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Abstract

Purpose: This paper explores the relationship between community development and Farmer-Managed Natural Regeneration (FMNR) as a strategy for resource conservation and community empowerment. It highlights how FMNR contributes to ecological sustainability and rural household livelihoods in selected countries in West and East Africa, including Niger, Ghana, Mali, Uganda, Tanzania, and Kenya.

Methodology: A content review of FMNR practices was conducted, focusing on their adoption, spread, and impact on community development. The analysis emphasized economic empowerment, ecological sustainability, best practices, challenges, and mitigation strategies.

Findings: The study found that FMNR enhances community livelihoods by promoting sustainable natural resource use and reducing environmental degradation. It strengthens community capacity for resource management and supports rural economic development. However, challenges such as land fragmentation, technological gaps, and limited adoption were noted.

Unique Contribution to Theory, Practice and Policy: To scale up FMNR, stakeholders should prioritize community training, strengthen institutional frameworks, and provide policy support for sustainable resource management. Addressing technological and socio-economic barriers is essential to maximize FMNR's potential in improving livelihoods and achieving ecological sustainability.

Keywords: *Community Development, Natural Regeneration, Empowerment, Impact*

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INTRODUCTION

Human innovation has profoundly transformed various sectors globally, significantly enhancing quality of life. Farmer-Managed Natural Regeneration (FMNR) represents a pivotal advancement in natural resource management, with substantial implications for sectors such as agriculture and finance, notably improving household income (Thornton et al., 2019). Although community development as a formal discipline is relatively nascent, there is a discernible trend among governments, development organizations, and private entities toward empowering communities through structured interventions. These initiatives encompass community-driven development programs, corporate social responsibility projects, and government-led initiatives targeting specific demographics, including cooperatives, self-help groups, community-based organizations, women, youth, persons with disabilities, the elderly, and vulnerable groups such as orphans.

As a practice-oriented discipline, community development aspires to cultivate empowered communities capable of self-determination, while acknowledging the collaborative roles of various stakeholders through capacity-building efforts. Several approaches within this discipline, including asset-based, capacity-building, and ecological strategies, align closely with FMNR. While FMNR requires multi-stakeholder collaboration for successful implementation, community development underscores inclusivity and stakeholder participation in endeavors aimed at improving human well-being. Across these interactions, the sustainability of natural resources remains a central priority (Ibrahim et al., 2017; World Vision, 2021).

The growing adoption of FMNR across nations is driven by the challenges posed by land subdivision, which threatens household food security and income. Research indicates that FMNR enhances land productivity and agricultural output, thereby addressing food insecurity. For instance, in the Sahel region, FMNR practices have been associated with increased crop yields (Binam et al., 2017). In Niger's Maradi region, FMNR adoption has been linked to an 18-24% rise in household income, attributed to increased crop and wood value (Haglund et al., 2011).

Genesis and Rationale of FMNR

Farmer managed natural regeneration (FMNR) was founded by an environmental conservationist Tony Rinaudo in Niger in 1984. The founder, on a mission to restore degraded ASAL region of Niger embarked on a relentless effort of tree establishment for the betterment of the environment. After numerous attempts, success stories were recorded. The practice spread to other African regions and the globe at large. Conservation related organizations, research institutions and governments have since embraced the practice with notable gains at household and national levels. The strategy being rural based in nature contributes to diversified livelihood options through provision of pasture for livestock production/sale and enhancement of beekeeping activities.

Natural resource conservation is not an entirely new concept. Many African communities prior to the colonial period practiced several forms of resource conservation to include rotational cropping, land fallowing/shifting cultivation to conserve the soils and increase crop yields. Community based natural resource management (CBNRM) practices were common across the region and spearheaded by established structures at the lowest levels such as council of elders. The roles of these community groups were to regulate access and use of natural resources such as trees, water, fodder and beehive hanging areas. Independence of African nations gave rise to the emergence of

formal governance of natural resources with minimal recognition and integration of indigenous management systems.

Over the years, informal community conservation groups have emerged as key partners in environmental conservation efforts. Co-management of natural resources between government and neighbor communities (quite common in Uganda) forms an integral part of resource sustainability. Water, forest and wildlife resources rank high in the list of such resources and attract the attention of authorities to craft co-management arrangements with communities. In these arrangements, communities often get empowered through capacity development, direct employment, and extraction of parts of resources to meet their basic needs, acting as an alternative livelihood source. The emergence of FMNR therefore and its subsequent adoption by farmers addresses the livelihood issue since decisions on the size of land to be set aside for FMNR practice rests with the individual farmer. Government bureaucracies in co-management arrangement are usually tedious, FMNR being farmer focused is therefore an ideal alternative.

Improved health which culminated in better living conditions led to an increase in human population particularly in the African continent which had high disease prevalence claiming many lives. This situation then saw a high demand for food and other human wants with a direct bearing on natural resources. Innovative ways to counter the risk of natural resource degradation was necessary from governments and development organizations. Subsequently, natural resource conservation strategies such as farmer managed natural regeneration (FMNR) emerged from efforts of environmental practitioners to reclaim degraded lands. The practice was initially common in arid and semi-arid lands but gradually embraced in middle and high altitude areas as a result of population pressure. The simplicity of management of FMNR strategy, benefits accruing from its practice have immensely contributed to its adoption and practice by farmers across nations.

