Optimising Carbon Sequestration, Biodiversity Conservation and Livelihood Benefits in Munanaire Community-managed Native Forest: The Potential Role of Social Businesses in Zimbabwe.

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Abstract

The interconnected risks of biodiversity loss, declining carbon stores in community-managed native forests, and rapid climate changes have heightened awareness in many developing countries of the urgent need to conserve indigenous forests. Beyond their timber value, native forests provide crucial non-timber benefits, including effective carbon sequestration, support for higher biodiversity, and food security. Partnering social businesses with community-managed forests can significantly advance social development goals related to climate change, health, a clean environment, and economic growth. This paper explores how social businesses can enhance carbon sequestration and biodiversity conservation, fostering sustainable livelihoods for marginalized communities. Qualitative data was gathered through structured focus group discussions with participants selected via purposive sampling. Our findings indicate that social businesses can optimize carbon sequestration in community-managed forests by providing modern management skills and facilitating access to green financing instruments like carbon credits and green bonds. Focusing on the non-timber benefits of indigenous trees can help forest-based communities diversify income streams, enhance livelihood resilience, and promote adaptability to climate change. This study contributes to understanding how to improve the resilience of marginalized communities dependent on indigenous forests.

Keywords: Carbon Sequestration, Biodiversity, Community-managed forests, Social Businesses, Zimbabwe

1.0   Introduction and Background

In many developing economies, social businesses' support for community-managed native also known as indigenous forests has become a major tributary not only for attaining sustainable livelihoods but improving resilience of marginalised communities

against the negative effects of climate change. Whilst there is no universally accepted definition of social businesses/enterprises, however, according to Yunus (2010), social businesses are more beneficial than mere charitable organisations in that they do not encourage dependency among the served but put those that are being served in a position of being active participants in the economy. Social businesses address a broad range of social and environmental problems including unemployment, social exclusion, deforestation, global warming, inequalities in accessing education, health, social among other basic services. For the purposes of this paper, social businesses refer to hybrid organisations that have both social and commercial mandates, particularly trying to solve the triple hybrid of social, financial and environmental goals. Most rural people living in Zimbabwe directly subsist from indigenous forest biodiversity and thus coupling social businesses in biodiversity conservation could be a more ingenious strategy for dealing with abject poverty, food insecurity and employment creation in marginalised communities. This is because apart for their timber extraction value, native forests provide a crucial linkage in the traditional food security value-chain system through the provision of important non-timber benefits. Many native trees aside from their timber value also come with ancillary co-benefits such as providing clean air and water (Chazdon and Brancalion, 2019; Dolch et al., 2016; de Almeida et al., 2020; Hu et al., 2020), help to control soil erosion (Estrada-Villegas et al., 2019; Annos et al., 2019; Cuenca et al., 2018), offer recreational and aesthetic amenities including traditional medicine (Joo and Suh, 2017; De Vitis et al., 2020; Crouzeilles et al., 2020), improve livelihoods by contributing to food security (Steur et al., 2020; Liu et al., 2020). In addition, most native forests in Zimbabwe have wilderness existence value that appeals to tourists seeking spiritual healing or interested in bird watching, hunting and forest-based cultural experiences (Muzurura et al., 2023; Muzurura et al., 2022). More importantly, many studies also show a positive correlation among sustainable-community managed forests, economic growth and national development (Asbeck et al., 2021; Bhardwaj et al., 2021; Tolangay and Moktan, 2020; Oldekop et al., 2019; Wyse and Dickie, 2018). Fagan et al., 2020; Deere et al., 2020; Dvderski and Jagodzinski, 2020).

