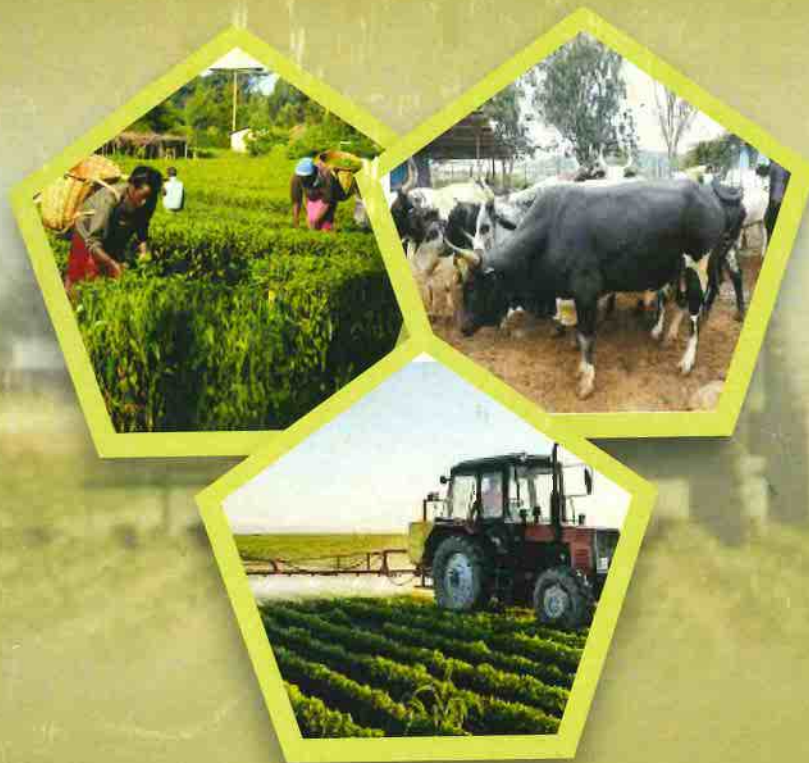


Contemporary Issues in **Agricultural Extension** **and Rural Livelihoods in Nigeria**



Edited by:

Aderinoye-Abdulwahab S. A.

Salau, E. S.

Bayei, J. D.

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Editors

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Foreword

The area of agricultural extension and advisory services is familiar to me being an academic who has taught different aspects at undergraduate and graduate levels; and a practitioner who has undergone several research studies in the field. I have equally chaired and participated in many consultancy services, thus; to be commissioned to put forth a foreword for a text of this nature, written by veteran academics is both an honour and a compliment.

Development and events in the field of agricultural extension and rural development are dynamic and changing fast, due to unfolding and unpredictable situations all around the world. Hence, the need for constant updating of information to improve agricultural extension practices for a sustainable development of the agricultural sector. Researchers and practitioners in the discipline and other cognate fields have crafted together this valuable treatise titled 'Contemporary Issues in Agricultural Extension and Rural Livelihoods in Nigeria'. The text has twenty chapters of different areas that hinge on agricultural extension and rural development.

Chapter One reviews the concept, goal, principles, roles and functions of agricultural extension with exposition on the competencies expected of extension officers. In Chapter Two, the principles, processes as well as methods of technology transfer in agricultural extension were well expounded while Chapter Three dwelled on principle of extension administration and supervision. Chapter Four explicated the approaches, which include the demand-driven and private extension models, as well as the roles of extension as an advisory service. In Chapter Five, the use of local leaders in agricultural extension to achieve a multiplier effect in rural development was explained. Chapters Six and Seven included topics on rural development efforts in Nigeria with a comprehensive conceptual consideration of approaches and strategies in rural development as well as rural community transformation via the deployment of tourism development. The significance of tourism development on rural livelihoods was also included. Chapter Eight delineated pastoralism and the plight of agro-pastoralists to include gender roles in the assimilation of migrants, and the challenges facing the host communities.