Building upon Traditional Practices

Farmer-Managed Natural Regeneration (FMNR) builds upon traditional environmental conservation practices while introducing significant innovations that set it apart from conventional approaches. At its core, FMNR integrates and formalizes many aspects of traditional knowledge and practices, making it adaptable to diverse cultural and ecological contexts.

One of the key ways FMNR builds upon traditional practices is through its reliance on indigenous knowledge. By leveraging local understanding of tree species, soil conditions, and ecosystem dynamics, FMNR incorporates practices such as selective tree cutting and fire management, which have long been part of traditional conservation. However, it refines these practices into a more systematic and replicable framework, ensuring that they remain both locally relevant and scientifically robust (Reij et al., 2009).

FMNR also shares significant overlap with traditional agroforestry systems. Like these systems, it involves the integration of trees with agricultural crops to enhance soil fertility and improve microclimatic conditions. FMNR advances this approach by emphasizing systematic pruning and tree management to optimize regrowth. This balance between agricultural productivity and forest regeneration underscores its alignment with and evolution from traditional agroforestry techniques (Binam et al., 2017).

Community engagement forms another pillar of FMNR, echoing the communal ownership and resource management systems of traditional conservation practices. Many traditional approaches relied on collective action and shared responsibility for resource stewardship. FMNR builds on this foundation by fostering active community participation, ensuring that the benefits of regeneration are widely shared and that the practice is sustained over time (Ibrahim et al., 2017).

Through its integration of these traditional elements, FMNR demonstrates how time-tested practices can be adapted and scaled to address contemporary environmental challenges, blending cultural wisdom with modern sustainability principles.

Diverging from Traditional Practices

FMNR diverges from traditional environmental conservation practices through introduction of more structured and expansive methods to natural resource management. One major divergence is the structured approach to regeneration. Traditional conservation methods often emphasize passive preservation, where forests are left untouched or protected from human interference. In contrast, FMNR actively manages natural regeneration by pruning, thinning, and protecting sprouting tree stumps. This active management accelerates the regeneration process, promoting the growth of trees while simultaneously allowing for agricultural activities to continue on the same land. By carefully managing the balance between regeneration and farming, FMNR ensures that both agricultural productivity and ecological restoration can occur simultaneously (Haglund et al., 2011).

Another significant departure is FMNR's scalability and adaptability. Traditional conservation practices are often deeply rooted in specific cultural or ecological contexts, making them difficult to apply in different regions or landscapes. FMNR, however, employs methodologies that can be adapted across a wide range of environments and socio-economic settings. This flexibility is evident in its successful implementation in countries such as Niger, Ethiopia, and Kenya, where it has been adapted to local conditions and integrated into broader environmental and agricultural development strategies (World Vision, 2021).

FMNR also integrates economic incentives into conservation, a shift from traditional methods that prioritize ecological outcomes without always addressing the economic needs of communities. By encouraging farmers to use regenerated trees for products like firewood, fodder, and other marketable goods, FMNR links conservation directly to household income. This economic integration provides a tangible incentive for farmers to adopt and sustain FMNR practices, ensuring that conservation efforts contribute to immediate and long-term well-being (Thornton et al., 2019).

Finally, FMNR diverges from traditional practices through its formal institutional support. Whereas many traditional conservation practices operated under informal, community-based governance systems, FMNR benefits from formal backing through government policies, development programs, and NGO interventions. This support ensures that FMNR practices are legally recognized, often accompanied by land use rights and financial resources, enabling broader adoption and long-term sustainability (Reij et al., 2009).

In these ways, FMNR represents a more structured, economically integrated, and widely applicable approach to environmental conservation, offering a modern alternative to traditional methods that emphasizes both ecological restoration and community development.

Holistic Sustainability Perspective

FMNR uniquely integrates environmental, economic, and social dimensions into its approach. It goes beyond traditional conservation's focus on preserving ecosystems to actively enhancing them in ways that directly benefit human well-being. For example, FMNR has been shown to restore degraded lands faster and at lower costs compared to large-scale tree planting campaigns (Binam et al., 2017).

Additionally, FMNR's emphasis on grassroots engagement and empowering local communities contrasts with top-down conservation methods that sometimes disregard local needs and knowledge (Ibrahim et al., 2017). This participatory aspect fosters long-term stewardship of natural resources, aligning conservation with local development goals.

FMNR both builds upon and innovates beyond traditional conservation practices by integrating indigenous knowledge with structured, scalable, and economically viable approaches. Its focus on regeneration, rather than preservation alone, positions it as a transformative model for sustainable natural resource management that is both ecologically restorative and socio-economically empowering.

ADOPTION AND SPREAD OF FMNR: CHALLENGES, SUCCESSES, AND ANALYSIS

The adoption of Farmer-Managed Natural Regeneration (FMNR) in various agro-ecological zones presents both opportunities and challenges, as it interacts with diverse environmental, economic, and social factors. While FMNR has been widely recognized as a cost-effective strategy for land restoration, its implementation across different regions, especially arid and semi-arid zones, presents distinct challenges. At the same time, it has led to notable successes, particularly in combating deforestation, soil erosion, and water scarcity—three of the most significant threats to environmental and human survival today.

Environmental Challenges and the Role of FMNR

Arid and semi-arid regions, especially in developing countries, face substantial risks of environmental degradation due to overgrazing, drought, and soil erosion. These areas are often characterized by low rainfall, fragile soils, and high levels of land degradation. In such regions, livestock grazing is typically the primary economic activity, with pastoralists driven by the need to increase their herds, often exacerbating the "tragedy of the commons" (Hardin, 1968). This situation is compounded during periods of drought, when overstocked lands face severe degradation and pastoralists experience significant loss of livestock.

FMNR addresses these challenges by offering a sustainable and low-cost solution for land restoration. By promoting the regeneration of indigenous trees on agricultural land, FMNR not only restores soil fertility but also improves water retention and provides vital pasture for livestock. In regions like the Sahel, for instance, FMNR has been successfully applied to restore degraded lands, with documented increases in vegetation cover and improved grazing conditions (Reij et al.,

2009). Furthermore, FMNR supports agroforestry practices that contribute to soil conservation, reduce erosion, and increase the availability of water resources for both crops and livestock (Binam et al., 2017).

In addition to improving livestock pasture, FMNR enhances other productive activities. Beekeeping, for example, has flourished in regions where FMNR has been implemented, as trees provide a reliable source of nectar for bees. Research shows that honey production in FMNR areas can significantly increase income for local farmers, adding to the economic resilience of rural communities (Thornton et al., 2019).

Adoption of FMNR: Theoretical Framework and Practical Application

The adoption of FMNR aligns with Rogers and Shoemaker's (1965) Innovation Diffusion Theory, which categorizes adopters into five distinct groups: innovators, early adopters, early majority, late majority, and laggards. The success of FMNR adoption largely depends on the perceived benefits both economic and ecological of the practice and the capacity of the users to implement it effectively.

Early adopters, typically progressive farmers or community leaders, play a critical role in promoting FMNR, as they often drive the initial stages of adoption by showcasing its benefits to others. The perception of economic benefits is particularly important, as many farmers are motivated by the potential for increased income from enhanced agricultural and forest products. In regions such as Niger, where FMNR has led to a 18-24% increase in household income due to the enhanced value of crops and timber, the economic incentive has been a significant factor in adoption (Haglund et al., 2011). Moreover, FMNR's cost-effectiveness as a land restoration method appeals to farmers who may not have the resources for large-scale tree planting or other intensive restoration techniques.

On the other hand, adoption among the late majority and laggards often requires overcoming barriers such as lack of knowledge, limited access to resources, and entrenched traditional practices. The success of FMNR in reaching these groups depends on the ability to adapt the message to local contexts, offer capacity-building programs, and provide necessary resources and institutional support. One successful model has been the establishment of farmer training programs, supported by NGOs and government agencies, which have helped scale FMNR in countries like Ethiopia and Kenya (World Vision, 2021).

Environmental and Economic Benefits of FMNR

From an environmental perspective, FMNR contributes significantly to asset-based community development by restoring ecosystems and enhancing biodiversity. The regeneration of trees not only improves soil fertility and increases water retention, but it also provides various ecosystem services. These services include the provision of woodfuel, medicinal herbs, gums, fruits, and timber, which directly benefit the local communities. Additionally, FMNR promotes the development of eco-tourism in some areas, where restored landscapes attract tourists, contributing to local economies (Reij et al., 2009).

FMNR also plays a role in promoting ecological resilience, particularly in the context of climate change. The ability of regenerated trees to sequester carbon and reduce the impact of drought and soil erosion makes FMNR an effective strategy for enhancing climate change adaptation and mitigation. This dual role in both ecological restoration and economic development has been key to FMNR's success in a variety of contexts.

How FMNR contributes to Sustainable Development Goals

Farmer-Managed Natural Regeneration (FMNR) directly contributes to several Sustainable Development Goals (SDGs), particularly those related to environmental sustainability, poverty reduction, and food security.

SDG 1: No Poverty

FMNR contributes to poverty reduction by improving household income through land restoration and increased agricultural productivity. By regenerating natural vegetation, FMNR enhances soil fertility, increases water retention, and improves pasture quality. These benefits lead to increased crop and livestock yields, which directly contribute to higher household income.

In Niger, for example, the adoption of FMNR resulted in a 18-24% increase in household income, driven by improved crop and timber yields (Haglund et al., 2011). This economic uplift helps reduce poverty, particularly in rural areas where subsistence farming is the primary livelihood.

SDG 2: Zero Hunger

FMNR plays a crucial role in improving food security by restoring degraded lands and enhancing agricultural productivity. By increasing soil fertility and water retention, FMNR enables farmers to grow more resilient crops and secure better pasture for livestock, thus addressing issues of food scarcity and malnutrition.

Research from the Sahel region shows that FMNR contributed to increased crop yields, particularly in drought-prone areas. In areas where FMNR was implemented, farmers experienced a marked improvement in both the quality and quantity of food production, helping to mitigate the effects of food insecurity (Reij et al., 2009). Additionally, FMNR has been shown to support beekeeping, providing farmers with another source of nutrition and income through honey production (Thornton et al., 2019).

SDG 6: Clean Water and Sanitation

FMNR contributes to improved water quality and availability through its role in soil restoration and water retention. By increasing tree cover, FMNR helps reduce soil erosion, which in turn minimizes sedimentation in water sources and improves the quality of water available for drinking and irrigation. Additionally, the enhanced vegetation cover helps regulate water cycles, contributing to more reliable water supplies for both agricultural and domestic use.

