



(REVIEW ARTICLE)



Assessing the efficacy of CBNRM frameworks in enhancing agricultural sustainability and conservation efforts

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International Journal of Science and Research Archive, , 2024, 13(01), 754–758

Publication history: Received on 11 August 2024; revised on 17 September 2024; accepted on 20 September 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.13.1.1752>

Abstract

Land degradation is a critical challenge in Africa, with 65% of the continent's landmass affected by environmental degradation due to deforestation, soil erosion, and biodiversity loss. The rising population, urbanization, and industrialization have exacerbated the problem, resulting in significant economic, environmental, and social consequences. This paper explores the effectiveness of Community-Based Natural Resource Management (CBNRM) strategies in mitigating land degradation and promoting socio-environmental resilience in African countries. CBNRM empowers local communities to manage natural resources sustainably, fostering food security, mental resilience, and biodiversity conservation. Case studies from countries such as Namibia, Tanzania, and Ghana highlight CBNRM's role in increasing agricultural productivity and conserving wildlife. However, the approach faces limitations, including financial constraints, insufficient government support, and conflicts over resources. The paper concludes that while CBNRM has significant potential, addressing these challenges through government reforms and conflict resolution mechanisms is essential for achieving sustainable environmental management and long-term resilience in African communities.

Keywords: Community-Based Natural Resource Management (CBNRM); Socio-Environmental Resilience; Land Degradation; Biodiversity Conservation; Sustainable Agriculture; Food Security

1. Introduction

The phenomenon of land degradation in African countries presents a grave and complex challenge that demands rigorous attention. The United Nations Environmental Programme reports that 65% of Africa's landmass is embroiled in various forms of degradation, with erosive forces undermining fertile soils, rampant logging ravaging forests, and biodiversity facing an imminent threat of extinction [1]. This dire situation is further exacerbated by compounding factors, including exponential population growth, uncontrolled urbanization, and unbridled industrialization, all of which intensify the pressures on Africa's delicate land resources [2]. The consequences of this environmental crisis are profound, with implications spanning across multiple domains, including food security, water availability, and socio-economic stability. A study conducted by the African Union (AU) (2019) revealed that land degradation costs the continent an estimated \$68 billion annually, equivalent to about 3% of its GDP [3]. Given the urgent need to address land degradation in African countries and safeguard the long-term sustainability of ecosystems and communities, community-based natural resource management (CBNRM) has emerged as a promising approach. As defined by Christo Fabricus, a professor of Environmental Science at Nelson Mandela Metropolitan University, CBNRM "aims to devolve authority for ecosystem management to the local level" [4], empowering communities to act on issues they consider important.

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Within this context, it is of great value to explore the viability and efficacy of CBNRM as a means to promote socio-environmental resilience. While community-driven approaches are ineffective due financial constraints, organizational inefficiencies, and conflicts arising from ethnic tensions and disputes over natural resources, this paper finds that there are compelling reasons to support CBNRM initiatives. The benefits of CBNRM include increased local governance and empowerment through community-based efforts, improved sustainable resource management, and enhanced conservation of biodiversity. Certain CBNRM metrics were used to assess success rates. Namely, empowerment was evaluated through empirical evidence of increased tendencies of communal protection; resource management was evaluated through metrics of average food consumption and crop yields deriving from SAPs; and conservation was evaluated through metrics of ordinances and wildlife and forest cover increase. Thus, governments and policymakers should continue to implement CBNRM in African countries.

2. Local governance and empowerment: Mental resilience

The shared sense of community created through CBNRM has the potential to enhance local governance and empowerment by promoting mental resilience among community members. Guitele J. Rahill, an Associate Professor in the College of Behavioral and Community Sciences at Florida International University, attributes the resilience exhibited by Haitian survivors in the aftermath of the 2010 Haiti earthquake to “cultural factors such as the family, traditional food, and spiritual factors” [5]. These cultural elements served as unifying factors within the Haitian community, fostering a strong sense of solidarity and community, which facilitated their ability to endure adversity and recover from the disaster. Likewise, in his autobiography “Long Walk to Freedom,” Nelson Mandela notes that the collective sharing of knowledge and courage among fellow anti-apartheid leaders during his incarceration reinforced their determination, as exemplified by his statement, “whatever we knew, we shared, and by sharing we multiplied whatever courage they had individually” [6]. Mandela's experiences underscore the pivotal role of community and solidarity in achieving a shared goal. Drawing upon these perspectives, the concept of CBNRM can similarly be applied as a strategy to mitigate environmental degradation and foster resilience. A study conducted by the United States Agency for International Development (USAID) finds that CBNRM programs in Mali and Guatemala “increased self-esteem, pride, exposure to commercial partners, and [developed] working relations with the government and NGOs,” empowering communities to combat environmental degradation [7]. In Guatemala, community-driven efforts reinforced cultural ties to nature and forests, while in Mali, CBNRM facilitated connections with local economic partners, allowing communities to engage in rice farming and actively combat environmental degradation. The experiences of Haitian survivors, Nelson Mandela's observations, and the findings from USAID's study collectively suggest that the establishment of a shared sense of community through CBNRM is effective in promoting mental resilience among community members. This mental resilience serves as a crucial framework for the successful implementation of CBNRM components, including sustainable agricultural practices and biodiversity conservation.

3. Food security and sustainable agricultural practices

CBNRM plays a crucial role in food security, as sustainable agricultural practices (SAPs) are a key component of CBNRM. The positive effects of SAPs are well-documented. As defined by Giacomo Branca, an associate professor of Natural Economics at Tuscia University, SAPs are “an integrated, cleaner production approach that generally leads to increased yields, delivering co-benefits in the form of reduced greenhouse gas emissions and enhanced carbon storage in soils and biomass” [8]. These benefits have a direct impact on improving food security. Sharon Pailler, a PhD holder in Economics from Clark University who has published numerous papers in the *Journal of Environmental Economics and Management*, found that between 2003 and 2012, the average number of meals consumed per day decreased by 0.01 meals in non-CBNRM households in Tanzania, while CBNRM households saw an average increase of 0.06 meals per day [9]. The observed changes in food production not only reveal the inadequacy of current agricultural management systems in achieving food security, but also indicate the potential effectiveness of CBNRM, which is linked with sustainable agricultural practices (SAPs), in addressing food insecurity. This may be explained by the improvements in soil management and crop production that SAPs entail. Edinam Dope Setsoafia, who holds a master's degree in Agribusiness from the University of Ghana, has conducted research indicating that the implementation of SAPs in Ghana, which included improved seeds, fertilizers, and soil and water conservation, have increased crop yields by 6% [10]. Thus, through the continuation of CBNRM initiatives, communities can experience an increased degree of food security through better, more resilient, SAPs.

4. Biodiversity conservation

CBNRM is instrumental in promoting biodiversity conservation in Africa. Namibia is a notable example of successful CBNRM programs in this area. In response to the decline of wildlife populations, the Namibian government amended

the existing Nature Conservation Ordinance to establish communal conservancies, marking the beginning of the country's CBNRM initiatives [11]. These conservancies enable local communities to allocate land for activities such as cattle ranching, farming, or wildlife conservation, which has facilitated collaborations with private companies to develop a tourism market. As noted by Munalula Melinda, a Ph.D. holder in Environmental Science from Columbia University, this initiative has led to the recognition of wildlife as an economic asset that requires effective management to promote conservation efforts, resulting in an increase in wildlife numbers [12]. The remarkable success of CBNRM in Namibia is evident in the country's economic gains. Between 1991 and 2013, CBNRM initiatives associated with wildlife conservation contributed N\$ 3.92 billion to Namibia's net national income, showcasing the positive impact of CBNRM on biodiversity conservation. The results of CBNRM on wildlife populations in Namibia are consistent with other African countries, notably Tanzania. According to Derek Lee, a quantitative ecologist and population biologist with a PhD in Biological Sciences, the establishment of Wildlife Management Areas (WMAs) in Tanzania through community efforts has significantly increased the densities of resident wildlife [13]. The effects of CBNRM extend beyond wildlife populations as well. In Ghana, the Forest and Wildlife Policy Act and Community Forest Councils (CFCs) were established to address deforestation caused by agroforestry operations [14]. These initiatives have successfully decentralized forest management and led to a significant increase in forest cover, as observed by Lindsey Wood, an agricultural economist at the University of Wisconsin [15]. These examples demonstrate the effectiveness of CBNRM in promoting biodiversity conservation.

5. Limitations: financing, organizational structures, conflict

Within this context, it is crucial to note that the successful implementation of CBNRM programs is hindered by insufficient government financing and limited organizational structures for managing these initiatives. As noted by the World Bank, “the conveying of rights over natural resources without fully capacitating local communities to govern, manage and develop resources under their jurisdiction” coupled with “limited funding” have constrained the efficacy of CBNRM in the country of Mozambique [16]. The success of CBNRM programs largely depends on the capacity of local communities to effectively manage natural resources. However, as seen in the case of Mozambique, such communities may lack the requisite skills, knowledge, and resources for this purpose. Moreover, adequate funding is crucial for the successful implementation of CBNRM programs, but it can be challenging to secure funding, particularly in low-income communities with limited resources. Upon closer examination of the ineffective transfer of management and limited resources within CBNRM programs, it becomes evident that there are underlying governmental challenges. According to Menelisi Falayi, a Rhodes University PhD holder in Environmental Science, the key governmental factors undermining CBNRM initiatives are “unclear policies, corruption, and a lack of participation and complex community ties” [17]. Falayi's research builds upon the World Bank's findings by illuminating the root cause of the issue, which is the role of governments in implementing and supporting CBNRM programs. To address these challenges, governments need to promote transparency by involving local communities in decision-making processes. Leonard I. Chirenje, a researcher at Great Zimbabwe University who specializes in Human Ecology, argues for a grassroots approach in governance and management, which “[involves] local communities in policy formulation which can be adopted at national level” [18]. The implementation of such a system has the potential to address the governmental challenges that currently limit the effectiveness of CBNRM programs.

In addition, communal conflicts arising from ethnic tensions and disputes over natural resources may undermine CBNRM initiatives. Africa has a long-standing history of ethnic conflicts that have hindered developmental efforts in the region. The Biafra War between the southern Igbo and northern Hausa, as well as the ethnic cleansing in Darfur and Rwanda, serve as salient illustrations of the disastrous effects of ethnic conflicts on African societies [19]. It is thus crucial to be cognizant of current and historical ethnic tensions when determining conservancy boundaries to create a conducive environment for sustainable development and the successful implementation of CBNRM initiatives. In addition, communal conflicts may result from resource-disputes as well. This encompasses the minor but persistent daily tensions in the Zambian copper belt as well as the more significant and widespread insurgencies occurring in Nigeria's Niger Delta region [20]. These conflicts highlight the need for conflict prevention strategies, which should focus on building strong and effective institutions for conflict resolution and peacebuilding, including early warning systems and mediation mechanisms.

6. Conclusion

In conclusion, the degradation of the environment presents significant threats to the African continent, impacting soil fertility, agroforestry, and biodiversity. However, the implementation of community-based natural resource management (CBNRM) can serve as a viable solution to mitigate the adverse effects of environmental degradation. CBNRM has the potential to promote mental resilience through a shared sense of community, enhance food security by

increasing agricultural productivity, and foster biodiversity conservation. Despite the potential benefits of CBNRM, this approach is often challenged by financial constraints, organizational inefficiencies, and conflicts arising from ethnic tensions and disputes over natural resources. However, these challenges can be addressed through governmental reforms. For instance, greater involvement of local communities in decision-making processes, recognition of ethnic boundaries, and the establishment of institutions for conflict prevention and peacebuilding can contribute to the success of CBNRM initiatives. Therefore, the implementation of CBNRM should continue to be prioritized as a means of promoting sustainable natural resource management, supporting local communities, and contributing to the overall development of the African continent.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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