SPECIAL ISSUE

Bima Journal of Science and Technology, Vol. 7 (2.1) August, 2023 ISSN: 2536-6041

TERRACING FARMING: THE PRIMARY AGRICULTURAL LAND MANAGEMENT PRACTICE IN TULA, KALTUNGO LOCAL GOVERNMENT AREA, GOMBE STATE, NIGERIA

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ABSTRACT

The study aimed at evaluating the agricultural land use management practices in Tula town, Kaltungo Local Government Area of Gombe State, Nigeria. The survey research design was adopted for this where information was derived through Focus Group Discussions (FGDs). The FGDs were conducted with local farmers, agricultural extension agents, and community leaders to gather insights on the current agricultural land use practices in Tula town. The study design was largely qualitative in nature, where emphasis was placed on personal experience and interpretations through face-to-face contact between the researcher and the subject of the research. The findings of the study showed that terracing was regarded as the primary agricultural land management practice used by 80% of the respondents because of the region's topography, population pressure, and land tenure system, with amongst other factors. In addition, the study also revealed that terracing was found to be effective in preventing soil erosion and improving water retention, which were crucial for sustainable agriculture in the region. Furthermore, the respondents expressed their satisfaction with the overall benefits of terracing, such as increased crop yields and reduced vulnerability to climate change impacts. The study recommended that the government enhance extension work services and ensure prompt distribution of agricultural inputs to farmers in order to improve farming in the study area and meet the demands of the region's expanding population. Similarly, the study recommended the implementation of training programs for farmers to enhance their knowledge and skills in sustainable agricultural practices. This would enable farmers to effectively manage natural resources and mitigate environmental degradation. Moreover, the study emphasized the importance of promoting collaboration between government agencies, Non-Governmental Organizations (NGOs), and local communities to develop and implement comprehensive strategies for sustainable agriculture in the region.

Key words: Agricultural Land Use, Management Practices, Terracing farming

INTRODUCTION

Terracing is an agricultural technique for collecting surface runoff water thus increasing infiltration and controlling water erosion known from ancient history and used to transform landscape to steeped agricultural systems in many hilly or mountainous regions of the world Marcin (2011) in Usman (2021). This is a method of growing crops on sides of hills or mountains by planting on graduated terraces built into the slope. Though labor-intensive, the method has been employed effectively by many communities across the world for instance China, Nigeria (e.g. Tula, Biu) and many more in order to maximize arable land area usually along variable terrains and to reduce soil erosion and water loss. Usman (2021).

In the same vein, Marcin (2011) observed that in most systems the terrace is done on a low,

flat ridge of earth built across the slope, with a channel for runoff water just above the ridge. Usually, terraces are built on a slight grade so that the water caught in the channel moves slowly toward the terrace outlet. In areas where soils are able to take in water readily and rainfall is relatively low, level terraces may be used. Terrace cultivation has been practiced in Asian countries such as China, Japan, the Philippines, and other areas of Oceania and Southeast Asia; around the Mediterranean; in parts of Africa; and in the Andes of South America for centuries.

Terracing farming stands as a pivotal agricultural land management practice within the Tula region of the Kaltungo Local Government Area, situated in Gombe State, Nigeria. As a method that deftly addresses the unique challenges posed by the region's topography, terracing farming has emerged as a cornerstone technique for sustaining agricultural productivity and minimizing soil erosion Wanah and Mayomi (2018).

The Tula area is characterized by its undulating landscape and irregular topography, rendering traditional farming practices susceptible to soil degradation, water runoff, and reduced crop yields. In response to these challenges, terracing farming has gained prominence as a strategic solution that leverages the terrain's contours to create level platforms for cultivation. These terraced platforms not only harness rainfall efficiently but also prevent soil erosion by reducing the velocity of water runoff Wanah and Mayomi (2018).

The significance of terracing farming transcends its immediate benefits. Beyond its soil conservation and water management advantages, terracing farming enhances land utilization by maximizing available space for cultivation, thereby contributing to improved food security and economic stability within the Kaltungo Local Government Area. This practice also serves as a testament to the local farmers' ingenuity and their ability to adapt age-old techniques to modern challenges (Field observations, 2020).

While some existing research has touched upon terracing as a method to control soil erosion and improve water management, few studies have deeply examined its holistic impact on agricultural productivity, socio-economic dynamics, and environmental sustainability within the Tula region. This study aims to bridge this gap by investigating how terracing farming aligns with the region's topographical and socio-economic characteristics, contributing to a comprehensive understanding of its suitability and effectiveness (Umar, 2021).