Studies have shown that areas where FMNR is practiced experience increased water retention in the soil, which reduces the impact of droughts and improves the availability of water resources (Binam et al., 2017). This is especially critical in arid and semi-arid regions, where water scarcity is a major challenge.

SDG 13: Climate Action

FMNR directly contributes to climate change mitigation and adaptation by promoting carbon sequestration and enhancing ecological resilience. Regenerating trees capture carbon from the atmosphere, contributing to efforts to mitigate climate change. Furthermore, FMNR helps restore degraded landscapes, making ecosystems more resilient to climate impacts such as droughts and floods.

Research has shown that FMNR is an effective tool for carbon sequestration in semi-arid regions, where it has been used to restore degraded lands. For example, in Niger, FMNR has been part of larger initiatives to restore over 5 million hectares of land, sequestering significant amounts of carbon while also reducing land degradation (Ibrahim et al., 2017). These efforts contribute to the global fight against climate change by enhancing the capacity of local ecosystems to absorb CO2.

SDG 15: Life on Land

FMNR directly supports biodiversity conservation and land restoration, which are key components of SDG 15. By promoting the regeneration of indigenous tree species, FMNR restores ecosystems, enhances soil fertility, and improves the overall health of landscapes. This regeneration of native vegetation contributes to the restoration of critical habitats for wildlife and enhances biodiversity.

In the Sahel, FMNR has led to the regeneration of thousands of hectares of degraded land, providing habitat for various species of flora and fauna. The practice has been associated with increased biodiversity, improved wildlife habitats, and greater ecological stability (Reij et al., 2009). Additionally, FMNR contributes to soil erosion control, which helps prevent desertification, a key concern in arid regions of Africa.

SDG 8: Decent Work and Economic Growth

FMNR has the potential to contribute to economic growth and job creation by promoting sustainable land management practices. The regeneration of forests and the promotion of agroforestry can lead to the development of industries around sustainable timber, honey, and other forest products. By providing alternative livelihoods such as beekeeping, FMNR also supports rural entrepreneurship.

In regions where FMNR has been implemented, there has been an increase in local economic activities related to the sale of timber, woodfuel, and other non-timber forest products. For example, in Niger, FMNR has not only increased household income but also created jobs in timber and honey production, contributing to broader economic growth (Haglund et al., 2011).

Challenges to FMNR Adoption

Despite its successes, the adoption of FMNR is not without challenges. One of the primary obstacles is land tenure insecurity, particularly in regions where land ownership is not clearly defined. Without secure land rights, farmers may be hesitant to invest in long-term regeneration practices. The lack of formal recognition of land rights can also hinder the ability to scale FMNR practices beyond individual farms or communities (Ibrahim et al., 2017).

Moreover, while FMNR is a low-cost method for land restoration, its success requires ongoing community engagement and the provision of technical support. In many regions, access to knowledge and resources remains limited, particularly for marginalized groups such as women and the youth. This can slow the rate of adoption and limit the broader impacts of FMNR (World Vision, 2021).

FMNR IN WEST AFRICA

The Story of Niger

The Niger region in West Africa is characterized by a semi-arid climate, with high temperatures and seasonal rainfall, making it highly vulnerable to droughts and desertification. The region experiences a Sahelian climate, marked by long dry seasons and short rainy periods, which significantly affects agriculture, the main livelihood activity. Socio-economically, Niger is one of the poorest countries in the world, with a largely agrarian economy dependent on subsistence farming and pastoralism. Livelihoods are heavily reliant on crop production, livestock rearing, and increasingly, the sale of non-timber forest products. Culturally, the region is diverse, with various ethnic groups such as the Hausa, Tuareg, and Zarma, who follow traditional agricultural practices and maintain strong community ties. However, social challenges, including high poverty levels, gender inequality, and limited access to education and healthcare, persist, creating barriers to sustainable development and prosperity. The interplay of these climatic, socio-economic, and cultural factors shapes the region's resilience to environmental changes and its capacity for development.

The introduction of Farmer Managed Natural Regeneration (FMNR) and its adoption in Niger began on a low note. Just like any other innovation, it started with a few people usually referred to 'innovators'. Trees protected through FMNR were often cut and stolen. A change in mindset began in 1984, following intense radio coverage on deforestation in the Maradi region of the country. This was followed by a country-wide severe drought and famine, which reinforced this link in peoples' minds. During the famine and through a food-for-work program, communities were required to practise FMNR on their farmland. For the first time, people in a whole district were leaving trees on their farms. Some 500,000 trees were protected. Many people were surprised that their crops grew better amongst the trees. All benefited from having extra wood for home use and for sale.

When the food-for-work program ended, over two-thirds of the trees were chopped down by the framers who had embraced the practice. However, district-wide exposure to the benefits of FMNR over a 12-month period was sufficient to introduce the concept and reduce fears about growing trees with crops. Gradually more farmers started protecting trees again until FMNR became a standard practice. Over a 20 year period, this new approach spread largely from farmer to farmer, and today five million hectares of farmland have been re-vegetated. This significant achievement occurred in one of the world's poorest countries with little investment in the forestry sector by either the government or NGOs. FMNR rapidly moved from being a "project" to becoming a "movement".

The success story of adoption of FMNR in Niger is a result of five key elements. Firstly, proper education of the farmers was done by the change agency on the benefits of FMNR. Secondly, follow-ups by staff and FMNR farmer champions acted as an assurance to potential FMNR farmers to practice the strategy. Thirdly, direct benefits/rewards to farmers in the form of firewood, pasture motivated many farmers to adopt the strategy. Lastly, farmer visits to share information was a critical component of the success story of FMNR, with several exchange visits organized by forestry staff, extension workers and NGO personnel.

THE STORY OF GHANA – TALENSI AND UPPER WEST REGION

The Talensi and Upper West regions of Ghana are located in the northern part of the country, characterized by a tropical climate with distinct wet and dry seasons. The rainy season typically lasts from May to October, while the dry season, marked by the Harmattan winds, occurs from November to March. These regions are predominantly savannah, with farming being the main livelihood, focusing on crops such as maize, millet, sorghum, and groundnuts, alongside livestock farming. Socio-economically, both regions face challenges of poverty and underdevelopment, with agriculture being the key economic activity, although recent efforts have focused on expanding access to education, healthcare, and infrastructure. The Upper West region, including Talensi, is culturally diverse, home to several ethnic groups, notably the Dagaaba, Mamprusi, and Talensi, each with their own traditional practices, languages, and customs. Social structures are largely communal, with extended family systems playing a central role in societal organization. Despite these efforts, challenges such as low access to basic services, limited industrial development, and gender inequality persist, hindering socio-economic progress in the region.

In Ghana, the adoption and spread of FMNR is exemplified by the experience of farmers in Talensi which experienced complex development challenges, owing to its environmentally fragile dryland. Over the years, its population, mainly subsistence farming or pastoralist families excluded from profitable production or value chains, had seen annual rainfall decline, forest cover and associated biodiversity disappear and loss of productivity from increasingly infertile soil. World Vision's response to this situation in this region in 2009 through the initiation of Farmer Managed Natural Regeneration (FMNR) project, which aimed to restore food security, household resilience and income opportunities from community-led natural resource management, witnessed significant success.

The project incorporating FMNR aimed to improve environmentally sustainable land management practices, reduce complex drivers of food insecurity and poverty faced by farmers in Talensi. At the end of the implementation period, being the third and final pahse of the project in 2020, significant achievements recorded included; improved household food security among 8,000 people, improved environmental management & stewardship among 2,000 people and improved households' savings and income among 2,625 people.

In the Upper West region of Ghana, the practice of FMNR to regenerate degraded agricultural lands in Lawra and Nandon districts by communities in collaboration with a local NGO, Centre for Indigenous Knowledge and Organizational Development (CIKOD) registered tremendous positive outcomes. Notable impacts of FMNR in these two districts from the study by three leading universities include; increased land productivity by 83% over a period of five years, enhanced

farmer earnings from forest and crop produce by four Ghana cedis. Further, the study found that farmers practicing FMNR were more food secure and climate resilient (Westerberg, et al, 2019). Farmers could harvest a wide range of on-farm products such as nuts and pods especially in the dry season which enhances their capacities to address food insecurity. Nutrition improvement is an added advantage in the practice of FMNR by rural inhabitants contribution to better health.

FMNR IN MALI – DIEMA AND KOLOKANI

The Diema and Kolokani regions of Mali, located in the western part of the country, are characterized by a semi-arid climate, with long, hot dry seasons and a short rainy period from June to September. The region experiences high temperatures and is prone to droughts, which significantly affect agriculture, the primary economic activity. The soil is relatively fertile in some areas, allowing for the cultivation of crops such as millet, sorghum, cotton, and maize, as well as livestock farming. Socio-economically, the regions face challenges such as poverty, limited infrastructure, and access to healthcare and education, although agriculture remains the main source of livelihood for rural populations. The cultural landscape is diverse, with ethnic groups such as the Bambara, Sarakolé, and Dogon, who follow traditional customs and practices. Community life is organized around extended families, with strong social ties and a deep connection to ancestral traditions, including unique rituals, festivals, and art forms. However, socio-economic development is hindered by political instability, low levels of industrialization, and environmental issues such as desertification, making these regions particularly vulnerable to both environmental and economic challenges.

Mali is one of the countries in the west African region experiencing low rainfall and frequent drought adversely affecting rural households ability to produce sufficient food to meet nutritional requirements. The rural households over the years developed coping strategies to mitigate the effects of drought, but with emerging environmental threats and shocks, such households are exposed and therefore more vulnerable. Climate change challenges affect crop and livestock productivity necessitating adaptation strategies. Livestock is regarded a traditional savings and an insurance instrument. (Nkonya, et al, 2024).

The introduction and adoption of FMNR practice in 2013-2015 and 2016-2019 in Diema and Kolokani districts in Mali had the primary objective of promoting livelihood resilience building. Further, FMNR was expected to improve value chain development and enhance group savings culture among rural inhabitants to foster sustainable socio-economic development. As a vulnerability intervention practice, FMNR adoption in Mali had positive outcomes among which increased livelihood diversification, higher agricultural productivity and reduced vulnerability. The practice of FMNR and other climate smart agricultural practices cumulatively contributed to increased food and nutrition security by 50 % and reduced poverty levels (Nkonya, et al, 2024).

FMNR IN UGANDA – ARUA AND KARAMOJA

The Arua and Karamoja regions of Uganda are situated in the northern and northeastern parts of the country, each with distinct climatic and socio-economic characteristics. Arua experiences a tropical climate with a marked wet season from March to November, and a dry season from December to February, while Karamoja is semi-arid, with higher temperatures and more unpredictable rainfall, making it susceptible to droughts and food insecurity. Agriculture is the

primary livelihood in both regions, with Arua benefiting from fertile soils that support the cultivation of crops like maize, cassava, and beans, whereas Karamoja relies more heavily on pastoralism, with livestock farming being central to the economy. Socio-economically, both regions face high levels of poverty, inadequate infrastructure, and limited access to education and healthcare, though there have been ongoing efforts to improve these conditions. Culturally, Arua is home to various ethnic groups, including the Lugbara and Madi, with a rich tradition of farming and trade, while Karamoja is predominantly inhabited by the Karamojong people, known for their pastoralist lifestyle and strong social ties within clans. Despite challenges, these regions are marked by resilience and a deep sense of community, with traditional practices, including dances, ceremonies, and storytelling, playing a vital role in preserving cultural identity.

The adoption and subsequent spread of FMNR in Uganda's Arua district began in the year 2010 with the initial step of training of Trainer of Trainers (ToTs) by World Vision who later engaged community members in collaboration with a local NGO – Ocebu Youth Action for Development (OYAD). The practice was adopted by farmers in many targeted areas in Offaka and Anyiribu sub-counties in Arua district with the assistance of the local NGO. The intervention served to protect community land from bush burning and cutting down of indigenous trees. By the year 2013, a total of 10,750 farmers had received training on FMNR practice with 460 farmers already practicing FMNR. Four schools within the project area adopted the practice where pruned trees acted as windbreaks and conserved the soils thus preventing erosion. (Okia & Gwali, 2014). A notable impact of FMNR practice in the region is an increase in animal fodder specifically for goats.

In Karamoja region comprising four districts - Abim, Napak, Nakapiripirit, and Nabilatuk, a majority of the inhabitants are poor and dependent on natural resources to meet their basic needs therefore posing the danger of over-extraction of such resources. Early interventions for resources conservation to ensure their sustainability are key. Due to high poverty levels in the region, many households utilize natural resources for food, fuel and fodder which impacts negatively on the health of the environment and compromises its ability to continuously provide for future needs of humanity. A study conducted. An intervention – Nuyok Resilience Food Security Activity was initiated with support from USAID which aimed at addressing household livelihoods issues. The implementation of the program encompassed practicing FMNR to restore degraded lands. By the end of the project lifespan, communities had managed to restore and prune 48,861 trees (Udon & Gebreselassie, 2023). Other impacts of FMNR in the region included an increase in food resources (including fruits and leaves), fuel wood, fodder for livestock, fencing and building materials. The practice of FMNR in the Nuyok program further led to integration of beekeeping as a livelihood diversification strategy.

FMNR IN TANZANIA – KONGWA AND MANYONI

The Kongwa and Manyoni regions of Tanzania are located in the central part of the country, characterized by a tropical savannah climate with distinct wet and dry seasons. The rainy season typically spans from November to April, while the dry season lasts from May to October, with temperatures remaining relatively high throughout the year. Agriculture is the main economic activity in both regions, with Kongwa benefiting from fertile soils conducive to growing crops such as maize, millet, and sunflower, while Manyoni is known for its livestock farming,

particularly cattle, alongside crop cultivation. Socio-economically, both regions face challenges such as poverty, limited access to education, healthcare, and infrastructure, with rural livelihoods primarily based on subsistence farming and pastoralism. Culturally, Kongwa and Manyoni are home to several ethnic groups, including the Zaramo and Nyamwezi, who maintain traditional lifestyles that emphasize communal living, farming, and livestock herding. While the regions have witnessed some modernization, particularly in trade and agriculture, traditional practices, ceremonies, and family structures remain strong, with community solidarity playing a central role in societal organization. Despite ongoing development efforts, challenges such as limited economic diversification, access to services, and vulnerability to climate change persist.

The rural population in Tanzania, like in many other African countries depend on natural resources for their sustenance. In the two districts of Kongwa and Manyoni, over-reliance on natural forests and land for production to support household requirements over the years has contributed to deforestation and poor land uses culminating in low agricultural productivity and land degradation. Due to rising human population coupled with increasing household needs has exerted pressure on land and vegetation leading to land degradation with its attendant effects on productivity.

Adoption and spread of FMNR practice in the two districts was made possible through the active participation of government authorities, NGOs and other actors. Village committees and District councils in particular played key roles in awareness raising on the importance of adopting FMNR to restore degraded lands. The spread of FMNR in the two districts is also attributed to promotional campaigns by practicing farmers who noted that FMNR 'sells itself' since its adoption is low cost. Benefits associated with FMNR such as improved incomes from sale of poles/timber and wood products, declining land productivity/soil fertility and loss of livestock due to inadequate pasture further prompted farmers to adopt the practice. On the impacts of FMNR, practicing farmers reported higher crop yields resulting in improved household incomes from sale of produce and improved food security. Other impacts include availability of fuel wood from pruning, medicinal plants and timber (Masanyiwa, et al, 2019).

FMNR IN KENYA – ELGEYO MARAKWET AND NAKURU COUNTIES

Elgeyo Marakwet and Nakuru counties in Kenya, located in the Rift Valley region, are characterized by diverse climatic conditions, ranging from temperate to semi-arid. Elgeyo Marakwet experiences cooler temperatures and higher rainfall, especially in the highland areas, supporting agriculture, with crops such as maize, beans, and potatoes being widely cultivated. In contrast, Nakuru, particularly in its lower regions, has a more variable climate, with areas prone to periodic droughts, affecting agricultural productivity. Both counties rely heavily on agriculture as the main economic activity, with livestock farming also being significant, especially in Nakuru. Socio-economically, both counties face challenges such as poverty and inadequate access to basic services, although Nakuru has witnessed more rapid urbanization and industrialization, benefiting from its proximity to Nairobi. Culturally, these counties are home to diverse ethnic communities, including the Kalenjin in Elgeyo Marakwet and the Kikuyu, Kalenjin, and Maasai in Nakuru. These groups have rich cultural traditions, including ceremonies, dances, and social structures based on extended family systems. Despite progress in education and infrastructure, both counties

continue to experience challenges such as unequal development, food insecurity, and vulnerability to climate change, which impact the livelihoods of many rural households.

In Kenya, land management approaches bordering on FMNR have been practiced in many areas where farmers allow selected tree regeneration on crop land through protection and management of sprouting stumps and wildings. Pastoralist communities in the north rift, north eastern, eastern and coastal regions traditionally closed some portions of community land for regeneration and restoration of vegetation for use during the dry spell. Management of such portions of land was bestowed on traditional institutions especially council of elders to regulate access and use by community members as a way of ensuring equity in utilization and to forestall imminent conflicts over common resources use (Wanjira, et al, 2020).

The adoption and practice of FMNR in Elgeyo Marakwet county being a semi arid region is timely as a resource restoration and livelihood diversification method. The county has three agro-ecological zones – the highland, escarpment and the valley. Traditionally, pastoralist farming has been in practice in the escarpment and the valley for decades owing to the low rainfall. Over the years, with changing climatic patterns, rising human population and diverse human needs, pressure on land resources increased necessitating initiatives such as FMNR practice. Conservation efforts of degraded lands in Elgeyo-Marakwet county has a long history from the 1980s with the participation of locals, government ministries and development organizations. Frequent droughts, crop failure, decreased production and livestock losses all contributed to the eventual adoption of FMNR (Muriuki, et al, 2022).

The main economic activities in the county are crop and animal production. Crop production is largely dependent on rain and therefore crop failure is commonplace given the erratic rainfall patterns resulting from climate changes. Livestock production being one of the productive sectors in the county has witnessed immense challenges of both pasture and water shortages. To ameliorate the problem of resource shortage, communities embraced the adoption and practice of FMNR through the support of World Vision and other partners. The spread of the practice of FMNR begun from World Vision's ADP operation localities to far-flung areas. This was done through capacity building of lead farmers, champions, demonstration sites/plots, study tours to impact other potential farmers.

The impacts of the practice are notable in the food security and livelihood areas in Soin, Ng'oswet and Tunyo of Elgeyo Marakwet county. Being a region prone to frequent droughts, food insecurity was a common occurrence. With the adoption of FMNR, farmers in the county especially in the escarpment and the valley noted significant improvements in food availability and diversified livelihood sources. Fodder for livestock, fruits (pawpaws) and nuts, beekeeping practices, availability of poles, timber, firewood are among the benefits associated with the practice of FMNR. In some cases pasture reseeding on enclosed areas set aside as FMNR plots has seen many farmers realize increased pasture during the dry season, thereby boosting milk production thereby enhancing food security and improving household income through milk sales and the sale of other farm products (https://www.wvi.org. >stories > Boosting Sustainable livelihoods through Farmer Managed Natural Regeneration).

In Nakuru county the adoption and practice of FMNR in Salgaa area was initiated by World Vision through the CRIFSUP project and through trainings and piloting, several farmers have adopted the practice aimed at enhancing community resilience to climate change. The FMNR practice adopts a grassroots movement approach, creating a farmer-to-farmer spread at community level to ensure wide, sustainable uptake. The project works with lead farmers who are identified through local leadership structures at the community level. They are then trained on FMNR and mandated to reach out to at least 10 replicating farmers. This encourages enhancement of FMNR knowledge through peer learning and establishment of FMNR demonstration plots.

Within Ndabibi area of Nakuru where World Vision operates, the adoption of FMNR by farmers witnessed improved crop yields – majorly cereals. Further, farmers diversified income sources to include sale of pasture from FMNR sites. Pasture establishment in FMNR designated areas enhanced milk production in contributing to increased household income and better nutrition.

Summary

The adoption of Farmer Managed Natural Regeneration (FMNR) in various regions, including West Africa (Niger), Ghana (Talensi and Upper West), Mali (Diema and Kolokani), Uganda (Arua and Karamoja), Tanzania (Kongwa and Manyoni), and Kenya (Elgeyo Marakwet and Nakuru), shares common impacts and success factors. In all regions, FMNR has been implemented as a strategy to restore degraded land, improve food security, and enhance livelihoods through better land and resource management. Key similarities include a focus on agriculture as the main livelihood, with FMNR improving crop yields, livestock fodder availability, and diversifying income sources. Socio-economically, the practice has contributed to reduced poverty, increased resilience to climate change, and improved household nutrition through the availability of diverse resources such as fruits, firewood, and timber. The success of FMNR in these areas has been driven by community engagement, capacity building through training, and peer-to-peer learning, with local farmers acting as champions for the practice. Additionally, the benefits of FMNR, such as better soil fertility, increased productivity, and improved food security, have been recognized across all regions. Despite differences in climate and cultural practices, FMNR's adaptability and low-cost nature have made it a valuable tool for sustainable land management and community development.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Farmer Managed Natural Regeneration (FMNR) has emerged as an innovative and effective method for restoring degraded lands, particularly in arid and semi-arid regions, while simultaneously offering economic benefits to local communities. The practice builds on traditional conservation techniques, enhanced by structured management strategies that balance ecological restoration with agricultural productivity. By integrating indigenous knowledge and fostering community involvement, FMNR has achieved remarkable success in addressing environmental degradation, improving livelihoods, and promoting sustainable natural resource management.

The widespread adoption of FMNR across diverse ecological contexts—from the Sahel to East Africa—demonstrates its scalability, adaptability, and potential to address pressing environmental

issues like deforestation, soil erosion, and water scarcity. Additionally, FMNR's integration of economic incentives has increased its appeal to farmers, directly linking land restoration with household income through activities such as livestock grazing, beekeeping, and agroforestry. This combination of ecological, social, and economic benefits positions FMNR as a transformative tool for rural development.

FMNR also contributes significantly to several Sustainable Development Goals (SDGs), including No Poverty (SDG 1), Zero Hunger (SDG 2), Clean Water and Sanitation (SDG 6), Climate Action (SDG 13), Life on Land (SDG 15), and Decent Work and Economic Growth (SDG 8). The practice has notably improved livelihoods, increased resilience to climate change, and created new economic opportunities, especially in rural communities across regions such as the Sahel and Niger.

However, challenges to its widespread adoption remain, including insecure land tenure and limited access to knowledge and resources, particularly for marginalized groups. Addressing these barriers will be critical to scaling FMNR and enhancing its contribution to sustainable development.

FMNR has demonstrated substantial success in regions like Niger, Ghana, Mali, Uganda, Tanzania, and Kenya, where it has helped regenerate degraded lands, enhance agricultural productivity, and improve food security. Its community-driven approach, which empowers farmers to protect and manage natural resources, fosters long-term sustainability by utilizing existing resources to enhance agricultural and pastoral systems. Over time, FMNR has evolved from a project into a widespread movement, supported by local champions, farmer-to-farmer exchanges, and institutional backing from NGOs and governments.

Recommendations

Promote Capacity Building and Knowledge Sharing: Expand FMNR training, focusing on early adopters and marginalized farmers. Platforms for local knowledge-sharing and community-based workshops will help overcome adoption barriers, especially among late adopters.

Enhance Institutional Support: Governments, NGOs, and research institutions should formalize FMNR support through policy integration, legal frameworks for land rights, and financial incentives to ensure long-term sustainability and broader application.

Strengthen Monitoring and Evaluation: Establish robust systems to monitor ecological and socio-economic outcomes, allowing for refined management practices and ensuring interventions are adapted to local needs.

Encourage Community-Led Conservation Initiatives: Promote decentralized, community-led natural resource management models that place local communities at the forefront of decision-making, enhancing sustainability and resource stewardship.

Integrate FMNR with Broader Environmental Strategies: Incorporate FMNR into larger land restoration and climate change adaptation strategies. Collaboration with international and national initiatives can amplify its impact in addressing global environmental challenges such as desertification and biodiversity loss.

Secure Land Tenure: Governments should prioritize land tenure reforms to ensure clear and secure land rights for farmers, fostering long-term investment in FMNR practices.

Increase Access to Resources and Knowledge: Provide technical support, education, and resources, particularly to women and youth. Expanding access to FMNR training and climate-resilient practices can enhance its impact on food security and livelihoods.

Support Policy and Institutional Frameworks: Develop policies that recognize FMNR as a viable land restoration method. Institutional support, including incentives for sustainable practices and integration into national development plans, will facilitate broader adoption.

Encourage Private Sector Involvement: The private sector should be encouraged to invest in sustainable practices like FMNR, particularly industries reliant on timber, honey, and non-timber forest products, to stimulate economic growth and employment.

Strengthen Community-Led Initiatives: Continue empowering local communities through participatory decision-making, resource-sharing, and cooperative models to ensure the long-term success and scalability of FMNR initiatives.

Scale and Expand FMNR Adoption: Focus on scaling FMNR to regions with severe land degradation and food insecurity. Enhanced collaboration with local governments, NGOs, and farmer organizations will broaden its reach.

Strengthen Farmer Education and Capacity Building: Invest in continuous education for FMNR, covering both technical aspects and the broader environmental and socio-economic benefits. Expanding peer learning and exchange visits will promote wider adoption.

Enhance Support Systems for FMNR Farmers: Provide comprehensive support to FMNR farmers, including access to markets, financial services, and additional resources for environmental restoration.

Integrate FMNR with Climate-Smart Agriculture: Integrate FMNR with other climate-smart agricultural practices to increase its effectiveness in mitigating climate change impacts and fostering resilient agricultural systems.

Promote Gender Inclusivity in FMNR Projects: Actively involve women in FMNR training and ensure they benefit equally from its outcomes, including access to improved resources and income opportunities.

Monitor and Research for Continuous Improvement: Long-term monitoring of FMNR's impacts is essential for assessing its effectiveness and identifying areas for improvement. Further research into its potential for broader landscape restoration and biodiversity conservation will provide additional incentives for adoption.

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