishment of a Marine Protected Area (MPA), instituted in 2005, can be interpreted as a conviction of the villagers of the need for associations to help them, the associative phenomenon that has been accentuated in Madagascar since the 1990s coincides with the emergence of development NGOs". Community management imposes the right of ownership for its proper management. The work of Yelkouni (2004, p. 95) confirms this where he states that "ownership can incentivize both prudent management and innovation". Integrated management calls on the Burkinabe government through natural resource management policies and NGOs involved in natural resource management for a good The Burkinabe state, through these governmental authorities, intervenes to maintain the stock of natural resources constant, to preserve the environment in the broadest sense and above all to stop desertification. Yelkouni (2004, p. 102) confirms this through his analyses. NGOs intervene through the implementation of projects in the commune where they grant funding to farmers in different areas (land management, water management, vegetation management) for the proper management of these natural resources. These projects bring more benefits in the management of natural resources. As confirmed by Ratsiazo et al. (2017, p. 30) in their analyses, "the project and its work induce spatial and social transformations in the short and long term, in rural and urban farming areas)".

CONCLUSION

The natural resources of the municipality of Tiéfora constitute in different forms (water resources, land resources, vegetation); these resources generate savings for the development of the municipality. However, they are still exposed to degradation due to agricultural activities developed by the local population. These agricultural activities have a negative impact on natural resources. But strategies have been adopted to deal with this deterioration. However, due to a lack of financial resources for the conservation of natural resources or a lack of knowledge of conservation strategies, natural resources are exploited without any real control, leading to their degradation.

The implementation of good management of natural resources is a better solution to conserve and protect natural resources in the municipality of Tiéfora.

REFERENCES

Benkahla, A. & Peter, H. (2013). *Gérer ensemble les ressources naturelles du territoire, guide méthodologique pur promouvoir et consolider une gestion négociée des ressources naturelles en Afrique de l'ouest.* Programme Negos -GRN-Mali, Sénégal, Burkina Faso, 75p.

Da, D.E.C., Yacouba, H. & Yonkeu, S. (2008). Unités morphologiques et gestion de la fertilité des sols dans le centre-nord du Burkina Faso par les populations locales. *International Journal of Biological and Chemical Sciences, 2*(3), 306-315. https://doi.org/10.4314/ijbcs.v2i3.39746

Elodie, R. (2011). *Les risques de pertes en terre et en eau dans le bassin versant de Doubégué (Burkina Faso) : pour une gestion intégrée.* Thèse de doctorat à l'université Michel de Montaigne Bordeaux, 541p.

Food and Agriculture Organization (2005). *Evaluation des ressources forestières mondiales*. Rapport national, 12p.

Kékéle, A. (2011). *Etude de la dégradation des terres par la télédétection dans un sous bassin-versant du Nakambé (province du Zondoma)*. Mémoire de maitrise en géographie physique à l'Université de Ouagadougou, 91p.

Lompo, O. (2003). *Les stratégies paysannes de lutte contre la dégradation des terres dans le sahel burkinabè.* Mémoire de maitrise (géographie rurale) université de Ouagadougou, 134p.

Ouédraogo, J. (2011). *Agriculture et dynamique actuelle dans le terroir de Songondin au Centre-Nord du Burkina Faso.* Mémoire de master recherche, Université de Ouagadougou, 97p.

Ratsiazo, N. N., Faniry, R., Mamy, L., Razafimanantsoa, T. C., Toazindria, M. E., Rajaonarimanalina, G. T. (2017). *Gestion des ressources naturelles à Madagascar.* Mémoire de groupe de fin d'étude pour l'obtention du diplôme de licence en science économique, 48p.

Yangouliba, G. I. (2016). *Dynamique des ressources naturelles dans la commune de Tiébélé (province du Nahouri).* Mémoire de master recherche, Université Ouaga I professeur Joseph Ki Zerbo, 109p.

Yelkouni, M. (2004). *Gestion d'une ressource naturelle et action collective : le cas de la forêt de Tiogo au Burkina Faso.* Thèse de doctorat en science économique à l'université d'Auvergne-Clermont, 240p.