Furthermore, this research differs from earlier work by not merely presenting terracing farming as an isolated technique but by situating it within the broader agricultural landscape of the Tula area. By analyzing its interactions with local farming practices, economic structures, and environmental considerations, this study seeks to unravel the intricate relationships between terracing farming and the region's sustainable development. (Field observations, 2020).

The Study Area

Tula, a historical Homeland in Kaltungo local government area is located between latitude 9º 83' 33"N and 9 49' 59"S and longitudes 11º 46' 66"W and 11º 28' 60"E with the elevation ranging between 528-730m above sea level. Tula is one of the populated communities in Kaltungo Local Government Area with a total population of 77,622 people since 2006 population census (NPC, 2006). See Figure 1.

Tula Homeland has a very long history for centuries ago. The native settlers of the area include the Tula tribe dispersed in Tula

Bima Journal of Science and Technology, Vol. 7 (2.1) August, 2023 ISSN: 2536-6041

Wange, Tula Yiri, and Tula Baule. The predominant occupation of the people is agriculture, both crop cultivation and rearing of animals, especially cows, goats and sheep.

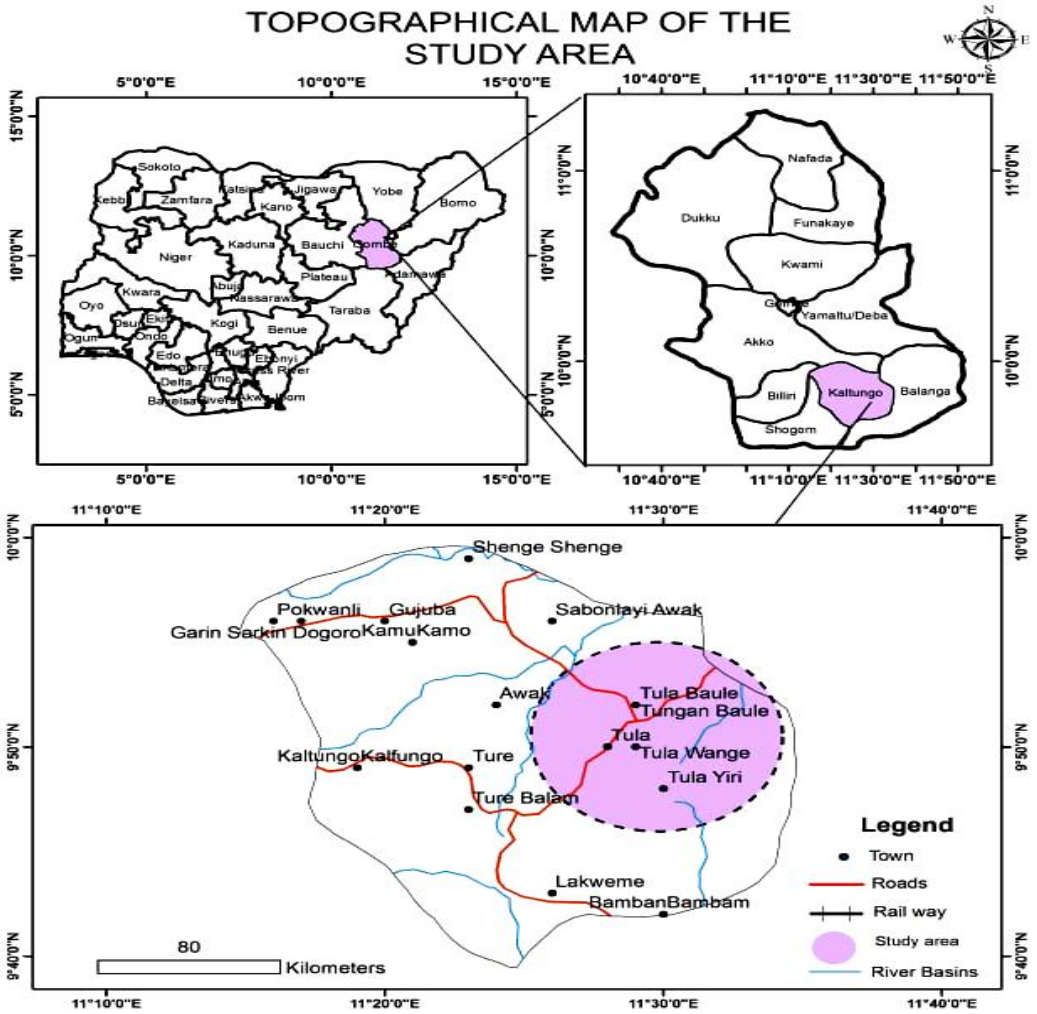

Figure 1: Map of Nigeria showing Tula Homeland
Source: National Centre for Remote Sensing, JOS (2021).

Based on 2006 National Population Commission Census, Tula town had a total population of 77,622 people. The people have rich culture that relates to every aspect of life, the socio economic activities the people is farming. The study area has various ethnic groups and ethnoliguistic such as Tula, Tangale, Tula, Awak, Kamo, etc. In addition, there also other minority tribes such as: Waja, Fulani, Dadiya. Like many other communities, Tula has central administration with a chief and district heads (Field observations, 2020).

The geological formation of the study area is basically on a basement complex rock containing of igneous and metamorphic rock of the preach brain. Moreover, the Yiri Bowl is a fascinating flat bottomed depression lying south of Tula Plateau. The Bowl is surrounded by steep sided slopes of sedimentary formations with extreme vertical

Bima Journal of Science and Technology, Vol. 7 (2.1) August, 2023 ISSN: 2536-6041

cliffs showing walls of sheared rocks in many places (Wanah and Mayomi, 2018).

As a result of changing geo factor constellation, rock relief form etc, the study area is composed of basement complex that has more or less clayey weathered grit are wide spread and cover different thickness on pediment surface. At some places they change in more clayey sediment whenever clay stone or shale are exposed at the surface. Deep weathered reddish colour aerosols are wide spread at the surface of the older pediment level. At some places, these far developed ferruginous tropical soils change into brownish camisole that seems to be younger (Wanah and Mayomi, 2018).

The study area is situated within the Sudan savanna vegetation type convers with grasses and shrubs and with some economic trees such as baobab, Acacia, *Goron* Tula, and some other exotic tree species such as Neem, Eucalyptus, etc. (Field observations, 2020). The soil of Tula is very rich for agricultural purposes. Agriculture forms the predominant occupation of the people. The black cotton soil which consists of clay and heavy loam can be found in Jalingo, some part of Bwele and Baule area. This soil is randomly distributed all over the area (Umar, 2021).

MATERIALS AND METHODS

The research design adopted in this study was survey research, where information was derived through Focus Group Discussions (FGDs). The purpose of the study was to gather responses from rural farmers in Tula town, Kaltungo local government area, Gombe State. The population of farmers was estimated to be 3000, and there were seven farmer's contact groups distributed across the study area according to the Agricultural Development Project Gombe State (2019) in Usman (2021).

The research design adopted in this study was largely qualitative in nature. An emphasis was placed on personal experience and interpretations through face-to-face contact between the researcher and the subjects of the research (Umar, 2021).

The qualitative research method, specifically FGDs, was employed because the research aimed to explain the respondents' predominant farming practices and their rationale or wisdom from the study area.

The consent or permission of the respondents was sought via verbal request. Thereafter, the purpose of the research was clearly explained to the potential respondents. Over 97% of the respondents were farmers. There were five (5) focus group contacts out of the seven (7) at least 5–10 people of nearly equal economic status were involved. Additionally, two students from the Department of Geography, Gombe State University assisted the researcher in recording responses and other field activities, while the researcher himself mostly posed research questions from the template designed to the participants.

The participants were allowed in FGD to orally express their views regarding the factors, reasons, benefits, and uses, as well as the types of crops cultivated under the terracing farming system in Tula community. The views of the responded were recorded on cell phone with their permission and then later carefully analyzed taking into cognizance the majority opinion from the respondents during the discussions.

RESULTS AND DISCUSSION

Reasons for the Adoption of Terracing Farming

Farmers have adopted terracing for several reasons. During the FGD, participants expressed that terracing farming is the most ideal owing to the area's physiography,

population pressure, and the land tenure system. The participants acknowledged that terracing farming has the potential to address these challenges by preventing soil erosion and improving water availability for agricultural activities. Additionally, they recognized that implementing terracing techniques could help alleviate the strain on limited arable land, allowing for sustainable farming practices in the Tula area. Moreover, terracing also maximizes land use efficiency by creating flat surfaces on steep slopes, making it easier for farmers to cultivate crops and increase their yield. The results of study agreed with the findings of many researchers such as Marching, (2015), Sadeeq and Umar, (2020) and Usman, (2021), to mention but a few.

