Land Degradation and Its Impacts on Ecosystem Services in the Nigerian Guinea Savannah: Insights for Sustainable Land Management

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Fieldwork Start Date: 1/02/2019

Fieldwork End Date: 5/06/2019

Project (Ph.D) End Date: 31/10/2020

Fieldwork Locations: Niger state, Nigeria specifically Nigeria Guinea Savannah region

Fieldwork Latitude: $6^{o}30^{1}$N, $9^{o}37^{1}$N

Fieldwork Longitude: 2^{o} 46^{1}E and $13^{o}11^{1}$E

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Executive Summary

The Guinea Savannah in Nigeria undergoes various social-ecological threats that have affected their conservation and capacity to provide ecosystem services. This research is focused on analyzing the condition of native savannah vegetation, their degradation and impacts on their ecosystem services. It also explores governance options in reducing savanna degradation, progress towards degradation neutrality and securing of ecosystem services. The study questions were analyzed using hybrid method of remote sensing techniques along with surveys, focus group discussions and interviews to collect data, which was quantitatively and qualitatively analyzed to capture degradation episodes in the Nigerian Guinea savannah. This research yielded initiatives for the savannah landscape conservation.

Introduction

The need to prevent land degradation through the enhancement of ecosystem performance has received unprecedented international endorsement and urgency. This is central to the attainment of other sustainable goals, making sustainable land-based initiatives encouraged at all levels. Besides, it comes with co-benefits such as a degradation neutral world, which assures global food security for the world's growing population, reinvigoration of productive environment including climate protection and biodiversity conservation as well as poverty reduction. Land degradation is also the long-term loss of native vegetation and being a citizen of a developing country where degradation is threatening, and livelihoods are dependent on the use of natural resources, A research on land degradation and its impacts on ecosystem services in the Nigerian Guinea Savannah to inform sustainable land management is essential. In Africa, Nigeria is synonymous with degradation and tops the global degradation danger list. Within the last two decades, Nigeria has lost nearly 81 % of its native vegetation. Focus is drawn to the degradation in the savannah because of the uniqueness of Nigeria along Agro-ecological zones. The zone is extremely threatened, as it is the

adjourning zone to the sudano-sahelian area, which studies have shown to be experiencing desert extension.

Study Area

The Nigerian Guinea Savannah lies between 6º30' N, 9º37' N, 2º 46' E and 13º11' E in north central Nigeria. It is the largest agro-ecological belt in the country accounting for 48.5% of country's land mass (NBCAP, 2004). Its geopolitical coverage includes seven states which are: Kogi, Benue, Kaduna, Kwara, Niger, Adamawa and Abuja (Figure1). It spans westward, and borders with the Republic of Benin along Niger and Kwara state. Eastward, and borders Cameroon at Adamawa and Taraba state. The belt is divided into two (North Guinea and Southern Savannah) due to differences in vegetation composition.

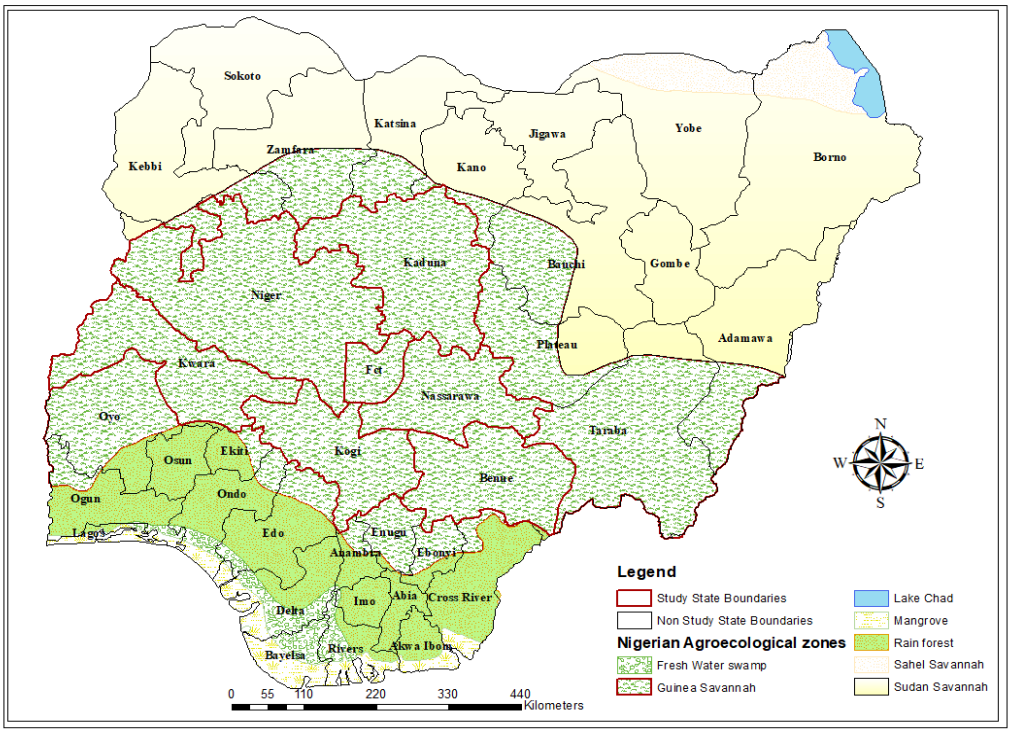

Figure 1: Nigeria Agro-ecological zones show the Nigerian Guinea Savannah and State boundary

Project Phase

Based on the project's scale the research questions encompassing subnational and state levels, the research phase and support is divided into two (2).

