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Wildlife Management Areas in Tanzania: Vulnerability and Survival Amidst COVID-19

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Abstract

The establishment of Wildlife Management Areas (WMAs) has been adopted as intervention to safeguard the wildlife and their habitats outside the core protected areas in Tanzania. Along with their conservation role, WMAs provide an opportunity for local communities to derive economic benefits from wildlife-based enterprises on their land. WMAs primarily rely on revenues generated from photographic and hunting tourism to support operational activities and create incentives for the local communities to conserve wildlife resources. The current global travel restrictions and lockdown caused by an outbreak of COVID-19 pandemic have reduced a vital funding source for WMAs. This, therefore, undermines the ability to manage the wildlife resources and reward communities for the opportunity cost of their land and other costs associated with coexisting with wildlife. This chapter examines the extent to which the decline of tourism revenues as a result of the outbreak of COVID-19 pandemic has affected WMAs as a framework for local communities to manage and benefit from wildlife. Data were collected through semi-structured interviews on five WMAs in Northern Tanzania that were purposively selected based on their ability to generate a significant amount of revenues from tourism. Findings show that the decline of tourism revenues triggers unprecedented adverse effects on the conservation of wildlife resources within WMAs. Livelihood of the local communities is also affected due to loss of employment opportunities and drop-off of tourism income obtained from the sales of local goods to the tourists and tourist hotels. We recommend the creation of local mechanisms for revenue acquisition that are more resilient to global shocks, diversifying revenue-generating options within WMAs, and putting in place the right funding model that would warrant WMAs sustainability.

Keywords: Wildlife Management Areas, COVID-19, local communities, tourism, livelihood, conservation

1. Introduction

Recognition of the close link between sustainable natural resource management and rural development and a pervasive decline of wildlife due to traditional centralized wildlife management practices prompted the introduction of Community-Based Wildlife Management (CBWM) in Tanzania [1–3]. CBWM approach intends

to fill the gaps emanating from ‘protectionist’ wildlife management practices whereby local communities were strictly excluded from utilization and management of wildlife [4]. The main assumption of CBWM approach is that access of economic benefits from wildlife-related enterprises among the local communities improves their standard of living and, consequently, motivate them to support wildlife conservation efforts [5–7]. The endorsement of Wildlife Policy in 1998 laid out the initial underpinnings of Tanzania’s approach to CBWM through the establishment of WMAs. The concept “represents an important option for wildlife conservation outside the core protected areas and acts as a buffer against human impacts while enhancing rural economic development” [8]. These community-managed areas are established within the village lands, whereby groups of villages set aside land for sustainable wildlife conservation and derive benefits from investment options provided by the land [9].

Despite the governance and conservation challenges undermining the success and sustainability of WMAS [5, 10, 11], WMAs are thought to represent a feasible option for conserving wildlife outside the core protected areas in Tanzania while enhancing rural economic development [12, 13]. A 2012 status report on WMAs by WWF, highlights some evidence that the creation of WMAs has led to improved biodiversity conservation and increased protection of areas that are considered ecologically important [5]. WMAs have also given villages a framework within which they can better manage their land and benefit from the wildlife through tourism activities [11].

Literature shows that tourism in community lands outside the core protected areas, particularly in northern Tanzania, has expanded and many villages earn considerable revenues through joint ventures [14–16]. By forgoing land uses such as farming, livestock grazing or settlement, and allowing investors to use the land for photographic and hunting tourism, the villagers receive a set of payments. Currently, several options for utilizing and creating benefits from wildlife resources exist in the WMAs. These include non-consumptive (photographic tourism) and consumptive (trophy hunting, resident hunting) uses that are carried out in a manner that does not interrupt the ecological processes and the ecosystem functions. For example, tourist lodges in IKONA and Burunge WMAs generate over one million US\$ per annum (See **Table 1**). Concessions are shared among the villages and used to fund the development and maintenance of social infrastructures like schools, dispensaries, or water projects. These benefits have, consequently, instilled positive attitudes towards conservation among the villagers, who are actively taking part in conservation through patrols, intelligence, and de-snaring [12]. Besides generating revenues, tourism development in WMAs provides local employment and market for local goods such as foods, souvenirs, and handicrafts. The income

WMA	District	Revenues from Hunting	Revenues from Photographic Tourism	Total revenues
1. IKONA	Serengeti	735,510	933,076	1,668,586
2. Burunge	Babati	78,261	1,189,785	1,268,046
3. Makao	Meatu	14,861	N/A	14,861
4. Enduimet	Longido	117,834	132,799	250,633
5. Randilen	Monduli	N/A ¹	332,801	332,801

Source: Respective Authorized Associations.

¹N/A: No operation of the respective activity.

Table 1.
Revenues (US\$) from hunting and photographic tourism disbursed to five WMAs of northern Tanzania from 2016/2017 to 2017/2018.

from tourism represents a growing source of economic diversification, poverty alleviation as well as economic incentives for community stewardship towards wildlife resources. Community Conservation Banks (COCOBA), also known as village savings and loan groups, have emerged as a popular strategy in guaranteeing the local livelihoods and the future of wildlife populations found on village lands outside the core protected areas [17]. Through the strategy, the communities are supported financially by allowing them to invest in environmentally-friendly businesses and, thus, lessening the dependence on ecologically damaging activities such as bushmeat hunting, farming, or cattle grazing.

1.1 COVID-19 pandemic, tourism and WMA

In December 2019, the Corona Virus Disease (COVID-19), caused by a Severe Acute Respiratory Syndrome CoronaVirus2 (SARS-CoV-2), was first reported in Hubei Province, which is a famous animal market in the Chinese city of Wuhan [18]. On 30 January and 11 March 2020, the disease, was declared 'A Public Health Emergency of International Concern' and 'a pandemic', respectively [19]. The anthropogenic impact on nature and biodiversity loss through deforestation and the modification of natural habitats have been associated with the outbreak of this pandemic [20–22].

The COVID-19 pandemic has pushed the world to a devastating economic recession, the tourism industry, being one of the hardest hit [15, 16, 23]. Lockdown and travel restrictions imposed around the world due to this pandemic have halted operations in the tourism industry as a result of the decline of cash flow from incoming tourists [24]. The World Tourism Organization (UNWTO) assessment of the economic impact of the pandemic on international tourism estimated a loss of US\$300–450 billion in 2020 compared to 2019 figures [25]. Monthly surveys conducted by SafariBookings.com from March to October 2020, involving hundreds of safari tour operators reported an over a three-quarter decline of bookings and massive cancellations of the bookings [26]. Also noted in these surveys, was a failure among the operators to meet their administrative costs [17].

Loss of revenues from tourism poses a severe threat to the survival of protected areas as these revenues are reinvested for the management of wildlife species and habitats. Tourism revenues are crucial for funding conservation operations and support the benefit sharing schemes among the communities. Furthermore, these revenues enable conservation as a land-use to compete effectively with other economic activities that are ecologically damaging. WMAs, like many other categories of wildlife protected areas in Tanzania, rely entirely on tourism revenues and partly on conservation donors for their operations. The collapse of tourism, therefore, increases their vulnerability to the global impacts of COVID-19. The COVID-19 pandemic is likely to strip off the vital funding for WMAs needed to manage the wildlife resources and reward communities for the opportunity cost of coexisting with wildlife. Tourism income contributes to almost 90–95% of conservation management costs in WMAs. The WMA's administrative costs include the remuneration of the staff - mainly community rangers, purchase of equipment and supplies needed for rangers to remain active in combating illegal uses of wildlife resources. Without adequate funding, the operational budget for anti-poaching surveillance and other activities for WMAs will seriously be affected. Further to impact on WMA operations, compromised livelihoods options as a result of reduced tourism incomes will likely intensify threats to wildlife resources through increased illegal activities pursued to cope with economic hardship. Evidence-based literature indicates that poverty is one of the critical drivers of wildlife and environmental crimes in Africa [27–31].

Considering the importance of WMAs in securing wildlife space around the core protected areas and creating incentives for local communities to conserve wildlife

resources, it is apparent that the failure of these areas to function properly will bear the negative repercussions on the local livelihoods and biodiversity. Understanding how WMAs can sustain their vital roles of conservation and improving the livelihoods of the vulnerable communities during the current unprecedented circumstance of COVID-19 is critical for their survival and management. This paper, therefore, analyses the extent to which the collapse of tourism activities due to COVID-19 pandemic has affected WMAs operational activities and local livelihoods. Our findings will contribute to further understanding of the effects that contemporary issues such as infectious diseases and, COVID 19, in particular, have on conservation, tourism, and local livelihoods. These findings are quite robust in recommending possible mechanisms of enhancing resilience and preparedness of community-managed conservation areas such as WMAs to emerging global pandemics.

2. Methodology

2.1 Study area

The study was conducted in the five purposively selected WMAs, namely; Makao, Burunge, Enduimet, Randileni, and IKONA located in Northern Tanzania (**Figure 1**). These five WMAs along with 33 others, covers a total area of 29,000 km² which is about 3% of the country’s land surface area. Details of these WMAs are shown in **Table 2** below.

The selection of the five WMAs was based on their performance in generating revenues from tourism activities compared to other WMAs in the country. For example, from 2016 to 2018 hunting and photographic tourism earned these WMAs a total of US\$ 3.55 million (US\$0.95 million from tourist hunting and 2.6 million from photographic tourism [32]).

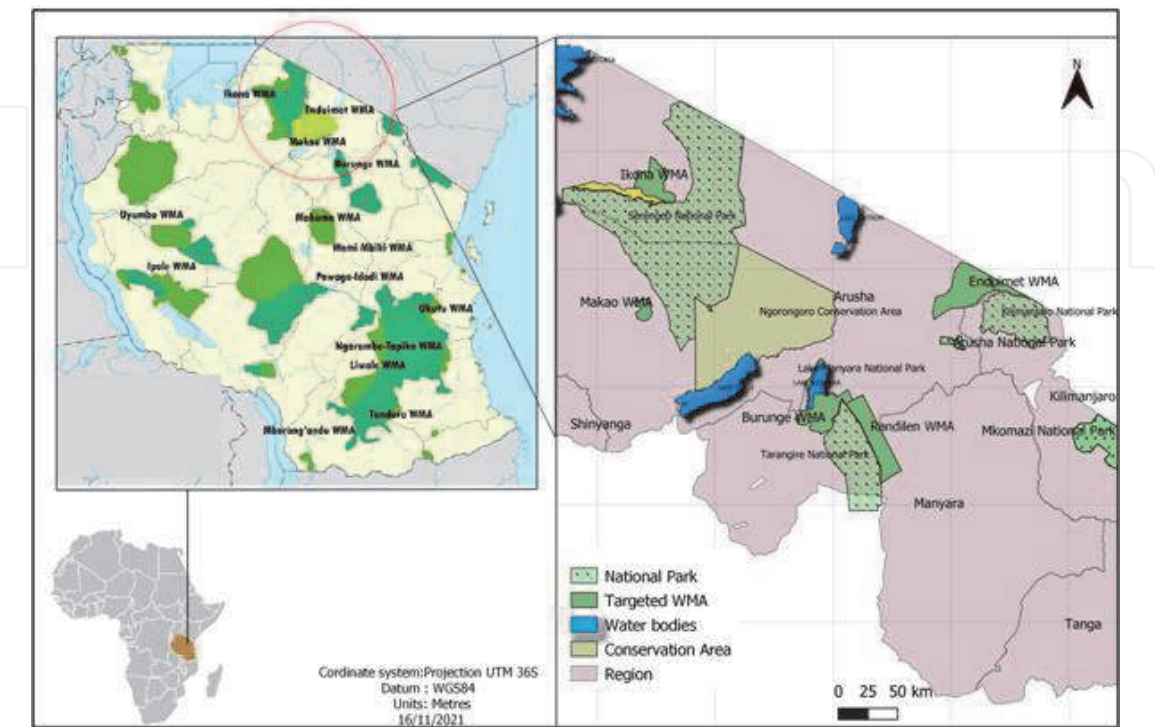


Figure 1.
Location of selected WMA's in the northern Tanzania.

WMA	District	Size (Km ²)	Year of establishment	Participating villages	GN and Date of gazettelement
IKONA	Serengeti	242.3	2003	5	GN 57 (09.03.2007)
Burunge	Babati	617.0	2003	10	GN 37 (31.06.2006)
Makao	Meatu	768.9	2007	7	GN 369 (20.11.2009)
Enduimet	Longido	751.4	2003	9	GN 57 (09.03.2007)
Randilen	Monduli	312.0	2011	6	GN 21 (01.02.2013)

Table 2.
Status of selected wildlife management areas.

2.2 Study participants and sampling method

The study population consisted of Village Game Scouts (VGS), village government leaders, leaders of the WMAs and ten community members residing in each of the five selected WMAs. The WMA leaders were purposively selected based on their positions and roles they play in the management of WMAs. The community members consist of villagers who have no leadership role in the village governments or WMAs but who derive benefits from tourism activities taking place in the WMAs, directly or indirectly. These participants (**Table 3**) were selected using both purposive and snowball sampling methods, considering their diverse roles in the community as far as WMAs, conservation, and tourism are concerned. In addition, with purposive sampling technique, efforts were made to consider gender of respondents considering different roles that males and females play in conservation and tourism.

2.3 Sources of data and methods for data collection

This study was conducted in May, 2020 and employed both primary and secondary data to generate information on the effects of COVID-19 on survival of WMAs and impacts on local livelihoods. Secondary data from different reports complemented the primary data obtained through interviews with key respondents. The use of qualitative data collection methods, and in this case, key informant interviews was deemed appropriate in providing a detailed understanding of WMAs performance amid the COVID-19 pandemic. Key informants were anticipated to provide a broader understanding of socio-ecological dimensions of the current situation facing WMAs in Tanzania and capture the complexities as well as diverse perspectives as the situation unfolds. In particular, key informant interviews with selected community members sought information on how tourism influences their livelihood and how the collapse of tourism activities in the WMAs has been affecting their socio-economic development.

Categories of participants	Wildlife Management Areas				
	IKONA	Burunge	Makao	Enduimet	Randilen
1. Village Game Scouts (VGS)	3	2	4	1	1
2. Village Leaders	2	2	2	2	2
3. WMAs Leaders	1	1	1	1	1
4. Community members	10	10	10	10	10

Table 3.
Number of participants in each category of respondents in the WMAs.

On the other hand, WMAs leaders provided information on tourism revenue sharing mechanisms, the local support for conservation efforts as a result of tourism, and how the decline of tourism activities within each selected WMA has affected both the WMAs' operational activities and local livelihoods. A checklist of questions was designed to guide an interview based on the key research objectives. The interviews were conducted conversationally to allow probing of the issues which were not included in the interview guide but useful in addressing the research questions. Social distance and other precautionary measures to avoid infection of COVID-19 were observed during the interview.

2.4 Data analysis

Content analysis was employed to analyze data from the interviews after translation from Swahili to the English language. Content analysis is a procedure for analyzing textual material (opinions and perspectives) which involves compressing texts into themes and content categories to uncover frequency of occurrence among texts [33, 34]. In this study, the content of the interview data was classified into important themes that were identified to reflect the objectives of the study. Each theme presented an "idea" and all the data related to a particular theme were added under that unit. The themes were evaluated by making comparisons of responses and determining how often each of the categories appears to conclude a specific aspect. The presentation of the results is also supported by quotes from respondents' responses for illustration purposes.

3. Results and discussion

3.1 Income generation from wildlife management areas

Results from the interviews show that tourism is an important income-generating activity in the five WMAs. Essentially, about 90% of WMAs income is obtained through various tourism-related opportunities such as photographic safaris, hunting tourism, concession fees, and other fees. The remaining 10% come from donor support in the form of grants and occasionally from penalties in form of fines imposed against various law offenders within the WMAs. The financial contribution of hunting and photographic tourism to five WMAs is corroborated by the 2018 Wildlife Sub-sector Statistical Bulletin [32].

The revenue from the WMAs is shared among the Central Government, Local Government and the respective WMAs. The participating villages in the WMAs receive 50% WMA's income share from the Government and the rest is used to cover the operational costs. Besides direct revenues, tourism has created numerous opportunities to diversify the local economy. It is important to note that livelihood diversification in WMAs is essential, as most of these areas are on lands that are considered economically marginal, experiencing semi-arid to arid conditions with limited possibilities for generating household income from other activities such as crop farming and livestock production. Tourism in such areas has been widely acknowledged to present opportunities and capitalize on the cultural, landscape, and wildlife assets commonly found on marginal lands that are not particularly valuable for other activities that drive the economy [35].

Further analysis of the income opportunities in the WMAs shows that tourism provides, not only a regular source of income to the member villages, but also adds value to different locally produced products in the course of tourists spending (**Table 4**). There were several ways through which the local communities in the

Categories of opportunities	Description
1. A partnership between investors and communities	<ul style="list-style-type: none">• Annual concession fees from contracts made between the WMA member villages and investors• Tourist lodges and hotels in the WMA employing local staff
2. Locally controlled small enterprises	<ul style="list-style-type: none">• Community members selling cultural/ traditional products and handicrafts to tourists
3. Local services to tourists and lodges	<ul style="list-style-type: none">• Local tour guiding• Supplying agricultural-based products, vegetables, and meat to tourist lodges• Performing traditional dances to entertain the tourists
4. Income share from WMA to local communities	<ul style="list-style-type: none">• The participating villages receive 50% of WMA's income share after Government deductions

Table 4.
Opportunities for communities to benefit from WMAs.

WMAs village members have been able to benefit from the presence of tourists in their areas. For example, it was revealed that some community members could derive benefits through working as local tour guides, direct employments in the tourist lodges and hotels as well as selling a range of locally made products such mats and baskets, beaded necklaces, earrings and bracelet, and Maasai attires to the tourists. It was revealed that, on average, community members engaging in selling local products and/or providing services to tourists might earn up to TZS 300,000 (approximately USD 130) per month. The local communities have also been hired occasionally by the tourist lodges and hotels to entertain tourists through performing traditional dances, where on average; each earns about 50,000 Tanzanian shillings per performance. There is a general understanding that tourism income within the WMAs positively influences the livelihoods of those who directly engage in tourism-related activities. Hence the collapse of tourism has affected the livelihood of several members of the communities who have not been able to derive any income from such activities for the past 6 months. One of the respondents working as a Village Game Scout (VGS) in Burunge WMA underscored the importance of tourism income by reiterating that;

“... It is through this job that I was able to build a decent brick house for my parents and I am capable of paying for my children’s school fees ...”.

Tourism-related income in the WMAs was also found to directly influence households’ access to basic education, health care, and other social services for the community members who do not have direct engagement with tourism activities. Results from interview indicate that the majority of the members of the communities benefit through collective income earned at the community level. This collective income is usually obtained either through WMAs’ share to the communities or when villages earn profits through leasing part of their land to tourism business investors. The communal income is usually invested in improving the provision of social infrastructure such as water, schools, roads, and dispensaries within the community. Some tour operators have been offering both financial and material support to support the communities rehabilitating school buildings as well as purchasing equipment required for schools and health care operations. Community development projects have generally been the fundamental means of extending tourism benefits to all community members. The funding of social services projects through tourism revenues relieves the communities from the burden of contributing to these services, thus making the money available to cater for alternative household requirements.

3.2 Effects of COVID-19 pandemic on WMAs’ operational activities and wildlife resources

Discussion with leaders of the WMAs uncovered that, following an outbreak of COVID-19 pandemic and, subsequently, loss of revenues from tourism, none of the five WMAs was able to effectively implement its administrative activities including the funding of the village development projects. For example, the Enduimet WMA was forced to defer implementation of the infrastructure development projects that were planned during the 2019/2020 financial year, among others, being the renovation of the ranger posts, construction of game viewing routes and a visitor centre in Engikaret. Other administrative activities that were put on hold include the review of village land use plans, tree planting activities, environmental conservation education through cinemas, and the Annual General Meeting (Table 5).

BURUNGE <ul style="list-style-type: none">• Failure to put in place a Spatial Monitoring and Reporting Tool (SMART) System for data collection and anti-poaching activities• Failure to purchase field gears for the scouts and crop protection tools• 24 local staff working in the hotels within the WMA were laid-off• Various village development projects in the WMA member villages were put on hold• Small scale businesses such as the sale of souvenirs closed• 50 local tour guides in the WMA lost their jobs• A planned improvement of the road networks within the WMA stopped• Could not conduct environmental education program to the local communities• Overfishing by the local communities within the WMA
ENDUIMET <ul style="list-style-type: none">• 15 employees laid off• Anti-poaching operations are confined within the WMA Borders, very little or no extension beyond borders and neighbors• Failure to implement social development projects such as water, education, and health infrastructures within the participating villages• Failure to develop and renovate the planned tourism facilities such as tented camps, Visitor Center in Engikaret, Game viewing Routes, and the Ranger posts.• Failure to undertake and review the village land-use plans• Failure to implement conservation projects and plans including tree planting, conservation and environmental education through Cinema
RANDILEN <ul style="list-style-type: none">• The collapse of local businesses especially those selling souvenirs for the past 3 months• Traditional dancers have no jobs• The number of patrols has decreased due to a lack of funding Village development projects have been put on hold
IKONA <ul style="list-style-type: none">• Nearly all local tour guides have lost their jobs• 26 employees who have been paid by the village given leave without pay• Village Game Scouts (VGS) have been reduced in number from 25 to 14• VGS undertake patrols without payment, they are just given food and no payments• Many activities like cultural activities are currently implemented• Closure of tourists hotels and local Business closed• Failure to fund development projects and support students who have been sponsored the villages
MAKAO <ul style="list-style-type: none">• VGS are temporally given leave without pay while others are working on loan• Lack of donation from the tour operators• Road construction project has stopped• Reduced numbers of patrols, giving rise to increasing of illegal activities

Table 5.
Negative effects of COVID-19 on WMA resources and local livelihoods.

In Burunge WMA, the planned projects that were affected included the development of the well-equipped permit infrastructures at the WMA common entry gate; establishment of a smart system database for patrol, wildlife monitoring, and data collection as well as the purchase of crop protection tools and field gears for the scouts. Other plans which are deferred pending returning of the situation to normality are the construction of different tourism user facilities like picnic sites and viewpoints, improvement of the road networks to stimulate tourism activities within the WMA, and implementing Conservation Education programs to local communities (**Table 5**).

The effects of COVID-19 have also been notable in the anti-poaching operations. For instance, IKONA WMA has been forced to retrench 11 out of its 25 village game scouts alongside reducing the number of patrol days. Furthermore, the remaining scouts have been working without pay and are either facing reduced salaries or unpaid leave. In Randilen WMA, no payment is offered to scouts participating in patrols other than meals. In Makao WMA, 15 scouts participate in patrols work on a rotational basis and receive no pay. The anti-poaching operations in Enduimet WMA are currently being confined within the WMA borders, with no extension beyond the borders (**Table 5**). Inadequate workforce to patrol the entire WMA areas and surrounding areas along with reduced working morale among the rangers due to minimal incentives, has translated into inefficient anti-poaching operations and, therefore, render the WMAs and surrounding areas vulnerable to poaching and other illegal activities. On the other hand, loss of income as a result of retrenchment and interruption of livelihood strategies prompts illegal use of resources. The effects of COVID-19 on conservation operations in WMAs are illustrated by views from some WMA leaders provided in **Box 1** below.

“...A steep decline of tourism due to COVID-19 has a devastating effect on the cash flow to WMA. The purchasing power of the WMA has drastically declined to the extent that no procurement is currently being made.”

Chairperson, IKONA WMA

“...The layoff of one-third of employees who were mainly responsible for carrying out anti-poaching operations has intensified pressure on natural resources. A WMA cannot do frequent patrols as there are no funds for fuel, vehicle repairs, and allowances for rangers. A few number staff are required to patrol a relatively large chunk of land and, thus making the anti-poaching operations a huge burden to WMA...”

Chairperson, Enduimet WMA

“...Loss of jobs, reduced salaries, and unpaid leaves have caused food insecurity among the members of the communities who are currently resorting to poaching and destruction of wildlife habitat if they are not assisted immediately. If this situation persists, I am afraid it might lead to overexploitation of the resources that attract tourists ...”

Chairperson, Burunge WMA

Box 1.
Opinions of WMA leaders on effects of COVID-19 on wildlife conservation.

Patrols in WMAs are essential in monitoring wildlife, preventing poaching, and in minimizing human-wildlife conflicts. Effective implementation of anti-poaching patrols in terms of the adequate number of personnel is, therefore, essential in providing an effective deterrent against illegal activities in an area [36].

3.3 Effects of COVID-19 crisis on local livelihoods

Assessment of the effects of the COVID-19 crisis on local livelihoods was crucial in understanding the livelihood losses due to the decline of tourism activities in the

WMAs. This is important due to direct and indirect correlations between the loss of livelihood options and destruction of wildlife habitats and species [28, 30, 31].

The findings of this study show that COVID-19 pandemic has had far reaching consequences on the livelihoods of the local communities. All WMAs participating villages have failed to implement various social development projects such as water, education, and health infrastructure, to mention a few, as there are no more dividends to finance these projects. The pandemic has also led to the temporary closure of all businesses that entirely rely on tourists for revenues. It was noted that each surveyed WMA had at least one hotel investment all of which have been closed down following the pandemic, a situation that has made many locals working as casual employees for the hotels to lose their jobs.

Loss of livelihood is further contributed by the closure of small scale local businesses that were conducted by the majority of community members. It was found that the owners of these small scale enterprises were unable to run their businesses due to a lack of tourists and the consequential diminished demand for their products. Other respondents reported that they had debts and loans which they could hardly service due to the impact of COVID-19. **Box 2** below summarizes some respondents' views on impacts that have brought by COVID-19 on their livelihoods.

“...Villagers who were employed by tourist hotels are now at home without any jobs. As a consequence, the tourism multiplier effect in society has dropped drastically due to the poor performance of other economic activities ...”

Nata Village Executive Officer, IKONA WMA

“...I used to supply vegetables and goats and sheep meat to the Singita-Grumeti Reserves Hotel Ltd. and earn at least one million Tanzanian Shillings per week from selling such products, but currently, I earn nothing because the business has collapsed ...” .

A villager of Robanda, IKONA WMA

“..I used all the money I had to buy materials for making handicrafts anticipating profits from selling such products to the tourists. Currently, I am just at home left with no money or business. If this situation continues for a long period, I will not be able to cater for my household basic needs...”

Member of the Cultural Women Group in Enduimet WMA

“...I took a loan from the Village Community Bank to buy raw materials for making handicrafts ... but I am unable to repay the loan because over the past three months I have not sold a single item that I made for tourists...”

A respondent, Enduimet WMA

Box 2.
Respondents opinions on effects of COVID-19 on local livelihoods

Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA) indicate that Small and Medium Enterprises (SMEs) in the country comprise 95% of the businesses in the country and contribute about 35% of the country's GDP. Compared to more prominent firms, SMEs are unlikely to survive economic shocks such as COVID-19 due to limited resources. The high concentration of SMEs in the tourism industry including their multiplier effects translate into disruption of value chains and, consequently, economic hardship to the majority of the people. A survey conducted in April 2020 by Launchpad Tanzania and Maarifa Hub to determine the severity of the economic impact of COVID-19 on small and medium businesses as well as entrepreneurs in Tanzania revealed that 97% of those surveyed had been economically impacted by the pandemic whereby 40% have experienced a loss of half of their income and 10% have experienced a total loss of income [37]. The tour companies dealing with hotel operations in the surveyed WMAs have also reported crises caused by COVID-19 due to the ongoing accommodation

cancellations without payment of cancellation fees coupled with a drop in future booking requests. It is important to note that the lodge and hotel establishments in the WMAs have created several job opportunities, the majority of which are held by members of the communities. This was attested by the campsite manager for IKONA Bush Camp in IKONA WMA with a viewpoint that;

“... each staff working in our lodge has at least ten dependents. This means hundreds of individuals and families across the community are supported by jobs created by our lodge. The layoffs of staff and unpaid leaves have devastating effects on the livelihoods of the majority of members of the community ...”.

4. Implications of the study findings

It is apparent that COVID-19 has set off unprecedented crisis in the tourism economy given the immense shock to the sector [38]. Findings of this study indicate that the pandemic has posed significant negative repercussions to the majority of local communities through interruptions of their livelihood options. This presents a potential threat to wildlife resources in the surveyed WMAs. As pointed earlier in the study findings, conservation of wildlife in WMAs largely depends on tourism revenue, and hence loss of such revenue due to pandemic has far-reaching implications for local livelihoods and wildlife conservation in particular. It is widely documented that communities living adjacent to core protected areas bear the highest cost of conservation through a loss of their land and human-wildlife conflicts [39, 40]. Loss of tourism revenues has not only increased opportunity costs of conservation to the local communities but also poses a significant threat to WMAs functioning as an alternative conservation approach and a reliable land-use option.

Furthermore, it is estimated that around 80% of all tourism businesses in Tanzania are informal SMEs characterized by low-skilled individuals and vulnerable segments of the population who are either employed or run micro and small enterprises [41]. The contribution of SMEs in creating employment is widely acknowledged globally, and in Tanzania in particular [42–44]. SMEs constitute over 90% of the businesses in Tanzania and are regarded as the engine for economic growth in the country [45]. Unlike large enterprises, SMEs can be easily established since their requirements in terms of capital; technology, management and even utilities are less demanding. However, when it comes to shocks, such as pandemics, the informal workforce engaging in SMEs bears the highest vulnerability, due to lack of safety nets in terms of limited social protection measures and inadequate savings.

Local communities within the surveyed WMAs experience a similar situation because their household income is barely diversified beyond tourism, and the majority of community members are either employed or self-employed in the informal tourism economy. The decline of tourism in the WMAs has left many households vulnerable due to loss of jobs (for employees) and closure of small businesses as a result of reduced demand for their products. It should further be noted that the closure of hotel businesses within the WMAs, has not only affected the workforce who were laid off and or given leave without pay, but also had a far-reaching impact on families who were supplying vegetables and meat and poultry products to the hotels. The crisis in the WMAs is also believed to have reduced household savings with only very few households having enough savings to meet their household expenses for one month or more. Inadequate savings among the community members intensify the extent of vulnerability for many households in the study area.

Since tourism is the main income-generating activity in the WMAs, its suspension following the outbreak of COVID-19, will bear the major ramifications for

wildlife conservation in the country. Our findings suggest that the pandemic has posed a major threat to conservation in the WMAs and hampered the conservation-related activities in numerous ways. Most of the conservation and development programs that were already planned by the WMAs have become uncertain (**Table 5**). The fact that the five WMAs studied are prototypes representing a success story for other WMAs existing or proposed in the country, there is a risk that the whole concept of WMA may become unpopular if the pandemic results to a total failure in these areas, which have already won the hearts of the communities. This will water down the conviction that wildlife conservation can compete effectively with alternative land uses and, thus, prompt people to claim back their land for these alternative uses, which essentially are ecologically destructive.

Community conservation programs are essential in motivating the local communities to conserve resources and pursue activities that are consistent with the preservation of nature. The drop in tourism revenues and the resultant layoffs of key staff implies inadequate resources for WMAs to conduct effective anti-poaching activities, monitor wildlife, and respond to human-wildlife conflicts. The COVID 19 crisis is also likely to intensify poverty and food insecurity among community members due to the decline of tourism income. In such cases, food-insecure communities are likely to resort to illegal natural resource for the sake of surviving. Additionally, since some WMAs partly depend on donor support for their operations, the dwindling economies may reduce the capacity of donors to provide financial support for wildlife conservation. Reduced donor support will, to a certain degree impair conservation operations by limiting the ability of WMAs to conserve and manage wildlife resources.

5. Survival mechanisms during and after the COVID-19

Addressing the effects of COVID 19 is critical in ensuring the sustainability of WMAs. Here, we describe actions necessary to sustain wildlife conservation and the livelihood of the vulnerable communities in an attempt to stir up further debate on the sustainability of WMAs in Tanzania as a framework for communities to manage and benefit from wildlife resources.

The volatility nature and the over-reliance on international tourism to support conservation and local livelihood subject WMAs to an increased degree of vulnerability to effects of global pandemics such as COVID-19. Creating local revenue mechanisms that are more resilient to global shocks may guarantee the long-term survival of WMAs against the negative effects of the pandemics. Such mechanisms, among others, include the need to expand and promote domestic tourism to locally boost wildlife-based tourism revenues and foster long-term community support for conservation. Currently, Tanzania receives about 1.5 m tourists annually, and domestic tourism represents only 26% of the total number [46]. Domestic tourism when properly developed and managed has the potential to create a more resilient tourism income and, can be a more reliable form of income for vulnerable communities as it does not fluctuate as much compared to international tourism. Among the factors that need to be addressed in boosting domestic tourism include the provision of affordable accommodation and transport to locals in protected areas, raising awareness on the attractions as well as instilling the culture of visiting local attractions among Tanzanians.

Furthermore, diversifying revenue-generating options in WMAs and promotion of income-generating activities that are compatible with nature conservation can also serve as mechanism to cope with the global effects of COVID-19 and other pandemics. The livelihood conditions of local communities could be improved

through the adoption of alternative livelihood options that reduce community dependency on tourism for livelihoods. For instance, beekeeping is among the income-generating activities that have a high potential to improve the local livelihoods and is considered compatible with conservation. As a custom, beekeepers need to maintain the natural habitat and reduce the unsustainable use of trees as a source of energy to boost the production of bee products. Many cultures around the globe highly value bee products and if well managed, beekeeping is likely to provide a reliable income for the majority of vulnerable communities that are dependent on tourism.

Moreover, concerted efforts from various stakeholders including the government, Non-Governmental Organizations, and individuals are required to minimize the negative effects of the COVID -19 pandemic in the WMAs. Currently, many WMAs rely entirely on tourism income and partly on donor support to finance conservation activities. There is no specific mechanism that exists for the central government to financially support the WMAs. The right support and funding models would be needed to allow WMAs to sustain their crucial management operations and support local development projects. This includes among other things, restructuring WMA benefit-sharing arrangements to provide the WMA's member villages with more revenue retention by reducing shares to the Government.

6. Conclusion

This study aimed to understand the nature and extent of the COVID-19 pandemic's impacts on the selected WMAs found in Northern Tanzania. In particular, the study looked at the impact of declined tourism revenues on conservation of wildlife resources, local employment as well as the potential trickle-down livelihoods effects on the families of community members. This study revealed that COVID-19 pandemic is having considerable devastating effects on the local livelihoods and WMA revenue collections. The pandemic has affected the incomes of enterprises and individuals due to the closure of tourism businesses and the collapse of the community's small-scale enterprises that are heavily dependent on tourism within the WMAs. Loss of tourism revenue further threatens the conservation of resources and management of WMAs to carry out critical operations for the conservation of wildlife and provide social and economic incentives to the local communities. The current situation thus requires actions to cope with the negative effects of COVID-19 to sustain the functions of the WMAs. Measures put forth include the promotion of domestic tourism, diversification of livelihood options for communities surrounding the WMAs, and concerted efforts by the Government, Non-Government Organizations, and the donor's community to provide funding for the sustainability of the WMAs.

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