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Pastoral Grazing Management System: A Panacea to Effective Livestock Management in Nigeria

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Abstract:

The National Livestock Transformation Planw as initiated by the Nigerian Government to promote the development of the livestock sector in some States in Nigeria. Before this plan, the initial Rural Grazing Reserve Areas initiative crashed before take-off due to push backs and unfavourable feedbacks from some key stakeholders. Generally, over the years (since the promulgation of Grazing Reserve Act of 1962) government policies on grazing reserves and management have not met its expected outcome for curbing the incessant farmers and herder clashesand improvement of livestock management processes. The specific objectives of this paper are to; describe the distribution of the allotted grazing reserves in Nigeria; and provide a Pastoral Management System framework that could be adopted for the implementation and operation of National Livestock Transformation Plan. GIS overlay and Near-Distance analysis were employed to establish the reserves distribution (within States and vegetational belts as well as the distance to the nearest forest reserve) while the ISO 14001:2015 Environmental Management System approach was adopted in describing the Pastoral Management System. The States with the highest number of Grazing Reserves include Adamawa, Borno, and Taraba States while Abuja, Oyo, Kaduna, Jigawa, and Kogi are among the States with the lowest allotted number of reserves. Generally, the Northern and Middle belt regions of Nigeria are better served with grazing reserves. Also, distribution is concentrated within the Sudan Savannah in the North East and Guinea savannah along the middle belt region. The concentration is reduced in the other parts of the Sudan Savannah in the North West and Sahel Savannah in the North. The reduction is due to desertification and encroachment challenges in these areas. Also, the average near distance of these grazing areas to forest reserves is approximately 12.5km. Since government policies on grazing reserves and pastoral farming have not met its much-expected outcome over the years, a Pastoral Management System has been recommended for effective operation of grazing reserves and other forms of livestock farming, in line with the sustainable development principle. It is expected that PMS would improve livestock management operations and reduce crisis amongst stakeholders. Also, there is a need to adequately survey and developed a GIS dbase on grazing reserves to serve as input in the PMS improvement monitoring processes.

Keywords: Pastoral management system, livestock improvement management, ISO 14001:2015 environmental management system, spatial distribution, GIS

1. Introduction

The Rural Grazing Areas (RUGA) establishment initiative was conceived by the Federal Government of Nigeria and was announced in June 25, 2019. The scheme was meant to curb the periodic conflicts between Fulani herdsmen and arable crops farmers in Nigeria. Also, it will allow herders to settle within a defined geographical space and tend their cattle as opposed to free range nomadic system in search of grazing lands. Pilot zones within specific geopolitical zones have been designated for the commencement of the RUGA policy (Arotiba, 2019; Toromade, 2019).

This policy has elicited strong opposition from many quarters, especially in the Nigerian southern geopolitical areas that have been selected for the purpose of the pilot scheme. The contending issues are based on the premise that the scheme has been designed to favour only people from Fulani extraction as cattle business is one of their major occupations. Also, seen as a process for Fulani expansionism in Nigeria. Many opinionated that cattle/ranching business is a personal business and should not be championed by Federal Government. The inadequate consultation with all relevant stakeholders before official pronouncement of the scheme to take effect also resulted to stiff opposition of the RUGA policy (Adegbamigbe, 2019; Ayanbolu, 2019; Johnson-Salami, 2019;Obaza, 2019).

The aftermath of criticisms from various quarters, warranted the presidency to suspend the RUGA scheme giving reasons that advocates of the RUGA scheme (Federal Ministry of Agriculture and Natural Resources) initiated it against the approved National Livestock Transformation Plan (NLTP). The NLTP is designed to run from 2019 – 2028 and is targeted at supporting the development of the livestock sector, which would be implemented in seven pilot states which include Adamawa, Benue, Kaduna, Plateau, Nasarawa, Taraba and Zamfara States. The plan will be implemented in conjunction with the Federal and State governments, farmers, Pastoralists and private investors. The approved pilot States for the NLTP include Adamawa, Nasarawa and Plateau (TheCable, 2019; The Punch, 2019; Udegbunam, 2019).