The book captured the principles of sustainable livelihood and its interrelationship with agriculture, strategies for food security among households, and sustainable issues towards agricultural and rural development in Nigeria in chapters Nine, Ten

and Eleven. Chapters Twelve, Thirteen, and Fourteen are on subjects of climate change and these include: climate change adaptation and mitigation strategies, effects of climate change on food security, and effects of climate change on livelihoods respectively. Chapters Fifteen and Sixteen have extensive discussions on gender mapping and role of gender in extension service and rural development while Chapters Seventeen through Nineteen are dedicated to the role, application, and challenges in the use of information and communication technologies for rural development. Finally, Chapter Twenty is on measurement and scaling in extension practice.

The book discussed the basics of contemporary issues in extension practice in the world with emphasis on the implication to the Nigerian context. This makes it relevant for achieving sustainability in extension service delivery. It provides detailed information for the use of students at undergraduate and graduate levels as well as practitioners involved in agricultural extension delivery in different sub-sectors of agriculture. It is therefore a valuable treatise for professionals and students in the field of agricultural extension and advisory services.

Prof. L. A. Akinbile

President, Agricultural Extension Society of Nigeria (AESON)
Department of Agricultural Extension and Rural Development
University of Ibadan
Ibadan, Nigeria

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Effects of Climate Change on Pastoralists' Livelihoods: Implication for Sustainable Peace and Development

¹Aderinoye-Abdulwahab, S. A. (Ph.D.)

²Chikaire, J.U. (Ph.D.)

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- 1 Department of Agricultural Economics and Extension, Kaduna State University aderinoye.as@unilorin.edu.ng
 - 2 Department of Department of Agricultural Extension Federal University of Technology, Owerri Owerri, Imo State, Nigeria.

Summary

The chapter examined the effects of climate change on pastoral livelihoods and the economy. It is divided into nine sections. Section one is the introduction which discussed the concept of pastoralism and pastoral economy. The second section looks at the overview of pastoralism and pastoral livelihoods. Then the inequalities in pastoralism were discussed in section three, while four talks about adaptation/ coping strategies and contributes to new paradigms for improvement of pastoralists' livelihoods as well as proffer new options in securing the livelihoods of the vulnerable group. Section five looks at pastoral livelihood vulnerability to the impact of climate change. Six discusses climate as a risk factor for pastoralist conflict while seven highlights the role of Agricultural Extension and Advisory Services (AEAS) in sustainable pastoralist livelihoods. Section eight discusses pastoralists and the quest for livelihood security and nine concludes the chapter.

Introduction: Pastoralism in Agriculture

Pastoralism is a branch of agriculture with extensive livestock production on rangelands and is often referred to as a subsistence means of survival by tending livestock such as cattle, sheep, goats, and camels (Kandagor, 2005). The concept of pastoralism varies greatly in terms of herd composition, management, and other aspects of social organisation. There are modern outlooks of pastoralism such as the ranches in the United States and sheep and cattle stations in Australia. Nevertheless, a common feature across the variations is that pastoralists significantly depend on livestock for their food and income (Catley et. al., 2013). Pastoralism across African countries is practiced diversely. Moreover, pastoralism depends on a double imperative: extensive land use and freedom of movement. Herds must normally have access to seasonally varied pastures and water. This is the way to afford a margin of safety against the erratic climate patterns. Pastoralism is jeopardised if access rights to a range of critical resources (land, pasture, water, the security of lives and properties) are not respected.

There are different types of pastoralism ranging from the transhumance to the sedentary. Transhumance pastoralism, on the one hand, is more mobile. The pastoralists in this category do not favour any particular place for settlement, rather they inhabit areas with the presence of grasses and water for their livestock (Rass, 2006). They do not depend so much on their animals for food but tend to cultivate crops to feed on. For example, pastoralists of Sierra-Leone are known to follow a shifting pasturage whereby they allow their livestock to graze land for 2-3 years and then migrate to another (Hammel, 2001). It takes several years before these

particular sets of pastoralists return to the same piece of land. The sedentary often referred to as settled pastoralists; follows a seasonal pattern of movement. They construct temporary structures like houses and they are ready to move when the situation is no longer conducive for their livestock. The Maasai in southern Kenya for example is only partly dependent on livestock whilst engaging in other sources of livelihood. Whichever method of pastoralism adopted by any group, it tends to be a better means of adaptation to environmental hazards than farming (Catley et al., 2013). This is because pastoralists follow the rains while a farmer stays put and often suffers during drought periods.

The FAO (2006) reports that pastoralism contributes around 10 percent of global meat production and supports about 200 million households in Africa. It is interesting to note that contrary to common assumptions, pastoralism contributes significantly to the economies of many states. This is evidenced in areas where; despite resources being scarce, pastoralists still manage to form beneficial relationships with the people in the area (Little, 2013).

Overview of pastoralists and pastoral livelihoods

Pastoralists are people who herd and raise livestock for a living and they inhabit over 21 countries; spanning the Sahel in the west through the eastern rangelands to the southern part of the continent (Simel, 2008). In Nigeria, pastoralists keep 96 percent of total cattle available, thus livestock production contributes 20 percent of agricultural GDP with about 280,000MT national meat and 432,000MT national milk production (FAO, 2006). The United Nations Development Programme (UNDP) categorises any family that depends on more than 50 percent of their gross household income on livestock (milk and meat) as a pastoral household, especially if such livestock products are consumed using unimproved pastures (UNDP, 2003). The majority of pastoralists worldwide, with a headcount of up to 500 million, live in developing countries (FAO, 2010) where they are faced with many developments and poverty challenges. However, pastoralists are also widespread in most industrialised countries: in Europe, Australia, the USA, China, and other countries. Pastoral areas in Africa occupy around 40 Percent of landmass (FAO, 2006).

Pastoralists usually make their living through a complex set of activities, using livestock production for trade and as a way to provide them with goods they cannot manufacture. Pastoralists live under challenging conditions; mostly in arid or semi-arid rangelands, or lands that suffer from extreme seasonal variations. Their animals graze on rangeland vegetation and transform it into a range of products including milk, meat, fibre, leather, and manure.

Pastoralists are mostly of patriarchal descendants and polygyny is typically the style of marriage in pastoral communities. They are usually male-dominated and the males take major decisions for the family. The division of labour is purely based

on gender. Men usually own the cattle, while women perform house chores and take care of the children. Pastoralists also have an emotional attachment to their animals. They rarely want to sell off their animals but could as well raise their livestock to cater for subsistent needs in terms of food and other market needs. Pastoralists try to adapt to various climatic conditions and other constraints posed to them by economic and political changes. Pastoral communities are widely spread in dry regions of developing worlds and sub-Saharan Africa whilst; their population is on the increase (Anderson et al., 2009). They move in search of pasture and water for their animals. The ability to migrate makes it necessary for them to practice partial or whole nomadic livestock grazing (UNDP, 2007). As they cross borders, pastoralists tend to adopt alternative settlement areas (Simel, 2008).

The spatial and geographic distribution of pastoralists is characterised by resource scarcity. They are usually situated in arid and semi-arid regions and these areas are characterised by scarcity and unreliability of rainfall (Homewood, 2008). Consequently, water is always a scarce resource for them. Amede et al. (2011) report that a significant number of pastoralists in Africa are supported by the rivers Niger, Zambezi, Nile, Senegal, and Volta. Thus, water is a significant resource for pastoralists while grazing land is equally a major resource that attracts herders. This is because pastoralists require water and grazing land for the survival of livestock. Therefore, these two resources determine, to a large extent, the livelihoods of pastoralists. Unfortunately, the two resources are greatly affected by the impact of climate change. Research shows that climatic events in drylands have greater impacts on rangeland production than overgrazing alone (Anderson and Hoffman, 2011). This may be partly responsible for livestock numbers which rarely exceed carrying capacity because frequent die-offs keep stocking density at lower levels (Moritz, 2008).

Pastoralists are affected by droughts as a result of extreme changes in temperature. They, therefore, migrate when the weather condition is not favourable for their livestock and this translates to increases in populations of the newly inhabited areas. This results in depletion of natural resources and aggregate opportunities in the new areas which could create a negative impact on livelihoods. As a result, situations tend to escalate into violence and increased vulnerabilities in areas where pastoralists have relocated to.

Inequalities in pastoralism

It has become a tradition for pastoralism to be commonly associated with negative ideas like droughts and drylands, marginalisation, backwardness, illiteracy, peripheral, remoteness, uncertainty, vulnerabilities, violence, and conflict. Pastoralists face discrimination and are sometimes tagged as criminals (Catley et al., 2013). They live with too much uncertainty and have often found themselves in the physical margins of new states. They are usually situated in politically sensitive areas where government

policies frequently neglect or marginalise them (Young et al., 2009). Pastoralists often find themselves in situations that prohibit access to grazing land and water for their livestock (Adekunle and Adisa, 2010). Pastoralism is therefore a phenomenon that has experienced many inequalities in history. Pastoralists are usually omitted from most policy documents on regional economic integration. However, the 2010 African Union (AU) policy framework for pastoralism in Africa has identified the past and future economic, social, and cultural contributions of pastoralists (Catley et al., 2013).

Certain governments have also adopted a rangeland enclosure which is the restriction of herders from access into specified green lands at certain periods. Unfortunately, such responses known as land grabbing have resulted in a measure of inequality for pastoralists as the rangelands are being converted into other uses such as forest uses and national parks (Galaty, 2013). Therefore, land enclosure often translates to over-grazing and depletion of pasture in the non-enclosed areas (Tache, 2013). Consequently, the resultant effect is often land degradation of the non-enclosed lands. Land degradation in the arid and semi-arid regions has often resulted in widespread desertification with irreversible changes to soil structure and nutrients (Osman-Elasha and Sanjak, 2008). This situation is heightened by persistent decreases in rainfall, increased frequency of drought spells, severe overuse of land with overly intense cropping with poor soil management, poverty, land tenure systems, land-use policies, market failures, and overgrazing of rangelands (Nyong et al., 2008).

Despite the inequalities inherent in pastoral livelihoods, mobile pastoralism in Africa has consistently remained more productive than ranch systems (Oba, 2013). Furthermore, external interventions to re-orientate pastoralists from nomadic lifestyles have consistently failed (De Jode, 2010). Moritz (2010) submits that different forms of mobility are, however, emerging. Similarly, Young et al. (2009) report that pure forms of pastoralism where families entirely depend on livestock for their livelihoods are on the decline. Moreover, pastoralists have also responded to droughts by splitting their herds and slaughtering calves to reduce stress on mothers. Given these trends, new forms of pastoralism such as agro-pastoralism, sedentarised pastoralism, commercial pastoralism, and non-herding pastoralism (ranching) are emerging (Oba, 2013).

Adaptation and Coping Strategies for a Sustainable Pastoralist Livelihood/ System

Pastoralists are aware of the effect of seasonal variation on their livestock and consequently their livelihoods. The survival of the pastoral herd is critically dependent on the availability of dry season pasture (Oba, 2013). Therefore, pastoralists adopt a range of methods to deal with the effect of weather and climate. As the frequency of drought increases, so does the need for pastoralists to maximise their drought survival techniques (Tache and Oba, 2010). Rangeland enclosure is one of the

responses adopted by pastoralists to feed their livestock during periods of scarcity. This is a situation whereby specific green lands are isolated for cultivation and herds are prevented from grazing on them at certain periods. Furthermore, pastoralists have developed some adaptive strategies to endure the effects of the dryland's ecosystem. These include but are not limited to; controlling access to and provision of water to livestock especially during the dry season, early take-off of livestock, destocking animals to restock when circumstance changes, diversifying into crop farming and other economic engagements, loaning the "excess on subsistence requirements" to family and friends to help them rebuild their herds as a form of social capital, raising different species or breeds of livestock to make optimum use of different ecological niches, and veterinary care (Anderson et al., 2009; Oba, 2013; Livingstone and Ruhindi, 2013).

Pastoralists have been responding to the inequalities in their environment in different ways. For example, inequalities in a pastoral environment have contributed to their mobility. Migration is a method herders adapt to control the impact of unfavourable weather on their livestock. However, not only do pastoralists move for inequality reasons, but they also have an in-depth knowledge of local ecologies. They, therefore, assess rangelands to move to better regions in search of grass and water for their livestock (Aderinoye-Abdulwahab & Adefalu, 2012; Aderinoye-Abdulwahab & Chingonda-Nkhoma, 2015). Migration could also be as a result of herder preferences or dietary needs of livestock rather than due to water and grazing land scarcity only (Behnke et al., 2011).

Remarkably, agro-pastoralism is another adaptation strategy that has offered pastoralists the opportunity to integrate livestock keeping with crop cultivation (Young et al., 2009). The cultivation of crops by pastoralists also provides the opportunity for them to utilise the pastures on-farm plots during the wet season before moving to the reserved rangelands during dry seasons (Fabusoro, 2009). However, due to the small size of farm plots and range enclosures, pastoralists still have to move their herds and the regularity of transhumance has been significantly transformed into other types of pastoralism. Splitting of herds is also an adaptation strategy that pastoralists use to lessen the risks of overgrazing and exposure to diseases and other hazards. They also invest in animals, particularly fertile females, to build up herd size as an insurance against drought, disease, and raiding. Pastoralists also select their stock by considering certain factors such as (good milk yields, drought resistance, fertility, and so on).

It has also become an integral part of pastoralism for herders to reserve a section of communal rangeland for later use (Tache, 2013) while they migrate to other areas as a result of fluctuations in rainfall. Migration into other areas by pastoralists not only leads to overpopulation of the newly inhabited areas but also results in resource depletion. Consequently, the scarcity of resources often translates into

conflict (Behnke et al., 2011). Diversification, even though debatable, becomes a consideration and this has over time helped to cushion the effect of risks associated with pastoralist livelihood systems.

Pastoralists' Livelihood Vulnerabilities to the impact of Climate Change

Vulnerability, potential for disruption or harm, is a measure of exposure as well as the capacity to respond to risks and hazards (Miller et al., 2010). By implication, it involves a combination of factors that determine the degree to which a person's livelihood is put at risk. Livelihood vulnerability is an outcome of factors such as affluence, education, gender, demography, technology, and above all, preparedness (Paul, 2011). In the same vein, Wisner et al. (2004) propose that various factors such as economic, demographic, political, and geographical locations all contribute to the differing levels of vulnerability of diverse groups. Therefore, one can argue that vulnerability stems from unsafe conditions. It can be contextualised from an individual, household, environmental, social, economic, and institutional perspective (Paul, 2011).

Livelihood, on the other hand, has been defined as the means people have adopted to earn a living (Scoones, 2009) by supplying their needs for food, water, shelter, and other services. Nonetheless, the frequent change in weather and climate can disrupt people from achieving this. Climatic drivers such as frequent drought events, more variable rainfall, and desert encroachment tend to retard the growth and development of people whose livelihoods depend greatly on those factors. Consequently, the effects expose people to more serious hazards that threaten their livelihoods. It is therefore understandable to note that access to natural resources is vital to livelihood security especially in areas where people depend largely on natural resources for daily survival (Bob and Bronkhorst, 2011). However, the scarce nature of these resources especially in the drylands often contributes to desertification, land encroachment, and other environmental conditions that in turn affect livelihoods. Furthermore, the rate at which people become vulnerable has increased due to population and economic growth. This is because the struggle for the usage of natural resources is under pressure as a result of human use. Consequently, a low capacity to adapt to climate change also automatically implies a high level of vulnerability.

Pastoralists in Africa are confined to arid and semi-arid regions where deliverables of governance are either weak or non-existent (Aderinoye-Abdulwahab and Adefalu, 2012; Devereux and Scoones, 2008). Marginalisation and isolation from government, the further compound vulnerability of pastoralists to natural disasters as well as to resource use conflicts. Moreover, natural resources such as water and land continue to be under pressure due to increases in human population and economic growth. Thus, ensuring a sustainable livelihood for people who depend largely on natural resources will remain challenging. It is therefore important for governments and policymakers to understand the complexities of particular livelihood systems, disaggregate the

complex nature of risks and vulnerabilities, and finally adapt particular interventions that can address the specific needs of the people. This way, the social protection of the pastoralists can be guaranteed and this will serve as a measure of reduced economic and social vulnerability. Social protection will include, but not limited to, public and private initiatives that provide income, security, social infrastructure, and social support for the marginalised groups.

Climate as Risk Factor for Pastoralists' Conflicts

Conflict is a form of disorder intrinsic to development processes. It is a situation in which two parties strive to acquire a set of scarce resources at the same moment thereby leading to a form of the disorder that often undermines developmental processes (Goldsmith, 2013). Many conflicts are triggered as a result of competition for resources. They can lead to the destruction of assets and infrastructure of marginalised groups. The African continent, like any other, is prone to conflict and has recorded many conflicts in the last century. These conflicts are caused by a wide spectrum of factors ranging from politics, resource control and allocation, economic, social and cultural differences, crossing borders, and many more (Goldsmith, 2013). Additionally, droughts and economic shocks such as major fluctuations in food prices are among the drivers of conflicts.

The close association between drought and conflict complicates what is already a complex phenomenon. Thus, it can be said that climate change is gradually becoming a major cause or fuel for conflicts in Africa. An example is in the Darfur region of Sudan where climate change has manifested in the form of extension of the Sahara desert (Young et al., 2009). This implies less water and arable land for both farmers and herders. The resultant effect of such a crisis is friction between tribes and this adds to existing problems among the tribes who had hitherto co-habited peacefully (Osman-Elasha and Sanjak, 2008). Similarly, a study in northern Nigeria found that the major source of conflict between pastoralist and farming communities was a dispute over grazing land along an ethnic divide which has been exacerbated by desertification in arid regions (Olabode and Ajibade, 2010; Adisa and Adekunle, 2010; Aderinoye-Abdulwahab et al., 2016). Pastoralist conflicts have often revealed issues of inequalities such as state policy biases and resource management, as well as marginalisation among pastoral communities (Goldsmith, 2013). Conflict is a key area that needs to be addressed when discussing coping strategies for pastoralists.

Land resources continue to have historical, cultural, social, and religious significance (Bob and Bronkhorst, 2011). As a result, these resources remain a source of conflict among people. Therefore, availability of and access to land resources are crucial to guarantee a real and long-lasting improvement in social, economic, and political well-being, especially in vulnerable societies that are prone to instability and conflicts (Bob and Bronkhorst, 2011). Specifically, the amount and type of land in sub-Saharan

Africa available to households and communities is critical to food production and stability.

Agricultural Extension and Advisory Services (AEAS): Role in Sustainable Pastoralist Livelihoods.

In the past century, pastoral zones have usually been neglected by governments for consideration in economic development programmes and the establishment of public services. Few social, financial, and technical advisory services (veterinary, information, training, etc), and often of low quality; were provided to pastoralists. Consequences are high levels of poverty, food insecurity, degradation of natural resources (i.e. rangelands, soil, and water), high dependence on relief, and an increasing frequency of conflict over scarce natural resources.

Today, pastoralists are faced with a multitude of challenges and situations that need informed decision-making. Access to high-quality, affordable, and reliable Agricultural Extension and Rural Advisory Services (AERAS) is critical so that pastoralists are in a better position to make the right decisions to improve livestock production, innovate, protect the environment and improve their livelihoods. AERAS can contribute to improving pastoralists' livelihoods and strengthening their capacities to deal with risk and change. Such services assist in spreading new ideas and sharing existing technologies and practices, as well as in supporting the organisation of pastoralists and linking them to markets.

AERAS have to respond to the specific needs of pastoralists in doing the following:

- (a) Information services: these include geo-botanical and hydro-climatic information, as well as updates on, e.g. pastoral conditions, disease dynamics, market prices and various research projects related to pastoralist production systems;
- (b) Training and advisory services on livestock production/management, natural resource management, business skills, life skills, conflict resolution, etc; and natural resource management focused on two key resources in pastoral systems; water and pasture, through three activities: reseeded pastures, protecting natural regeneration of woody species, and rehabilitating pastoral wells;
- (c) Veterinary services (vaccination, animal healthcare); and health: a mobile system for human and animal healthcare that involved movement between pastoralist camps to offer preventative, curative and awareness-raising activities; the main activity was communication for behavioural change;
- (d) Input supply: access to animal feeds, drugs, seeds, and other inputs;
- (e) Financial services: access to credit facilities, grants, and subsidies; and mediation and advocacy services: for conflict resolution, policy development,

and support; as is being advocated for to improve livelihoods of rural dwellers in eastern parts of the country (Chikaire et al., 2011).

- (f) Infrastructure and transport services: markets, roads, public transport, water for livestock, etc.
- (g) Income diversification, which involved the development of appropriate infrastructure and strengthening the local technical and organisational capacities (market facilities, herders' and women's cooperatives); (Bloch, 2016).

In addition to these services along the livestock value chain, it is important to provide social services such as access to water, education, and human healthcare to pastoralist communities to improve their standard of living and to make life in the arid and semi-arid lands (ASALs) more attractive. Compared to arable farming communities, pastoralists live in very remote areas with low population density and their herds are highly mobile. Road networks and public transport are poor. Especially poorer pastoralists are not always aware of some of the services offered by governments and private agents or do not have the means to access them. Therefore, AERAS providers should be "mobile" and developed together with pastoralist communities. In some cases, pastoralists can play an active role in the delivery of services. For instance, community-based animal health workers or Pastoralist Field School facilitators recruited from within the pastoralist communities can offer services in their own and neighbouring communities.

Pastoralists and the Quest for Livelihood Security

Two third of global drylands, which inhabit more than 2 billion people, is used for livestock production. In Sub Saharan Africa (SSA), about 40% of the drylands are invested in livestock production (Rass, 2006). Pastoralism, a predominantly livestock-based production system relies heavily on mobility thus making its features include flexibility, low costs, and freedom of movement (IIED, 2010). According to the World Initiative for Sustainable Pastoralism (WISP), pastoralists, also known as herders, indicate both cultural identity and production system. However, droughts, desertification, land degradation, and encroachment are hampering the livelihoods of people living in the drylands as witnessed around the Lake Chad Basin. Regardless of these; pastoralism, in most parts of SSA, has survived despite the mentioned features through coping and adaptation mechanisms such as the southward movement of herders for pasture and water. In the past, several governments in SSA viewed pastoralism as environmentally destructive. However, it is becoming clearer that pastoralism could be viable as it supports a substantial amount of households.