First, Phase (I)

The first phase which is the state level is in Niger state, Nigeria, and its entire three geo-political strata (zone A, B, C).The activities in this phase includes questionnaire, informal interview, focus group discussion and mapping.

Project component (Phase I)

Fieldwork in Niger state aimed at collecting data necessary to achieve the following three components of my research:

- Land Degradation Hotspots and the Remnants of the Old Nigerian Guinea Savannah
- Ecosystem Services and Natural Savanna Biomes Disturbance in the Nigeria Guinea Savanna.: A Participatory assessment
- Factors Determining Sustainable Land Management and Land Governance in the NGS

Second Phase (II)

The aim of this phase is to cover the remaining part of the study in the other Six (6) states of the Agro-ecological zone, which the first phase could not cover. The subnational focus is the entire Guinea savannah agro-ecological zone covering the six North-central states in the zone; Kogi, Abuja, Benue, Kwara, Nassarawa and Kaduna. The objective of the study will be achieved by visiting the whole state in the zone to validate the result of the remote sensing activities including the commencement of follow-up activities such as validation and organization of local training.

Project component (Phase II)

Fieldwork in the other states aimed at collecting data necessary to achieve the following three components of my research:

- Human Induced Land Degradation Dynamics in the Savannah Social Ecological System of Nigeria between 2003-2018.

Fieldwork Overview

Fieldwork was done for five months and linked to the research phase in three parts: first, a visit to validate the critical hotspots of human induced degradation across the zone as identified by satellites analyses in the states outside Niger state. The second which is in Niger state, because of

its protected sites with minimal human impacts, which are useful training features for mapping the remnants of savannah native species. This will help to scale-up savannah remnants modeling in other states. Third, focus group discussions and informal interviews with residents of savannah communities in Niger state. Household questionnaire survey was conducted to evaluate ecosystem services and the local initiatives including structures to conserve savannah. Also included in the field work activity is the visit to relevant government agencies like the Niger state ministry of Statistics to collect necessary data.

Activities and Timescale

Training of Field Assistants

Field assistants and the driver were trained for four days on what is expected from the project idea and exercise. The training exercise took place between Tuesday 5/02/2019 to Saturday 9/02/2019. The preliminary (map) analysis from human induced degradation was explained to the team with a special focus on Niger state. The degradation type, land uses and land cover to be identified during the survey were defined to the assistants. Furthermore, the content of the research questionnaire and focus group guide was explained to team. The training also includes how to handle the GPS, Digital camera and how to fill groundtruth record form. Using Hmmm.mm positioning format using the Geographic coordinate system.

Pre-testing

The pre-testing of the questionnaire lasted for two days between Tuesday, 12/02/2019 and Wednesday, 13/02/2019. 10 samples of the research questionnaires and a focus group guide for the social survey in the three geopolitical zone in Niger state (A, B, C), were printed for testing with selected few in Boss local government serving as the respondents. During the exercise, the understanding of the initial training given to the field assistants was also tested. Further, inputs were provided by Dr Ojoye, of the Department of geography after perusing the questionnaire.

Ground-truthing (Mapping)

Ground truthing was carried out in Niger state and across the three geopolitical area using a GPS and pre-developed map. The locations of land cover and land use, communities, and protected areas was collected. In addition, a participatory transect walk to visit hotspot of degradation was integrated into the ground activities. During the walk, stakeholders were encouraged to identify

locations and causes of degradation in the savannah. The information gathered was helpful in the overall mapping of remnants of the savannah, interpretation and discussion of degradation as identified by the satellite image analysis. These activities were carried out all throughout the fieldwork period in the three zones (See plate 1-6)

Plate 1: Grouth truthing exercise in Kuta, Zone B

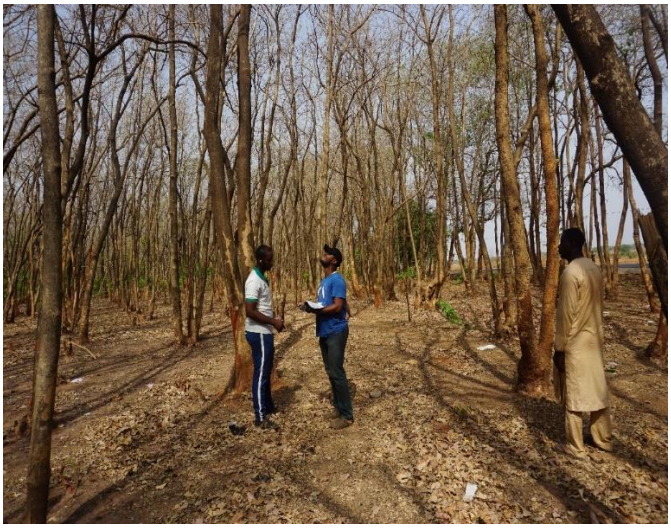

Plate 2: Mapping of remnants of Savannah

Plate 3: Savannah Vegetation Plot Mapping Zuguruma Sector of Lake Kaniji National park