Sustainable cattle ranching and other forms sedentary Pastoral agriculture are widely acceptable and profitably practiced. In developed climes, it has remained one of the major contributors to the national GDP (Behnke and Centre, 2012). The World Cattle Inventory estimated that the world has 1.468 billion heads of cattle, Brazil has the largest cattle inventory followed by India and China. The United States has the 4th largest cattle inventory in the world while Nigeria is ranked 14th with 20,000,000 heads (FAO, 2019). Currently, agriculture accounts for 17.5 and 11.7% of GDP and accounted for 57 and 22.3% of total employment in sub-Saharan Africa and North Africa, respectively (FAO, 2019).

The Pastoral farming is still rudimentarily practiced and is marred by insecurity and social tension leading to loss of lives and properties. Also, Federal Government policies towards Pastoral farming have not been sufficiently implemented to meet established objectives (Ingawa, Tarawali and Kaufmann, 1989; Abdullahi, Daneyel, and Aliyara, 2015). To this end, the intent of this paper is to bringto limelight the need for Government and relevant public parastatals in this regard, to adopt a Pastoral Management System (PMS) framework in resolving challenges regarding Pastoral farming in Nigeria. This is expected to speedily bring about the desired outcome of the NLTP. This paper therefore, highlights the historical background and challenges of grazing reserves in Nigeria;spatial distribution of grazing reserves in Nigeria amongst States, vegetational belts and regarding proximity to existing forest reserves;the applicability of PMS adopting the ISO 14001:2015 management system standards.

1.1. Historical Background on Challenges of Grazing Practice in Nigeria

Ingawav, Tarawali, and Kaufmann (1989) provided a historical synthesis of grazing practice in Nigeria. They indicated that preservation of land for livestock farming has existed before the British occupation of Nigeria. The use of land areas around towns and villages for grazing are socially regulated during the planting season. In the absence of legal controls to prevent encroachment by farmers, the allotted reserves have subsequently gone extinct due to increasing population and demand for food. Typically, cattle movement are from semi-arid zone in the North to the subhumid zone in Nigeria. Inadvertently, the conflicts between farmers and herders resulted due to improvement in livestock management in terms of veterinary and tsetse fly control, which significantly increased livestock in the subhumid zone. Also, is the preference of livestock farmers to graze and have access to water, reduced the available land resource (Ingawav, Tarawali, and Kaufmann, 1989).

In a bid to curtail the gradual decrease of grazing lands, the Grazing Reserve Act was promulgated in 1964. Also, in a broader perspective, the act was put in place as a policy measure to promote livestock farming and address the challenges confronting livestock development in Nigeria. To this effect, grazing reserves were established to protect grazing lands from crop farming, provide easier access by Pastoralists and promote nomadic colonies/transhuman Pastoralists. The ultimate intension was to encourage livestock development (Ingawav, Tarawali, and Kaufmann, 1989).

An approximate expanse of 2.3 million ha of land was acquired as grazing reserves in the northern States as at 1980, which made up 10% of the total amount of 22 ha earmarked for the Third National Plan (Ministry of Agriculture, 1981). According to Ingaway, Tarawali, and Kaufmann (1989), the high compensation involved with the acquisition of grazing reserves as stipulated by the Federal Land Act of 1978, resulted in the low implementation of grazing reserves establishment. Also, few grazing lands established were officially gazetted. Added to this, the settlers in these reserves are not previously nomads who were once residents around the crop farming villages, in the sub-humid belt, before the establishment of the grazing reserves. Therefore, the adaptation of these nomads proved challenging, as the ecological and social conditions are different from the far North. This consequently, resulted in the modification of Pastoralists' strategies derived from studies in the semi-arid zone.

Ingawav, Tarawali, and Kaufmann (1989) indicated the key challenges which relate to the following. (1) facilities provided such as milk collection centres are not relevant. These involved high processing cost with respect to milk preservation to maintain the minimum hygiene standards. (2) The reserves have been established as exclusion zones which prevented the land from encroachment by arable farmers. This separated communities and prevented socioeconomic interaction within these zones. (3) The farmers consequently, became uncooperative regarding grazing reserves projects with increased litigation cases relating to destruction of farm crops and land disputes.

Odemwingie (2015) quoted government figures indicating more than 4,000 deaths occurred as a result of conflicts from both parties since 1998. Also, quoted figures from Human Right Watch indicated 3,000 people were killed between 2010 and 2013, in central Nigeria. Added to this, a total of 1,000 people was killed across five States within a period of five months that spanned between December 2013 and April 2014.

Some of the efforts put in place by the Government have not resolved the Fulani Herdsmen crisis. The 247 million dollars to mark out grazing reserves in some parts of the country (Katsina, Bauchi States in northern Nigeria, as well as Abuja) have not met expected end. Also, is the Great Green Wall Programme (GGWP), designed to arrest desertification, a major issue that moves herdsmen from the far North to head south, did not yield its expected benefits. Odemwingie (2015) indicated the problem of grazing sites is regularly a source of crisis between herdsmen and farmers.

Similar to the 1964 grazing reserve bill, the 2016 National Grazing Reserve Bill 2016 was established in each of the States of the Federation Nigeria to improve agriculture yield from livestock farming and curb incessant conflicts between cattle farmers and crop farmers in Nigeria. The specific objectives of the commission include: (a) Increase and Optimize Cattle and Dairy Production in Nigeria; (b) Ensure Peace and Security in Nigeria by preventing clashes and violence between the Cattle Farmers and Crop Farmers; (c) Discourage Transhuman and encourage and enforce Ranching and Restricted Grazing in Nigeria. The bill is yet to be effectively implemented.

Iro (1994) elucidate the fact on repeated failures of government intervention in Pastoral development. These inefficiencies include difficulty in adapting to successive Pastoral migrations, the government lack of understanding of traditional livestock management and non-involvement of Pastoral farmers in the design and implementation of the development programs. Abdullahi, Daneyel, and Aliyara (2015) also opined that grazing reserves development in Nigeria has been very slow despite policies and financial commitment put in place. In 2015, only a total of 23 out of the 299 (which translates to approximately 2.3 million hectares) proposed grazing reserves in the Northern Nigeria that includes Abuja, have been gazetted. The need to breed highly productive and disease resistance cattle are amongst recommendations proffered by Abdullahi, Daneyel, and Aliyara, 2015.

1.2. Study Area

The study area (Figure 1), the Federal Republic of Nigeria is delimited to the west by the Republic of Benin, Chad and Cameroon in the East, while the northern section shares border with the Niger Republic. The coastal water lies within the Gulf of Guinea in the South. The country covered an estimated landmass 356,668 sq miles (923,7770 sqkm) and subdivided into six (6) geopolitical zones. These include the North-Central, North-East, North-West, South-East, South-South, and South-West.



Figure 1: Study Area – Nigeria States and Geopolitical Zones

2. Materials and Methods

2.1. Data & Methods

The names and location of grazing reserves are obtained from the Federal Ministry of Agriculture. These are georeferenced from existing spatial databases in the public domain. Out of the 202 grazing reserves names collected, 92 were mapped within a GIS (ArcGIS 10.5). The delineation of ecological zones/forest reserves were manually digitized from scanned copy geo-referenced maps within the GIS environment.

Overlay analysis was carried out to present the spatial distribution of grazing reserves amongst States and vegetation belts. This analysis is a spatial operation in which more than one map layer features are aligned with a common coordinate system. These maps are then superimposed or overlayed to show the relationships between features that occupy the same geographic space. Generally, there are two key methods that can be involved when performing an overlay analysis. These are feature (overlaying points, lines, or polygons) and raster overlay. The work has employed the feature overlay. All maps presented in this work are derived by carrying out a GIS overlay analysis.

The Near Analysis Arc tool was employed in order to evaluate the proximity of forest reserves with respect to the distribution of grazing reserves. Specifically, the Near Distance enables the distance calculation and other information relating to proximity between the input features and the closest feature in another layer or feature class (ESRI, 2015).



Figure 2: Near Distance Measurement Schematic Source: ESRI, 2015

The ISO 14001:2015 Environmental Management Systems was adopted for the development of PMS.

3. Results and Discussion

3.1. Distribution of Grazing Reserves in Nigeria

The Federal Government indicated a total number of 415 grazing reserves while only a third of this amount has been put into use. The Ministry of Agriculture (in 2014), indicated the existence of 141 reserves that have been officially gazetted, where less than 20 of them are only suitable for cattle rearing (Odemwingie, 2015).

However, the list of grazing reserves obtained from the Ministry of Agriculture in 2019, indicated a designated number of 201 grazing siteshad been allotted within States in Nigeria. A total of 77 sites are indicated to be gazetted. Also, 7 out of gazetted reserves are noted to be fully developed. The distribution of grazing reserves is within the Nigerian States, vegetation belts as well as near distance relationship with forest reserves are presented in Figures 3, 4, 5, and 6.



Figure 3: Distribution of Grazing Reserves amongst States Source: Federal Ministry of Agriculture



Figure 4: The Selected States for Grazing Reserves and NLTP

There is no established basis, such as environmental and socioeconomic considerations, in the public domain for the allotment of grazing reserves/NLTP in Nigeria. However, the States with the highest number of Grazing Reserves include Adamawa, Bornu, and Taraba States. The FCT, Oyo, Kaduna, Jigawa, and Kogi are amongst the States with the lowest allotted number of reserves. Generally, States with concentrated grazing reserves location are situated in the Northern and Middle belt regions of Nigeria.



Figure 5: Distribution of Grazing Reserves in Nigeria

The grazing reserves straddle from the North East into the North Central region and upward towards the North West. In establishing the location of the grazing reserves in relation to the forest reserves, the results of Near Analysis showed that Oju and Augie in Benue and Kebbi States respectively, are situated in the forest reserves (near distance = 0km). Also, Ribah (Kebbi), Dalijan (Yobe), Baruten (Kwara) and Gumsa (Yobe) grazing points are at an average distance of 0.5km.The near distance measurement for other grazing reserves ranged from 1.2km to 67.2km. Generally, the average Near Distance measurements is approximately 12.5km.



Figure 6: Location of Grazing Reserves along Vegetational Belts

Also, the distribution of grazing reserves along the vegetational belts is such it is more concentrated in the Sudan Savannah in the Northeast and the Guinea savannah along the North Central region. Lesser concentration is observed in the parts of the Sudan Savannah in the North West and Sahel Savannah in the North. The scanty concentration in the Sahel is as a result of desert encroachment around this area. This distributional pattern supports Waters-Bayer and Taylor Powell (1986) description of cattle movement from the semi-arid zone to sub-humid zone in Nigeria where there are relatively more water and pasture.

3.2. Pastoral Management System: Concept and Application

In recent times various forms of technologies have been introduced for the management of Pastoral farming. To ensure introduced technologies are sustainable, management strategies involving the use of a decision support system has become relevant within this context. Herrero, Fawcett, Perez and Dent (1997) showed the importance of a systems approach in sustainable cattle production systems in Latin America along with technologies that would ensure its continued success. The decision support systems are to link livestock information system and established farm models to make decisions concerning cattle farming in Latin America. Grazing management has been identified as part of the key determinants of farm sustainability. Aside issues such as soil fertility and climate, socioeconomic and other externalities are central to decision making processes in farm management processes. A modelling framework involving planningand

resource use allocation as well as operational management support and monitoring was put together. This thereby provides an avenue for strategic planning and implementation processes (Herrero, Fawcett, Perez and Dent, 1997).

Grazing reserves initiatives have been implemented since the early sixties but has generally failed to deliver its expected policy objectives which covered reduction in social friction between and the expected boost in pastoral farming. The shortcomings associated with the implementation of the policy can be improved upon by applying a management system in line with the ISO 14001:2015 international standard management principle (BSI, 2015). The driving framework can be indicated as the PMS, which is described herein.

Sustainable development has been the driving force in applying Environmental Management System to organizational activities. This supports the initiative of responding to changing environmental conditions with uncompromised equilibrium with socioeconomic needs. This basically allows organized bodies via stated policy, achieve expected outcomes that have been established in the EMS. It has also been noted that this systemic approach can provide leaders/decision-makers with the required information to adequately manage laid out processes in the short and long run, thereby creating avenues to reaching sustainable development. These amongst other include: safeguarding the environment by preventing or mitigating inherent environmental impacts, support the organization to comply with applicable regulations or compliance obligation, influence ways which organization functions with respect to the ways products and services are designed, produced, and disbursed by using a life cycle perspective, which can prevent impacts if used or found elsewhere within the life cycle; enable the achievement of financial benefits as a result of implementing sound environmental alternatives which places a better market value for products and services, effective communication of relevant environmental information to relevant stakeholders or interested parties.

The gains relating to a functional environmental management system strongly depends organizational or institutional commitment from all levels and functions spear headed by higher hierarchy of decision makers. The goal is for institutions and organizations to leverage on avenues and opportunities that would prevent adverse environment impact and enhance beneficial environmental effects, especially those associated with strategic and competitive implications. Top hierarchy within an organization can thereby effectively address its risks and opportunities by integrating and aligning environmental management into the organization's business and operational processes.

The application principles of management system standard have not been effectively applied in government and public institutions. In Nigeria, some private organizations and multinationals have been witnessed to apply the management system standard to their operational requirements. However, the reality check showed that public and government institutions are in the same operating environment whose operations can have a direct impact on society at large. For example, in addressing the current subject matter, the need to develop an operating plan that would enable the Government to adequately address risks and opportunities associated with pastoral farming in Nigeria cannot be overemphasized. Generally, underlying social and environmental risks in pastoral farming and grazing reserves establishment in Nigeria include incessant farmers and herders clash as well as soil quality and vegetation loss (Taiye, Dauda, Emmanuel, 2017). The opportunities relate the financial gains, increase in GDP and employment via expansion improvements in pastoral farming processes (Behnke and Centre, 2012).

As highlighted in the requirements and guidance for use, approach to EMS is of Plan-Do-Check-Act (PDCA) fundamental concept, which is an iterative process used by organizations to achieve continual improvements in adopted operational processes and service delivery functions. Plan (P) requirements covered the establishment of environmental objectives and processes necessary to deliver results in unity with set environmental policy. D0 (D) as it suggests is to implement the processes as planned while CHECK (C) requires monitoring and measurement of processes against the environmental policy which includes related commitments, environmental objectives and operating criteria. This is a form of look back or performance review process. Act (A) by taking actions to continually improve and make processes sustainable (reduce risks and enhance opportunities). The PMS approach as indicated below is adopted using the PDCA cycle and the framework for ISO 14001:2015 international standard (BSI, 2015). The applicability to the key requirements (clauses 4 to 10) is briefly described thereafter.



Figure 7: PMS Framework Approach Source: BSI, 2015

- Organizational context (4): The identification and high-level conceptual understanding of external and internal issues that may impact the ability of PMS to achieve its intended outcomes is an important requirement. The internal issues can be related to grazing techniques while external issues caninclude environmental factors, sabotage and clashes between herders and farmers. The understanding of contextual issues determines the way the PMS is being managed and how improvements can be derived.
- Theneeds and expectations of all stakeholders/interested parties should be established and those that are compliance obligation adequately highlighted and fully addressed. One of reasons why previous reserves failed has to do with the issues of compensation toland owners and existing land tenure system(Ingawav, Tarawali, and Kaufmann, 1989).
- Operational boundaries need to be determined and agreed upon amongst expected stakeholders/interested parties. The application of GIS technology in demarcating land ownership and boundaries can be employed to achieve this. Some of the point locations describing most of the grazing reserves acquired from the Ministry of Agriculture cannot to verified in public domain. Also, in addition to the organisational context, grazing reserve operational processes and interactions as well as expected outcomes will be considered, established and maintained.
- Leadership (5):In Nigeria, developmental programmes censored by Government have generally not been successful. This has been narrated to be as aresult of faulty backgrounds, riddled with corruption, lack of political will to do what is right and follow programmes to a logical conclusion (Onyenechere, 2010). The commitment, involvement and accountability of top management to ensure actions are performed and expected outcomes are realized also a key aspect to be considered in the PMS. The local and State tiers of Government will have full responsibility and accountability of the PMS. The defined leadership roles and responsibilities would be defined and ensuring adequate engagements and full involvement for the system management. The Federal Government will act as top regulatory bodies or agency ensuring compliance to statutory requirements. Privately owned reserves could also be under auspices of Local and State governmental monitoring, stakeholders' engagement, and communication. Also, it is required for the leadership to determine policy objectives and show commitments in support of the management and overall performance of the PMS. The guiding policy can be crafted from the already existing Grazing Reserves Bill (2016).
- Planning (6): The planning shall cover the management of highlighted risks and opportunities. The planning in place is expected to provide assurance that would reduce risks such as social conflicts/unrest and other operational risks(such as soil quality degradation and pest/disease infections) as well as enhancement of opportunities. Generally, the risk-based thinking approach will be considered in all planningin line with the requirements of the international standard. Also, identification of relevant environmental aspects and management will be given necessary consideration as required in the Management System.
- Support (7): Alfonso (2019) suggested the need to set a global watch service that would oversee the commitment of development organizations to communication that facilitates social change in less developed countries, through participation and dialogue. Adequate and effective communication processes amongst stakeholders is important for the effective functioning of the PMS. The reserves management system will consistent with the information generated within the system. Generally, infrastructure is needed for effective production processes and improvement in livelihood of any society (Sherkulovich, 2015). Other related supports in terms of social infrastructure and relevant manpower in government Ministries will be defined and dedicated for relevant technical functions.
- Operational Planning and Controls (8): the PMSwill have processes in place for planned changes and review the consequences of unintended changes. Such as grazing reserve expansion, introduction of new breed stock, or any changes that is included as part of the grazing reserve policy. Operational activities will be carried out in line with the life cycle thinking, ensuring activities are carried out an environmentally friendly manner.
- Performance (9): evaluation will need to be addressed within the PMS. This will include periodic inspections and reviews in conjunction with LG, state and Federal government as well as other private operators. Scope of inspections and reviews will include operations, administration, compliance, measurement of stakeholder satisfaction or other interested parties.
- Improvement (10): in line with the international management system standard, the continual improvement on the suitability, adequacy and effectiveness of the PMS should be addressed on a periodic basis.

4. Conclusion and Recommendation

The government policies on grazing reserves and pastoral farming have not met its expected outcome over the years. It is expedient that a PMS is put in place for the effective operation of grazing reserves and other forms of livestock farming, in line with the sustainable development principle. The PMS would help streamline the livestock farm operations, facilitate mutual understanding amongst relevant stakeholders, preserve the environment by promoting continual processes with respect to effective methods of operation, and increase GDP derivable from livestock farming. Also, there is a need to adequately survey and developed a GIS dbase on grazing reserves, to serve as a tool required in the developed PMS.

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