The bulk of the estimated 19.7 million cattle in Nigeria reportedly feed on arable crop farms while grazing; and this often results in conflicts between the pastoralists

and the farmers. Whilst scholars averred that conflict is an inevitable phenomenon, competition for scarce resources among the people of drylands is the real conflict triggers and it is being exacerbated by a high rate of insecurity in northern Nigeria. Thus, part of the extended consequences of the conflicts between pastoralists and farmers in Nigeria include food and livelihood insecurity, reduced incomes, and increased vulnerability to the impact of climate change.

It becomes imperative to chart a lasting solution to the identified problems. Flexible and evolving combinations of management practices and policies that are key to successful pastoral adaptation are necessary. It has been established that the impact of climate change can manifest in the drylands by the inability of the lands to sequester (store) carbon due to droughts and overgrazing. Hence, it is essential to tap into the ability of African grasslands which have vast carbon sequestration potential and can store up to 34% of the global stock of carbon dioxide. This will prevent carbon from being released into the environment as locking the carbon in the soil will lessen the propensity to trigger conflicts. Therefore, carbon sequestration is an emerging opportunity in the drylands which if harnessed can help to alleviate the impact of climate change on pastoralist livelihoods.

Experience has shown that extension workers can be engaged by the government to achieve an enduring solution to the problem. Extension agents being change agents can create a sensitisation programme for water catchment and conservation systems such as the prudent use of dams and irrigation sub-systems maintainable at the local level to curb the effect of climate change impacts on livelihoods. As a long-term solution, researchers have also opined that diversifying income is a definite adaptation strategy to solve the problem associated with pastoralism. Pastoralists, alongside herding, can equally engage in other income-generating activities such as the keeping of poultry and petty trading; thereby reducing the pressure on land and the scarcity of resources.

In terms of policies, there should be a paradigm shift from the highly nomadic lifestyle to a more sedentary one. This can also be handled by extension agents through advocacy drives. In the meantime, the recent anti-grazing laws enacted by some states in Nigeria should be suspended as the laws have become a recipe for conflicts. If this could not be urgently achieved, the government through extension workers must help herders to gradually shift from their traditional nomadic existence to a more static lifestyle because the pastoralists are never given a sense of belonging wherever they go since they are not landowners. We also have to face the reality that modernity is making pastoralism counterproductive and inefficient. Therefore, unoccupied and isolated lands can be converted into grazing areas in the affected states to curb the incessant crises. This will enable herders to better maintain their livestock, reduce livelihood vulnerabilities, and other climate change impacts.

Finally, Nigeria, like any other African country, needs to emulate countries like the Netherlands and Germany who seem to have better policies in terms of climate change adaptation. It would, therefore, be necessary to plan a rights-based approach that will increase the integration of pastoralists into political, social, and economic systems at national and regional levels, thus addressing the fundamental problems of marginalisation and weak governance that lie at the root of the vulnerability of the drylands.

Conclusion

Pastoralism is of great significance and its importance to a nation's economy cannot be disregarded. Among the direct benefits of pastoralism are: subsistence and livelihood factors, financial investment both locally (for the investor) and nationally (for the nation/government), labour investment, insurance, social investment through persistent social association and cultural identity among families, groups and communities, economic activities such as raw material production, and human capital such as employment in the form of skills development and indigenous knowledge. The indirect benefits of pastoralism include agriculture-related advantages like the use of manure, the use of livestock as traction for tilling the soil as well as recruiting livestock for labour purposes. Pastoralism also offers an indirect benefit by way of tourism as herders migrate from one region to another. Such movements lead to cultural assimilation and acculturation.

It goes without gainsaying that pastoralism offers certain environmental benefits although indirectly. Contrary to popular assumptions, pastoralism does not necessarily degrade the environment but can deliver positive environmental gains. For example, grazing enhances seed germination for seeds that go through the animal gut, enhances the cycling of nutrients through the ecosystem, and stimulates growth especially grasses. Dung is also a source of fertiliser while hoof action breaks soil crust thereby allowing water penetration into the soil.

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