Land Tenure System

Most of the farmlands were inherited and fragmented into smaller plots among family members. The fragmentation of farmland has led to inefficient land use and difficulty implementing modern farming techniques. Furthermore, the participants emphasized the need for collaborative efforts among farmers and local authorities to promote the adoption of terracing farming and improve land management practices in order to achieve long-term sustainability in the Tula area. As such, farmland that was supposed to be cultivated by one of two individuals could be defragmented (land tenure) into 10 or more plots, thereby creating more pressure on the land. The study further found out that women and elderly individuals mostly cultivated farmland closer to the town, but younger people mostly travelled long distances to prepare and cultivate much bigger farmlands. This further increased more pressure on the land. For instance, farmlands were seemed to be exacerbated due to the growing population in the area as more people sought to cultivate their own plots of land. Additionally, the study found that the reliance on women and elderly individuals for cultivation near the town may be due to accessibility issues or cultural norms that restrict younger individuals from participating in cultivating nearby farmlands (Field observations, 2020).

The terracing style in Tula has been one of the best across the world according to many literatures (See Plates 1&2). These terraces had no specified standards or sizes used when designed. However, they were a times designed due to the slope aspect and the nature of the soil materials in that particular area. If the rate of erosion is seemed to be frequent; the terraces would be placed closer and vice vasa (See Plate 2).

Other Benefits of Terracing Farming

A part from erosion control, terracing farming helps to conserve water in the soil, because soil types in the area were mostly erodible that can easily allow water to pass through; these terraces help to allow soil materials as well as nutrients to stabilize for normal farming activities. Similarly, one of the common ways of maintaining nutrients of the soil in Tula community include the use of manure, household refuse and animal dung which were usually collected at strategic locations closed to the house-holds. During dry season and on the on-set of rains the collected manure was then moved and spread over the land with the view to improving the nutrients in the soils. As such there was no report of bush fallow in the area (Field observations, 2020).

Other Agricultural Systems Practiced in Tula

The study further discovered other agricultures system practiced alongside terracing farming include mix farming, mixed cropping (Plate 4) and mulching (Plate 3), crop rotations. This also goes a long way in

improving the quality of the soils in the farmlands across the community.

Mulching for example, involved the use of crop remains to cover the top soil in order to project the soils from, harsh weather condition erosion at the same time converse moisture in the soil was identified in the study area. These remains when decayed and decomposed and add more nutrients to the soil (Field observations, 2020).

Types of Crops Produced in Tula

These careful soil management practices done in the study area, in addition to other climatic factors allow farmers to cultivate different types of crops, ranging from cereals, leguminous, vegetation etc. The predominant crops cultivated include: guinea corn, maize, beans, soya beans, groundnuts, cocoa, yam etc (Field investigation, 2020).

Plate 1: Terraces on relatively gentle slope

Plate 1: Terraces on relatively steep slope

Plate 3: An example of mulching in Tula

Plate 4: An example of mixed cropping in Tula

CONCLUSION

One of the major constraints affecting agricultural land use management practices and annual food production in the Tula community includes population pressure and growth, destructive traditional management practices, pressure on land, land degradation, soil fertility decline, declining crop yields, high incidents of weeds, changing rainfall intensity and pattern, and an increase in the incidence of pests and diseases. These constraints have led to a decrease in agricultural productivity and food security in the Tula community. Additionally, limited access to modern farming techniques and technologies exacerbates the challenges faced by farmers in effectively managing their land and increasing crop yields. These constraints necessitate farmers to bring about innovations such as terracing (creating steps on slopes to prevent erosion), mulching (covering the soil with organic material to retain moisture and suppress weeds), and manure application (adding animal waste to improve soil fertility) to help conserve the nutrients in the soils in the area. For example, terracing can prevent soil erosion on steep slopes; mulching can help retain moisture in the soil during dry periods; and manure application can improve soil fertility for better crop growth and development in the area.

Recommendations

Base on the findings of this study the following recommendations were given;

i. The government should help food crop farmers to improve the management of their agricultural lands by providing them with extension services, and agricultural loans.

ii. Government should ensure timely supply and distribution of agricultural inputs such as fertilizer, herbicide and other chemicals to the farmers.

iii. Farmers should adopt the use of improve varieties such as short duration crops and drought tolerant varieties.

iv. There is need for government, NGOs and other relevant bodies to assist farmers through policy formulation and strengthening of research institutions in their effort to discover more innovative adaptation measures that are adaptable to the environment.

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