Importantly, many studies report that most native forests efficiently store more long-lived stock and flow of carbon pollutants than exotic plantations, and hence have the potential to offer substantial amount of climate change and global warming mitigation

(Asbeck et al., 2021; Bhardwaj et al., 2021; Wyse and Dickie, 2018; Hu et al., 2020). Like many developing economies in Sub-Saharan Africa, Zimbabwe has not been excepted from the adverse impacts of climate change and global warming such as; lengthening of crop growing seasons, early tree flowering (Asbeck et al., 2021; Bhardwaj et al., 2021), reduced clean water availability and/or exposure to extreme overlapping flooding and droughts (de Almeida et al., 2020; Hu et al., 2020), reduction in the quality of crop and fruit yields (Kaushal and Baishya, 2021; Hong et al., 2020; Hohl et al., 2020), and sudden upsurges in the population of rural people exposed to vector-borne diseases like malaria and cholera (Schleussner et al., 2016; Huang et al., 2020; Hu et al., 2020).

In recent years, many community-managed native forests in Zimbabwe have been increasingly subjected to severe anthropogenetic interference leading to lower carbon sink and loss of biodiversity. For instance, rapid urbanisation has forced the country to switch land use from indigenous forests to either residential, industrial uses or agricultural use. Consequently, the harmful effects of extreme climate changes associated with rapid deforestation of community-managed native forests have often fallen disproportionately on marginalised communities, especially women and children. Muzurura (2019) reports that unlike men, women and children have a constrained adaptive capacity to deal with the effects of climate change. If social businesses are properly harnessed as creators of environmental social value, they could play an integral role in assisting the preservation of community-managed indigenous forests and directly contribute towards sustainable climate and global warming mitigation strategies for developing countries like Zimbabwe.

At international level, Zimbabwe is a signatory to various multilateral agreements that include the Kyoto Protocol, the Paris Agreement, the Montreal Protocol, United Nations Conventions to Combat Desertification, United Nations Convention on Biological Diversity, and the Convention on the International Trade on Endangered Species of wild flora and fauna. Of noteworthy, in 1992, Zimbabwe became one of the first countries to ratify the United Nations Framework Convention on Climate Change (UNFCCC) whose main objective is stabilising greenhouse gas emission

concentrations to a level that would prevent anthropogenic interference with the climatic system, within a time period which allows ecosystems to adapt naturally and enable sustainable development in the atmosphere. At the national level, in 2019 Zimbabwe formulated the National Climate Policy that is intended to influence the adoption of agroecology as an adaptation and mitigation remedy to the effects of climate change and global warming. Despite being party to many international and regional bodies that deal with deforestation, climate change and global warming, the country has failed to situate social businesses in national climate mitigation strategies, practices and policies. In fact, both social businesses and community managed indigenous forests have also been overlooked or ignored by the country's natural environment conservation policies. The country's national conservation policy for instance, favours commercial forest enterprises that are primarily driven by profit maximisation at the expense of social value. As a result, large swathe of what were community-managed forests have been re-forested with fast growing exotic forests. However, as reported in many studies native forests tend to sustain higher species diversity and sequester more carbon than exotic plantations (Das et al., 2021; Mattana et al., 2020; Friggens et al., 2020; Crouzeillej et al., 2016; Kaushal and Baishya, 2021; Dar et al., 2019; Hoque et al., 2020).

A total of 40% of Zimbabwe's land is occupied by forests; of which 15,624,000 hectares of the forests are native trees whilst 153,000 hectares are covered by plantations (Food and Agricultural Organisation (FAO), 2020; Government of Zimbabwe (GoZ), 2023). At least 5.1% or about 801,000 hectares is categorised as primary forest that is, being the most biodiverse and carbon-dense form of native forests. The most common native trees in Munanaire forests include the dry miombo woodlands, the Baikiaea plurijuga, the acacia and colophospermum mopane and combretum-terminalia (GoZ, 2022). Even more worrying, whilst most indigenous trees in Munanaire forest have a huge potential for sinking more carbon due to extensive biodiversity, they have poor regeneration rates. Anthropogenic activities that are common in this forest include overexploitation, unplanned deforestation and in some sections, changes in land use from forestry to agricultural and artisanal mining activities. Whilst most exotic trees take shorter periods to mature, most native trees in Munanaire forest mature at around 50 to 100 years (GoZ, 2020).

The problem of deforestation is not intrinsic to Munanaire forest only. For instance, between 1990 and 2020, the country lost over 33,000 hectares or 60,000,000 million native trees annually (GoZ, 2022). Out of the total 15.62 million hectares, forest cover is expected to decrease to 6.189 million hectares by 2030 based on an average deforestation rate of 312,000 hectares by annum (GoZ, 2022). Most of the indigenous forests are lost to manufacturing by large firms, wildfires, household uses like energy supply and food, brickmaking and wood carving. An estimated 0.6% of Zimbabwe's native forests are also lost to agricultural expansion particularly to tobacco curing and production of charcoal (GoZ). In 2022 only, the country could have lost an estimated 9,050,000 hectares of indigenous forests and an equivalent of 3,82 metric tonnes of CO_2 emission (FAO, 2022). Furthermore, at least 10% of colophospermum mopane woodlands that are renowned for higher biomass are damaged during the harvesting of Mopane worms (Gonimbrasia belina), and expansion of land to support mining activities. The GoZ (2020) estimates that the country requires at least US$55 billion to reduce greenhouse emissions by 33%. This amount is huge given that the country is also saddled with a high public debt overhang of US$18.8 billion, and that its gross domestic debt growth rate has been mainly phlegmatic for the past two decades.

According to Shirima et al (2011), Zimbabwe native woodlands store an estimated 23 Mg ha-1, hence, making them a significant carbon sink and a main tributary to climate change mitigation strategy. An increase in carbon sink increases the availability of freshwater (Tolangay and Moktan, 2020; Hoque et al., 2021; Das et al., 2021), causes huge latitudinal and elevated shift of biomes (Asbeck et al., 2021; Crane, 2020; Estrada-Villegas et al., 2019), which in turn increases food insecurity in developing countries (Schleussner et al., 2016; Huang et al., 2020; Hu et al., 2020; Kohl et al., 2020; Maxwell et al., 2019). Hence, the importance of coming up with strategies that optimise carbon sequestration in these woodlands to mitigate the effects of greenhouse emissions and food insecurity. Low optimisation of carbon sequestration and loss of biodiversity in community-managed native trees as Zimbabwe's Munanaire forest could be exacerbating climatic changes and global warming in surrounding districts and thus, compromising the sustainability of local communities' livelihoods through reduced food security and elevated natural disasters. Carbon sequestration affects carbon and nitrogen cycles that are key to the mitigation of climatic changes

and global warming (Annos et al., 2019; Estrada-Villegas et al., 2019; Cuenca et al., 2018; Fofana et al., 2020; Hohl et al., 2020). In recent years, the country has been exposed to severe and erratic weather patterns characterised by intermittent cyclical droughts and shifting onset of rainy seasons. Extreme weather patterns, especially cyclones and El Niño effects have increased their frequency, duration and intensity. Such climatic changes may be linked to global warming and have potential to disrupt livelihoods by aggravating food insecurity in both rural and urban areas. The main objective of the paper was to explore how Zimbabwe can yoke social businesses and marginalised communities in order to enhance carbon sink and biodiversity conservation as a strategy for improving rural people's welfare.

The study is important for several reasons. First, natural climate solutions and strategies especially those that rope in social businesses may be a more sustainable way of promoting biodiversity conservation and reforestation of community-managed forests. Second, native trees produce large biomasses that have many social value benefits such as increasing ecosystem structure, improving biodiversity conservation, strengthening wildlife protection, enhancing water catchment, preventing soil erosion and soil moisture holding capacity. Simultaneously applying ecological and social concepts also known as agroecology in the design and management of sustainable agriculture and food systems may help rural communities to arrest hunger and poverty. Third, there is an upsurge in the use of carbon financing instruments such as carbon credits and green bonds in many developed economies (Erbough and Oldekop, 2018; Hell and Brancalion, 2020; Gann et al., 2019; Crane, 2020; Liu et al., 2020). For instance, social businesses and forest-based communities may use community-managed forests to offset the huge portions of carbon emissions in developed economies using carbon credits and green financing.

Fourth, in many developing countries such as Zimbabwe, the interconnected threats of loss of biodiversity through deforestation of native trees, climate change and poverty reduction have increased awareness on the necessity to conserve indigenous forests. However, in Zimbabwe there is a lacuna of empirical literature that focus on the complex linkage among social businesses, community-managed indigenous forests, biodiversity conservation and food security. Hence, the purpose of this study. The rest

of the study is organised as follows. The first section covers the introduction and background. Literature review is presented in section two. The third section covers the methodology whilst the fourth and fifth sections present research findings, discussions and policy implications respectively.

2.0 Literature Review

Carbon sequestration is a complex issue covering various issues in the biophysical environment (Mattana et al., 2020). The term carbon sequestration is often used to describe the acquisition and storage of carbon to reduce the impact of carbon emissions in the atmosphere (FAO, 2020; Das et al., 2021; Asbeck et al., 2021). When compared to pasture systems or single-species crops, forest systems are reported to have a higher potential to sequester more carbon (FAO, 2020; Kaushal and Baishya, 2021) Hong et al., 2020, Hohl et al., 2020; Deere et al., 2020). This is because forest systems capture and utilise light, nutrients and water more efficiently than pastures (Diaz et al., 2016; Bloomfield et al., 2019; Erinos et al., 2019). Mature indigenous trees are major long-term carbon stores due to their complex structure, hardwood nature of trees and stronger resilience to flooding, droughts and wild fires (Seddon et al, 2019; NevenKamp et al., 2019; Maxwell, 2018). In indigenous forests, carbon sequestration can also be combined with soil-based remedies to prevent carbon emissions and remove atmospheric carbon dioxide (Das et al., 2018; Chu et al., 2017; Joo and Suh, 2017; De Vitis et al., 2020; Crouzeilles et al., 2020) and the public sector (Chu et al., 2017; Joo & Suh, 2017). Trees help to conserve soil, water quality and provide recreation (Korner, 2017; Lewis et al., 2019; Molin et al., 2019; Noomau et al., 2018). Trees provide people with invaluable products and services such as food, medicine, building materials (Brancalion and Holl, 2020; Diaz et al., 2016; Cuenca et al., 2018; Bannister et al., 2016; Korner, 2017), fibre, recreation space, seed dispersers and pollution filtration (Chaisdon and Uriate, 2016; Chomba et al., 2016; Molin et al., 2019), reduce flood risks (de Souza et al., 2016; Fagan et al., 2020; Hu et al., 2020) are important reservoirs of carbon (Bond et al., 2019; Boissiere et al., 2017; Bellard et al., 2016), water and nutrients (Douwes and Buthelezi, 2016; Feng et al., 2016; Das et al., 2018). Displacement of native forests have unintended consequences particularly, the reduction of pollination services (Hong et al., 2020; Heilmayr et al., 2020; Brancalion

et al., 2018), disruption of water cycles and decrease in carbon stored in above ground biomass (Reid et al., 2019; Perion et al., 2019), lowering of albedo in boreal zones and inducing temperature rises (Kull et al., 2019 Besseau et al., 2018; Rozendaal et al., 2019; Fagun et al., 2020).

According to Kildisheva et al (2020), extensive use of exotic monoculture plantations instead of promoting diverse and carbon rich-mix of community-managed indigenous forests have serious implications on food security and sustainability. The reason being that monoculture plantations discourage optimum carbon sequestration due to early harvesting (Hu et al., 2020; Crane, 2020; Hu et al., 2020), decelerate biodiversity growth and recovery (Philpson et al., 2020; Parsa et al., 2019; Gardan et al., 2020), and may hinder sustainable communal livelihoods through lower non-timber and social value (Heilmayr et al., 2020; Brancalion et al., 2020; Pedrini et al., 2020; Kildisheva et al., 2020; Fofana et al., 2020). Unlike commercial forest business, social businesses are largely motivated by ethical issues, governance and environment and hence, suitable culverts for protecting natural environment (Garden et al., 2020; Liu et al., 2020). Indeed, many studies also demonstrate that the loss of indigenous forests are not easily compensated by reforestation using exotic trees in spite of short growing season (Oldekop et al., 2019; Pedrini et al., 2020; Seddon et al., 2019; Ennos et al., 2019; Veldman et al., 2019; Wyse and Dickie, 2018).

In many countries social business and what are termed community forest enterprises have been promoted as means by which to deliver social, environmental, and financial benefits to forest-based communities (Hajjar et al., 2020). However, their major shortcoming is that in pursuit of profit maximisation goals, the need to protect the natural environment is seriously compromised. In contrast, social businesses go beyond by helping local communities to address problems of poverty, deforestation, social marginalisation and environmental degradation given the inability of central governments and traditional commercial businesses to do so (Perino et al., 2019). However, the contribution of social businesses could be meaningful if the enabling environmental laws and policies provide incentives for sound forest management, support increased value addition and promote the formation of human, physical, social

and financial capital for sustainable production of timber and non-timber forest products (Frigesens et al., 2020; Perino et al., 2019; Mollin et al. 2018)

3.0 Methodology

The extant study used a revelatory case study of Munanaire community-managed native forest located in the Guruve District of Zimbabwe. The researcher conducted one focus group discussion. The advantage of using a focus group discussion within a single case was that researcher was able to study the ways in which various individuals collectively made sense about the benefits of community-managed forests. As shown in Table 1, the composition of the focus group was stratified according to forest management knowledge and responsibilities, local social businesses, expertise and specialised forest skills, and being a local resident. The focus group had four objectives. The first objective was to solicit perspectives about how to better manage community managed native forests for the benefit of local communities. Second, to explore strategies that can be used to optimise carbon sequestration and biodiversity conservation in community-managed native forests in order to promote sustainable livelihoods. Third, to explore whether it was feasible to reforest some depleted areas of indigenous forests with exotic forests. Fourth, to examine how social business can help community-managed forests to improve biodiversity conservations, carbon sequestration and livelihood resilience.

The focus group discussion was also held under the assumption that the community experiences would be different in particularly local environment and socio-economic contexts. Whilst it is accepted that focus group discussions cannot aim to be truly representative of the total population living in the three wards, the researcher ensured the results could be deemed illustrative of the possible ward variation and therefore, able to provide a limited generalisability. In this regard, the participants for the focus group discussions were chosen using purposive sampling techniques. Participants were selected using criteria like; knowledgeable about environmental conservation of indigenous trees, direct beneficiaries of these forest, managers of local social businesses, being botanists, ecologists or environmental economists. Although a discussion script was employed, the researcher developed a relatively unstructured

approach to asking questions that was in keeping with the broad nature of the study under consideration. The discussion used a combination of vernacular languages and English, and notes were taken by the researcher who later converted the notes into a codebook summarising the main topics discussed and participant's views.

Table1: Location and Attendees of focus group discussions

Name of ward	Number of attendees	Reason for selection
Ward 21	5	beneficiaries
Ward 22	5	beneficiaries
Ward 23	5	Headman, beneficiaries
Key experts	8	2 Botanical experts; 2x ecologists, 3x environmentalists, 1x economist

4.0 Discussions and Findings

4.1 The role of social business in community managed forests

It was found that social businesses can play a significant role in fostering socio-economic development in communities that depend on indigenous forests. Most beneficiaries suggested that social businesses can assist in providing the essential expertise, forest management skills, reforestation strategies, and how to mobilise revenues using carbon credits. This suggestion was of particular interest as it was very clear from the group discussions that most local people involved with the management of Munanaire forest were not even aware of how carbon credits and green bonds could assist these communities to derive and diversify their sources of revenue. This was after it was reported that Munanaire forest was largely used for its direct timber value and non-timber benefits such as a source of fuel, fibre, and traditional medicine, food, and rainmaking activities. A biologist indicated that Munanaire forest was useful in providing watershed protection, soil erosion control, recreational, educational, cultural and spiritual benefits. It was also demonstrated by two ecologists that carbon sequestration in Munanaire forest is potentially 50 times greater than in monoculture

plantations. This finding is also supported by a number of studies for example, Lewis et al (2019) and Molin et al (2018).

4.2 Reforestation of depleted areas of Munanaire forest

Regarding reforesting some sections of depleted indigenous forests in Munanaire forests, most participants such as ecologists, environmentalists and economists were all in agreement that reforestation of former community-managed forests with either indigenous trees or some monoculture small plantation can help rural communities to achieve multiple goals like mitigation of climate change, biodiversity conservation, economic growth and national development. It was added by some beneficiaries of Munanaire community managed forests that rather than being an end goal in itself, situating some of form of monoculture plantation within community-managed forests could also serve manifold objectives like climate-change mitigation, soil and hydrological stability as well as providing socio-economic benefits like food security, resilience to drought and floods, and creating employment for youth and women. These findings have confirmation in literature where it is reported that compared to exotic forests native forests support high species and functional trait diversity that enhance ecosystem resilience and improve forest productivity (Kull et al., 2019 Besseau et al., 2018; Rozendaal et al., 2019; Fagun et al., 2020; Philpson et al., 2020; Dvderski and Jagodzinski, 2020). However, some beneficiaries preferred reforestation with native or exotic trees. For instance, two participants were in favour of reforestation using exotic trees for reasons that these trees mature early and have a high revenue turnover compared with native forests. This view nevertheless is not supported by some studies that suggest that decisions to reforest parts of native trees with exotic ones must be based on considering a combination of ecological, historical, cultural and socio-economic factors at different spatial scales. This view has support in literature (se Friggens et al., 2020; Dass et al., 2018; Crane, 2020; Lewis et al., 2019); Chazdon and Brancalion, 2019).

4.3 On optimising carbon sequestration and biodiversity conservation

One botanist argued that whilst monocultures of fast-growing plantations are used in other countries, in the long-term indigenous forests maximise biomass and sink far more carbon while conserving resilient biodiversity. It was also suggested by the local headmen that from traditional experiences the Munanaire native forest has inadequate seed supply that are also difficult to store due to their desiccation sensitivity. However, a serious concern raised by many beneficiaries was that some exotic species have the potential of becoming invasive and thus may have disastrous effects on strategies to improve natural habitat, land degradation, and may lead to sub-optimisation of carbon stores in Munanaire forests. As also observed by Bellard et al (2016) invasive species are the major source of global biodiversity and lower carbon sequestration in many native forests. This finding is not wholly supported by literature. For example, several studies demonstrate that mixing forest species instead of a monoculture plantation has a higher capacity to conserve biodiversity, and attract seed pollinators and dispersers (Dyderski and Jagodzinski, 2020; Crouzeilles et al., 2020; Holl and Brancalion, 2020; Horak et al. 2019). Horak et al (2019) aver that if patches of exotic forests are maintained within a plantation of native forests, such forests will not only regenerate autonomously but will become more resilient to fire, diseases and extreme droughts.

5.0 Recommendations

Despite their significant contribution to carbon sink and biodiversity, most indigenous trees take time to mature and are difficult to reforest; therefore, the study recommends promoting some naturalist interactions that involve reforesting depleted portions of indigenous tree species with some monoculture plantations and introduce some seed-dispersing animals, fungi and pollinators to achieve a resilient and biodiverse ecosystem in community-managed forests. In this regard, social businesses can assist communities that subsist on indigenous forests to mobilise funding for some of these initiatives. Social businesses are also recommended to scale up non-timber value activities in community-managed indigenous forests such as bee-keeping, rearing of wild animals, growing of wild mushrooms, handcrafting and other

agroecological activities. These activities reduce the demand for the timber value of indigenous trees whilst simultaneously arresting deforestation.

Developing sustainable and diverse income streams for forest-dependent communities

For community-managed native forests to be sustainable, the income streams generated by the forest must exceed those obtained from both timber and non-timber value. Hence, social businesses can assist native forest-dependent communities through developing sustainable income streams. The findings show that communities that manage Munanaire forests are not aware of carbon credits and other forms of green financing. Therefore, the recommendation for social businesses is to assist these communities to broaden revenue streams through promoting cultural and ecotourism, providing marketable watershed services, and facilitating the access to carbon credits and green financing in international markets. Social businesses should also help to create a missing market for non-timber forest products such as fruits, fungi, mushrooms, nuts, fibres, ornamental and medicinal plants, mosses, resins, gums, syrup, game meat, and honey. These in turn can help to increase livelihood resilience of the forest-based communities against food insecurity, poverty and unemployment.

Replanting depleted areas with seedlings with appropriate genetic variability and provenance

Large sections of the community-managed Munanaire forests have been lost to anthropogenic activities mainly for fuel-wood, agricultural and residential expansion. In this regard, social business can help by providing locals with knowledge of vegetative propagation and by providing seeds with higher genetic diversity consistent with local genetic variation. This may help to regenerate indigenous trees that are resilient to diseases, inbreeding depression and the effects of flooding and wildfires. Training local people on phenological monitoring regarding abiotic and biotic factors as well as seed physiology and morphology can help faster afforestation of depleted areas. Social businesses may help to provide linkages with commercial forest

enterprises as well as experts like botanists and ecologists to enable locals to build low-cost seed-storage facilities and seed banks for use in times of need. This is because most indigenous seeds in Munanaire forests have dormancy mechanisms that may require specific conditions for germination. Traditional knowledge of locals who have resided and benefited from community-managed forests should be harnessed for training of younger generations.

Green financing and Carbon Credits

The value of carbon often exceeds revenues from the main drivers of deforestation in community-managed forests such as timber value. Therefore, monetising community managed forests as carbon sinks by ensuring local communities have direct markets to carbon markets. Social businesses can also provide low-interest start-up loans to enable community managed forests to be transformed into viable forest commercial enterprises. In addition, social business may also provide cheap loans to local communities to assist in security and adaptation during periods of financial hardship that are often induced by unplanned destruction of forests either by wild fires or floods. Whilst harvesting rates of returns of monoculture plantations are reasonably high compared to indigenous forests, social businesses must help to smoothen variabilities of market prices of fuelwood by helping to regulate foreign product market prices.

Innovative marketing skills

Most local people are not aware or are unfamiliar with marketing of ecotourism and other services that help to directly monetise biodiversity, substantial start-up funding must be provided by social businesses especially for accommodation construction near community managed forests. Social business can help by monitoring that payments actually benefit local communities responsible for the native forests so as to dis-incentivise any prospects of changes in land use to other activities such as agriculture or artisanal mining. Promoting partnerships that encompass multiple stakeholders such as government, forest scientists, chiefs, community leaders and social businesses are likely to lead to enduring long-term benefits for local communities that depend on Munanaire forests. In turn, optimising carbon

sequestration in community managed forests may require overcoming social-economic-political and cultural barriers as well as good governance of natural resources. The government must reduce the regulatory burdens on forest-based communities by addressing land tenure concerns and carbon fixation, watershed protection, facilitating export promotion, and simplifying bureaucratic requirements on the processing of foreign products, especially game meat. Other promising options are green and social purchasing policies (buying forest products that originate from environmentally friendly and/or socially responsible SMFEs). In this regard strategic alliances with social businesses, downstream buyers and processors can increase returns of community-managed forests through risk/benefit sharing mechanisms and by reducing transaction costs. Such alliances can also promote value-addition opportunities and access to market information for local communities.

6.0 Conclusions

In many developing economies, social businesses' support for community-managed native forests have become crucial for biodiversity conservation, optimising and maintaining carbon sinks, and thus helping the resilience of marginalised communities that subsist on indigenous trees. The main purpose of the study was to examine how social business can help biodiversity conservation, carbon sequestration and improved livelihoods in community-managed native trees. The main findings demonstrate that if properly yoked with community-managed forests, social business can help to diversify incomes coming from non-timber products.

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