Plate 4:Native Savannah Mapping in Lavun LG zone A

For the mapping of the remnants of the native Savanah, 20 different sample plots of 30mx 30m were developed around the three geopolitical zones (A,B,C). For each plot, the coordinates of the plots, Name of trees, Height in feet including diameter (ft) tree Canopy and Crown Height were estimated to assist in identifying hotspot of native species (see plate 2 and 3)

Plate 5: Mapping of remnants of Savannah in Boss LGA, zone B

Plate 6: land degradation of Savannah

Focus group Discussion and Informal Interviews:

Focus group and informal interview were organized among the savannah land users and stakeholders. (Plate 7-12) Both were necessary to gather information about people's perspectives on the degradation of savannah and its ecosystem services. This action will deepen the understanding of the research questions, and assist in designing the questionnaire. These activities were carried out in each Local Government Area all through the three zones. Focus group discussion was also conducted with staffs of the National park service (see plate:12)

Plate 7: Focus group Discussion in Mokwa Local government

Plate 8: Focus group Discussion with Kudugi

Plate 9: Focus group Discussion with women in Mokwa Local government

Plate 10: Focus Group Discussion with women in Lavun Local government

Plate 11: Alaji Nuruden and Mr Danjuma Key informant interaction at Borgu land Zone C

Plate 12: After discussion session with Staff of the National Park Service, Kaniji lake National park

Questionnaire survey:

Data on the ecosystem services, land practices and the governance of savannah at the community level were captured using two-different questionnaire designed for household heads and experts. The questionnaire for household head captured the following: Basic information about zones, household composition, characteristics of household in term of capitals, environmental issues and perceptions, drivers and threats of land degradation in the savannah, how the status and trend of ecosystem services in the savannah is affected by the characteristic land use land cover in the area. Opportunities and trade-offs for managing the services provided by native savannah through sustainable land management, importance value and impacts were identified. In addition, sustainable options for managing the Nigerian Guinea savannah was also examined. The questionnaire was piloted before the actual survey to check its feasibility (see pre-testing above). 270 (90 each) households was surveyed from communities in the three geopolitical strata of Niger state (Zone A-B-C). Questionnaire activity was carried out in each of the three zones. However, the expert questionnaire excluded household composition and characteristics of household in it design it was administered to experts who mostly are lectures who can provided relevant information on aspects of the questionnaire.

Plate 13: Questionnaire and discussion session at boss village, Zone B

Plate 14: Questionnaire and discussion session at Roffia village, Zone B

Plate15:Questionnaire session at Swanshi village, Zone C

Plate 16: Questionnaire and discussion session at Roffia village, Zone C

Preliminary insight

- The Nigerian Guinea Savannah (NGS) is extensively degraded
- Land degradation due to unsustainable human activities drives more often than natural causes of degradation in the Nigerian Guinea savannah.

- Unprecedented internal migration from zones seriously affected by desertification further leads to opening of savannah e.g most farmers from Kebbi now move to Niger state to farm
- Currently, there is no working respite to arrest the degradation of the NGS, as government is not serious of the issue.
- Degradation causes,drivers and trend across the three geopolitical zone in Niger state is similar

Aspects of your field work plan that are yet to be covered with proposed duration:

Only the second phase of the research has not been covered during the period of the fieldwork that is phase covering the remaining part of the study in the other Six (6) states of the Agro-ecological zone, which the first phase did not cover. i.e Kogi, Abuja, Benue, Kwara, Nassarawa and Kaduna.

Challenges during the fieldwork

Changes in the Nigerian 2019 election timetable had participatory consequences for both researchers and participants especially the security and timing of field activities, which also altered my plans to return by May as initially planned.

Further, some bottlenecks such as confusion, frustration and misinterpretation, low cooperation in seeking approval to conduct fieldwork in some communities were encountered thus affecting research activities.

In addition, response from Idea Wild Foundation for the use of drone to conduct the vegetation mapping is yet to be received; therefore, the exercise was conducted manually. Other challenges include

- Non contagious of the LGA selected for the ground truthing exercise
- Lack of good access road connecting the LGA
- Inadequate cooperation from the savannah resources users
- Language barrier
- The research team were not too familiar with the area study because of cultural diversity
- Security challenge limited us from visiting some hotspots of savannah in the state like Alawa forest.

Progress

I am making progress with the paper on

Human Induced Land Degradation Dynamics in the Savannah Social Ecological System of Nigeria between 2003-2018.

Student's Signature and Date: