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Hadzabe's Transformation and Livelihood Dynamics: Livelihood Sustainability in the Changing Environment of Yaeda Valley

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Abstract

This article aims to document the transformation processes that underlie Hadzabes' foraging system and their implications on their livelihood. A transect-walk study method used targeting 303 households Hadzabe-foragers. Data was collected using household surveys, interviews, FGDs, observation, documentary reviews and community mapping. Analysis of data was done using SPSS (Version 20) and regression analysis. Land use changes were assessed based on change detection in ArcGIS (Version 10.5). Pareto analysis of the 80-20 principle was used to analyse changes that have occurred to the Hadzabe living system. Findings show that 74% of the participants admitted that change is being caused by development in tourism, change in climate, and population increase. Others are policies, laws and acts on resource use and education. Dynamics in Hadzabe were reported to be taking place slowly via agricultural activities, tourism, trade, beekeeping and poultry. Findings also indicate that, with changes, livelihood sustainability is still a problem requiring stakeholders' cooperation to solve since the environment continues to change. The study concludes that although the stated causes and dynamics have had significant contributions in transforming the Hadzabe, livelihood sustainability is still a challenge as the Hadzabe continue to disengage from foraging by adopting new economies that ensure livelihood sustainability, while living in a changing environment of marginal and shrinking land. Thus, the community should be sensitized on food security so as to develop strategies to handle food storage for future use, especially during adverse weather conditions.

Keywords: *dynamics, causes, transformation, foraging, livelihood sustainability*

1. Introduction

Transformation in many world societies, including the Hadzabe of Tanzania, is marked as a successful and progressive move towards holistic development in a changing environment (Yatsuka, 2015; UCRT, 2007; Sassaman, 2004). The Hadzabe, like other world foragers, have been obliged to fulfil their livelihood needs as nature changes continue to take place (Safari et al., 2021). The state of livelihood sustainability remains very high and severe in most developing countries of the world, particularly in Sub-Saharan Africa and Asia (Mabulla,

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2007) where food sustainability has negatively challenged human aspects of life economically, politically and socially (UCRT, 2017). Although foraging activities have been considered a successful human subsistence strategy to maximize food security through diverse food targets (Marlowe, 2010), currently it is considered as a wrong means of fulfilling livelihood demands.

The Hadzabe community has been living in the Yaeda Valley for many centuries, moving from one place to another as the indigenous founders of the Yaeda Valley (Marlowe, 2002). The Yaeda Valley is located within the Great Rift Valley on the north-western part of Tanzania, and it has been subjected to changes resulting from anthropogenic effects and associated demographic changes over time. It is indicated in Safari et al. (2021) that the Hadzabe, who are population-wise, have managed to live peacefully in the valley and its ecology for a long time, engaging in hunting and gathering without harming each other. As the earth global system dynamics continue to take place, the Hadzabe as one of the entities of the world face these challenges. They are forced to change their normal experiences of life to other means of living so as to sustain their livelihood. Thus, the gradual transformation of the Hadzabe community has rarely or wrongly been disseminated, leading to diverse interpretations, as they live on a changing environment.

With time series changes on both environment and human behaviour, the Hadzabe of the Yaeda Valley have been triggered to change their livelihood system, leading into the disappearing of some natural food or the food being reduced to a staple food for them (Rangeland Initiatives, 2012). The natural environment used before as the main source of natural food has been subjected to changes leading to insufficient food provision, especially natural fruits, berries, root tubers, honey and even medicinal services obtained from the forest (Shadrack, 2011). Redfern (2018) and Ihucha (2008) showed that a decrease in natural food supply, used as staple food to the Hadzabe, has contributed to a mind-set change; and that foraging is no longer an appropriate way of livelihood satisfaction.

It is also reported in Laggan (2016) that the Hadzabe community is known for its long-time dependence on hunting game, collecting honey, digging tubers and gathering berries and other wild fruits: all of which have now been devastated with environmental changes affecting natural food supply. Climatic changes and land encroachment have brought some dynamics that force the community to transform to other alternative ways that can ensure livelihood supply as nature is no longer supportive (Fassbender, 2016). Through increases in migration and population explosion in the Yaeda Valley, there has been a high rate of land grabbing and encroachment, reducing the land size used before for foraging. Moreover, Safari et al. (2021) confirm that climate change catalyses and accelerates changes in the Hadzabe livelihood earning since forests once used to provide wild foods have been altered, and other areas are now being used for farming and pastoral activities.

According to the Pastoralists in Non-Governmental Organizations (PINGOS) (2013), because of inadequate natural food supply, some groups of the Hadzabe moved out of Yaeda Valley to other places looking for natural food and means of subsidizing livelihood. This act of scattering out of the Yaeda Valley to other places attracted other people to enter and establish several economic activities not practised before in the valley, catalysing land degradation and associated problems. The Hadzabe's migration from the Yaeda Valley has led to depopulation as some places are left vacant, hence attracting invasions, encroachment and conversions of some virgin land allocated for cultural uses of the Hadzabe. This situation of land invasion and conversions were found on both studied villages as some of the land had been occupied by non-hunter-gatherers like the Sukuma and Iraqw, who have developed agriculture and other activities that are not user-friendly to the environment.

It is also stated in Marlowe (2010) that the intra-migration taking place in and out of the Yaeda Valley has transformed Hadzabe's livelihood and culture as they intermingle with different people with diverse cultures and paradigms. Through such contacts on the changing nature and climate, the Hadzabe have benefited: they have transformed in different spheres of life, including culture. Several transformations in permanent settlement, education, agriculture, trade, projects management and tourism are indicators of change in the Hadzabe resulting from migration movements and contacts with different people. According to Bill and Warren (2007), transformations among hunter-gatherers have assisted in life and livelihood sustainability as they live in a changing and challenging environment impacting natural food availability.

Mollel (2014) shows that this situation has transformed Hadzabe community into a mixed economy, with reduced dependency on wild foods, and practicing new livelihood economies. Rain-fed agriculture, which is the mainstay of livelihood in Tanzania, has been the most important activity among the Hadzabe despite several impediments facing the sector, making it lag behind. Marlowe (2002) argues that although agriculture in Hadzabe has been considered as the immediate solution to solve problems related to food scarcity and livelihood, it is still a challenge as most of them have not accepted it. Even though the Hadzabe are transforming into agriculture, the majority have been reluctant to adopt this new way of life. Only a few Hadzabe grow vegetables and cereal crops on small plots around their homes (ibid.).

Garfield et al. (2016) shows that culture is the main challenge facing the Hadzabe as far as practising agriculture effectively is concerned. From the ancestors and throughout their generation, the Hadzabe have been moulded as foragers depending on nature by collecting and hunting natural food. Ihucha (2008) is also of the opinion that, together with climate change and other factors forcing Hadzabe to alter their culture, it will take them a long time to capture, adapt and move with recent livelihood economies. Similarly, Safari et al. (2021) are concerned that,

because of slow changes, the Hadzabe's future is going to face challenges; and that they might suffer from famine and hunger as the environment continue to change. Building awareness is inevitable to ensure their surveillance on the changing nature of the environment. They need to be informed that food and livelihood security in Tanzania depends on agricultural conditions and production; and on socio-economic conditions including distribution, access and affordability of food.

1.2 Theories Governing the Study

The study was governed by two theoretical frameworks: sustainable livelihood framework (SLF) by DFiD (2000); and socio-ecological system framework (SES) developed by Ostrom in 2009. Both frameworks, as used in the study, show the symbiotic and mutual relationship between human beings, land/nature and resources in bringing about life-cycle-dependence based on conserving, management, governing and utilization/uses. In SLF, the natural capital focusing on land and forests has been shown to be of a potential in the life-cycle of human beings and sustainable livelihood. The land is considered and taken as the only resource in many ecological services that suits human life and livelihood, hence it requires a careful utilization.

It is also indicated in SES that for human beings to attain and continue receiving ecological system services from nature like rain, water and wildlife, conservation and management should be taken into consideration. The SLF and SES indicate the potential and connections of interdependence between human beings and nature, and how they affect or influence each other via management and conservation. The strength of these frameworks in the study is that they laid the foundation and methodology in approaching the study. The objectives of both SLF and SES frameworks were streamlined with the study aims to make it easier to capture the required data, and help in addressing the objectives of the study.

1.3 Knowledge Gap

Several studies on this subject have been on climate change and its impacts on Hadzabe foragers (Safari et al., 2021; Shedrack, 2011), change in natural resource uses (Mollel, 2014), hunting and foraging (Mabulla, 2007), as well as on why the Hadzabe—as hunter-gatherers of Tanzania—and are still in the trade (Marlowe, 2010, 2020). None of these studies have focused on Hadzabe dynamics and transformation towards sustainable livelihood in the context of the changing nature of the environment. Therefore, there is a limited information on how shifts in the livelihoods of the contemporary foragers have ensured livelihood as the environment continues to change. Thus, with indicators of change, the study objectives were to assess factors that have affected Hadzabe's dynamism and transformation regarding the changing nature and sustainability in livelihoods on the changing environment.

1.4 Conceptual Framework for the Study

The conceptual framework for this study is adapted from the study by Rebugio and Camacho (2005), orienting on sustainable forest management (SFM) and livelihoods satisfaction to societies. Variables addressed are sustainable livelihood development, environmental conservation, socio-economic development, roles of nature conservation and alternative activities for sustainable resource management. The framework has been modified to streamline this study as shown in Figure 1.

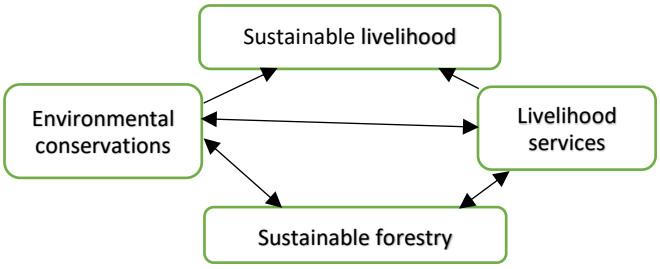

Figure 1: ***Conceptual Framework on Livelihood Sustainability***

Source: Authors' creativity (2022)

Sustainable livelihood to a community that relies on nature to fulfil its livelihood depends on the efforts employed in protecting the land and its ecology. Conserving the environment is very important as this is the ignition point of ensuring a friendly life. This can be done by caring for the available forests which will result in offering its ecological services like water, wildlife, medicines and rain. This conceptual framework has a great connection with Hadzabe life as they lived in the Yaeda Valley where they led a friendly life with the environment/nature, getting natural food and services that emanated from maintaining forests, while conserving the environment.

The article is organized into five sections, with several sub-headings. Section one presented the introduction of the paper, theories underpinning the study, conceptual framework and knowledge gap. Section two is on the research materials used in the study with sub-headings on the study area, sample size, as well as data collection methods. Section three presents results and discussion reflecting on the study topic and aims, while section four gives the conclusion and recommendations based on the findings of the study.

2. Research Materials

2.1 Study Area

This study was conducted in three villages in two wards: Domanga Village from Eshkesh ward; Yaeda Chini and Mongo wa Mono villages from Yaeda Chini Ward; all in Mbulu District, Tanzania. Mbulu district is one of the five districts forming Manyara region. Other districts are Babati, Hanang, Kiteto and Simanjiro (Figure 2).

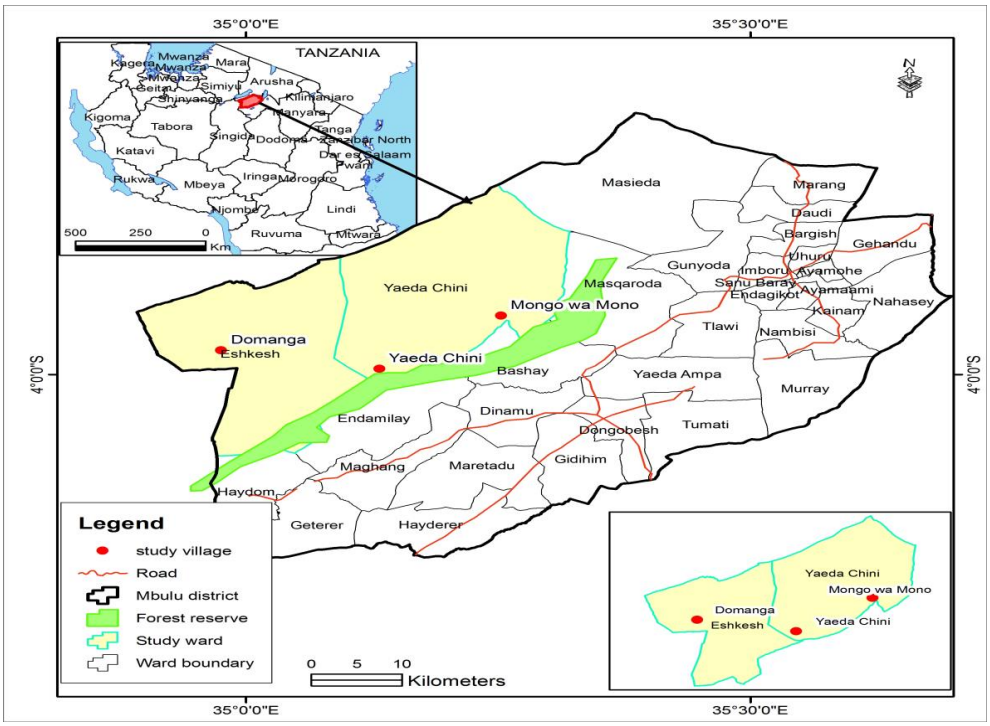

Figure 2: ***Location of the Study Area***

Source: GIS Unit, Department of Geography, UDSM

The studied villages were selected purposively as they were the ones inhabited by the Hadzabe and prone to natural changes. Also, these villages had started practising new livelihood economies apart from foraging activities because, after their land was invaded, the Hadzabe were forced to live in marginal areas that do not support their livelihoods.

2.2 Sample Size

The sample size for this study was drawn from one ethnic group of the Hadzabe scattered into two wards of Eshkesh and Yaeda Chini, inhabited by the Hadzabe community, in Mbulu District. About 303 respondents were chosen purposively from three villages: Domanga from Eshkesh Ward, and Yaeda Chini and Mongo wa Mono from Yaeda Chini ward. Data from the districts was drawn from households in a cross-sectional survey carried out between October and December, 2020. Household's respondents were obtained from the village register found in each studied village. In this case, a household was defined as a group of people who sleep under the same roof and take meals together. Because the study intended to get one ethnic group—the Hadzabe—respondents were picked randomly through the assistance of village leaders by

using the village register obtained from the village offices. Household selection followed random sampling procedures using an official list of households on the studied villages. Because respondents had a problem in communicating either in Kiswahili or English, transcribers from Hadzabe with good Kiswahili speaking skills were used to provide clarification during conversation between researchers and participants on the different themes of the study.

2.3 Data Collection Methods

Several methods were used in collecting data. These methods involved a combination of focus group discussions (FGDs), key informant interviews (KIIs), household survey, community mapping and observation.

2.3.1 Household Survey

Data was collected from 303 houses obtained from the village registers selected purposively from foragers. The study was conducted between October and December, 2020. A total of 303 questionnaires were used to collect data, including both open- and close-ended questions. The data collected using this method included causes of Hadzabe livelihood dynamics, and changes or dynamics taking place recently apart from those of normal experiences. Also collected was information on land use changes and critical challenges facing the Hadzabe as an outcome of the changes. Furthermore, the method focused on data based on availability, accessibility and utilization of natural foods for livelihoods. Lastly, the method focused on the future plans of the Hadzabe as the environment continues to change. Household survey methods were very suitable in this study as a lot of information (data) was collected in a short time through questionnaires. The limitation of the method was that most of the respondents were unable to read and write; as such the researcher had to ask for assistance from interpreters to help such respondents.

2.3.2 Key Informant Interviews

Face-to-face in-depth interviews were conducted with 12 key informants using an interview guide to facilitate the collection of qualitative data on foraging system dynamics and their causes. The key informants were selected purposively using several criteria like education, duration of stay, leadership, and age. These comprised of people who had knowledge on the themes being studied, and included 3 village leaders and 4 elders familiar with the history and environment of the Yaeda Valley for not less than 50 years. Also, the interviews were held with 4 officials from 4 departments of the Mbulu District Council: planning, forest, agriculture, and livestock. Data collected using KIIs focused on the state of livelihood on the changing nature and alternative activities done to replace hunting and gathering. Further, the interviews focused on environmental conservation issues as the nature of the environment continues

to change and food availability, especially of natural foods, becomes scarce. Also, the method was used to collected data on the alternative activities done to subsidize the disappearing natural foods. The KIIs were fruitful to this study for the collection of valid information because participants were free to express their opinion. Moreover, participants involved in the interviews had experiences and additional specific knowledge of their areas. The constraint of this method was that it was time-consuming, although this was unavoidable as respondents took a long time to respond to different matters.

2.3.3 Focus Group Discussion

Three FGDs were held reflecting the topics. In each FGD, there were 8-12 discussants from each village that participated in the study; depending on attendance, motivation and ability to discuss the topic. Discussions lasted between thirty minutes and one hour, depending on motivation of members, and the ability to discuss and give decisions on matters raised. The total number of FGD participants were 30 from all studied villages, including members from different village committees: mainly Hadzabes who were responsible for forest resource management, village environmental committees, and few members who had participated in the designation of land use planning in the Yaeda Valley. The method adopted to collect information was based on the dynamics happening and how they influenced or affected livelihood in the changing nature within the valley, causes of change, and perception on the dynamics in relation to environmental conservation. Further, the FDGs explored future plans of the Hadzabe on livelihood sustainability as the environment continues to change while land shrinkage persists and interferes with foraging. The merit of this method was that a lot of data was collected as participants were free to discuss whatever they thought was relevant to the study. However, in some cases there was group dominance by some members, which prevented other members from presenting their ideas.

2.3.4 Community Mapping

Three satellite images were taken to the villages, each village with its own satellite image. The villages were represented by 5-8 elite persons selected through the assistance of village executive officers. The qualification required to participate in community mapping was that one should have skills in writing and reading, and even in interpreting maps. In the given satellite maps, participants had to observe some features located within their areas and map them. The selected participants were used in community mapping because it was difficult to get other (Hadzabe) participants who could manage to read and at the same time identify features on maps. In the given satellite maps, participants were required to map out areas that had been designated for new economic activities to supplement livelihoods. In most cases, participants were able to identify rivers, forest zones, areas with

gullies, tourist camps, REDD project sites, swamps and water-logged places. Buffer and demarcated areas designated for Hadzabe cultural uses were also easily identified and mapped out. In the designated areas for cultural use, participants managed to identify encroached parts by showing directions or places of origin of encroachers, and stated causes of such encroachments. Participants indicated their awareness of land use change by identifying most parts of land used for foraging that had been converted into other activities like lumbering, charcoal-making and agricultural activities, and which was advancing towards buffer zones of the reserved areas for cultural uses.

2.3.5 Observation

Observation guide kits were prepared and used to observe the main focus of the study: mainly newly established activities to replace foraging such as agricultural fields, livestock keeping, beekeeping and poultry projects. Settlement patterns were also observed to justify transformation from nomadic life to permanent settlements. However, the study was unable to determine livelihood sustainability by using the observation guide kits as there were no surplus food stored; even storage facilities—to ensure food security in terms of availability, storage and utilization—were not found. Results obtained through observation were presented through photographs depicting the real situation from the study area.

3. Results and Discussion

3.1 Hadzabe Foraging Dynamics

During the study, it was revealed that the Hadzabe, through living in the Yaeda Valley, have been exposed to several changes aggravated by different factors. Changes that were reported by respondents of this study included the building of new settlements (24%), changes in food intake system (23%), engaging in agricultural activities, keeping some animal (20%), and the rest as indicated in Figure 3.

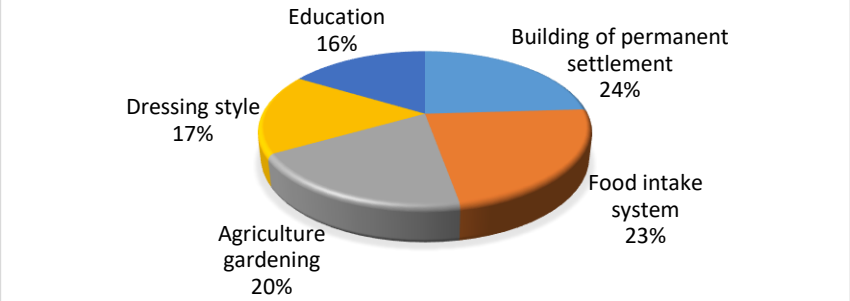

Figure 3: ***Hadzabe Foraging Dynamics***

Source: Field Survey (2020)

About 78% of the respondents who participated in this study positively agreed that changes were a catalyst of learning and development, and that environmental changes had—and continues to—expose them into a new and modern life system. Respondents from both villages said that having a permanent settlement had helped them get services provided by the government and other stakeholders. They mentioned such services to include medical, education and water facilities that were the critical problems in the Yaeda Valley. Furthermore, FGD participants admitted that these changes had transformed them in all aspects of life and exposed them into a new world. Moreover, they mentioned that now they could even contact different people and exchange ideas compared to previous years when they lived in forests engaging in foraging only.

Information obtained through KIIs indicated that changes were seen as important, particularly in the process of withdrawing slowly from being nature-reliant through foraging for livelihoods. The participants said they had started practicing other alternative livelihood economies in which they produce food and meat instead of depending solely on wild food and meat. Because of environmental changes, the Hadzabe are changing too in food intake because natural food is diminishing due to climate change and human-induced activities on their natural settings. The nature and land size used to supply natural foods has been squeezed, encroached and degraded; and thus it was not now enough to support the growing food needs of the population.

Moreover, the study found that Hadzabe children were going to school, unlike in the past. According to Weisdorf (2005), the change in Hadzabe's attitude from being hunter-gatherers to start going to school is marked as a paramount and significant development marking a crucial transformation. Given the significance of education, the government has built a special school that offers free education to Hadzabe children.

3.2 Causes of Hadzabe Foraging Dynamics

Like other world societies subjected to daily changes taking place, the Hadzabe have not been spared such dynamics. The Yaeda Valley, the home of the Hadzabe, has been facing changes that have impacted the Hadzabe's general livelihood. The main cause that has prompted the Hadzabe to change from their traditional life as they previously lived in the Yaeda Valley is associated with the factors indicated in Figure 3. The study findings reveal that most of the changes have been contributed by tourism development (24%), change in climate (22%), demographic change as population has increased in the valley 21%, and other factors as indicated in Figure 4.

In general, the mentioned causes that have contributed to Hadzabe foraging dynamics are considered to be the pioneers of the change from a traditional life system to a modern one, though it is taking place slowly.

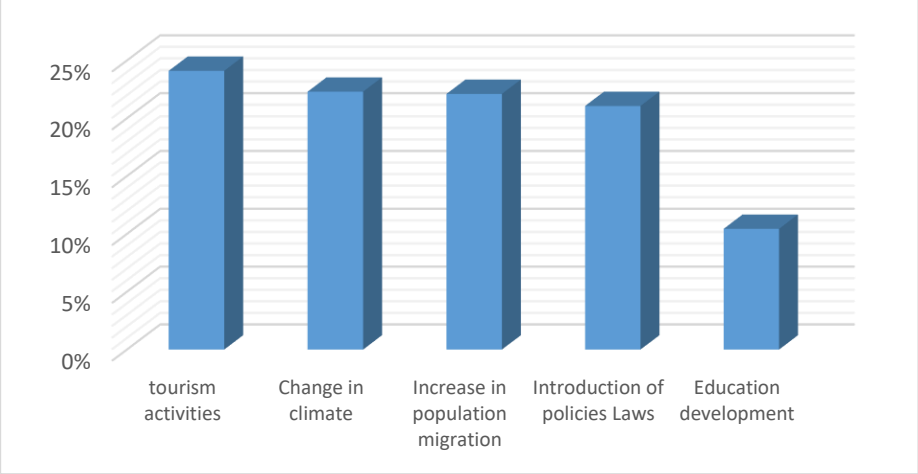

Figure 4: ***Causes of Hadzabe's Foraging System Dynamics***
Source: Field Survey (2020)

The study findings indicate that there has been development of tourism as the valley has a lot of attractions—mainly wild animals, forests, and the topography of the Yaeda Valley—which is surrounded by steep slopes and hills that act as the central point attracting tourists to visit the area. Furthermore, the way the Hadzabe live—their forms of culture of hunting and gathering—has played a vital role in the development of tourism; and has helped to divert most Hadzabe youths from being hunter-gatherers to becoming tourist guides and porters. The growth of tourism in the valley has altered the means of earning livelihood prompted by the changing nature of climate in the Yaeda Valley, and the Hadzabe community in particular. These findings are also supported by Zahabu and Jambiya (2008) who opined that the development of cultural tourism in Hadzabe around Eyasi Basin brought advantages in their livelihoods, and that there have been food supplements through tourism incentives.

Climate change and its associated impacts, particularly in forest resources and water catchments, provide a hectic lifestyle to the Hadzabe. Forests, which are used as the core of natural food provision to the Hadzabe, have been affected as some of fruits and root tubers trees have died or disappeared, as reported in the interviews held throughout the studied villages. Wild animals that have been living in nearby forests have shifted or gone away because, due to climate change, the Yaeda Valley can no longer offer enough wild meat or grass to feed on. Increased migration—that has led to population explosion in the Yaeda Valley—has brought about land grievances as most of the immigrants have been grabbing land that was free to the Hadzabe for hunting and food gathering. Because of population increase, there has been encroachments on land even designated for cultural use as people seek for more places for livestock keeping,

fodder, agriculture and areas for investment. All these have caused fertile land to degrade, forcing the Hadzabe to move on to marginal, shrunk, and squeezed land. As a result, they have had to opt for other means of livelihood to ensure succession in their generations.

Marlowe (2010) acknowledges that education has changed the Hadzabe tremendously. As of recent, free education has exposed school-going Hadzabe children to change who, as they acquire more knowledge, disseminate this knowledge to their parents, hence scaling out changes: they are moving from their old style life to a more modern life as they continue to intermingle with other communities and adopt other life styles. As it was reported by the Mbulu District Planning Officer in an interview, it had been difficult to sit and discuss together with the Hadzabe various issues facing them as they lived in the forest. Education has helped bring them together as they now live in permanent settlements, with modern and improved houses.

3.3 State of Livelihood of the Hadzabe in the Yaeda Valley

Food security is one of the essential variables that ensure livelihood sustainability: so, food should be consistently available or within an individual's reach. To the Hadzabe, the most common food resources—apart from animals and plants—are wild meat, root tubers, honey and edible fruits, especially berries. Findings clearly indicate that food resources and supply are diminishing in relation to the number of consumers and the corresponding shrinking of the land. In the study, respondents were asked to state if at all livelihood sources were sustainable in terms of food availability and accessibility. Table 1 presents their responses.

Table 1: The State of Food Supply for Livelihood

Response on Livelihood and Natural Food Supply	No. of Responses	Frequency (%)
Enough natural food supply for livelihood	07	02.3
Moderate natural food supply for livelihood	87	28.7
Less natural food supply for livelihood	189	62.3
No natural food supply for livelihood	20	06.6
Total	**303**	**100**

Source: Field Survey, 2020

The findings presented in Table 1 indicate that there has been food crisis in Hadzabe, and that land for food production as a major component of livelihood continue to be scarce. During the field study, about 68.9% of all respondents indicated to have a big crisis in food availability and supply. In the discussions, members noted the decrease of natural food obtained from the forests because of human activities, as well as climate change and imposed laws restricting free

access to forest resources. The 28.7% of respondents who reported to have enough natural food supply were youths who were still energetic to walk long distances into the deeper outskirts of the forest from their residence. It was suggested in the study by research participants that as the nature of the environment continues to change, with unpredictable climate, food and water—which are the main problems devastating the Hadzabe—should be given priority by both government and other stakeholders. The Hadzabe need to be granted food aid and wells for water supply, otherwise their livelihood sustainability is in danger:

> *We do not have much of the wild foods left in this area. If you need such foods, you have to go very far and spend a lot of time to find them. We cannot predict our future life as food supplies are diminishing, although we are trying to practise agriculture. This is still a challenge as we depend on rain-fed crops. We are requesting our government and other stakeholders to give us food and dig water wells for us, and establish water points* (Focus Group Discussion, 2020).

Generally, from the study findings, the Hadzabe are facing big challenges in sustaining their livelihood, and many ecological constraints assumed to favour reliance on foraging for food. The principal factors, as stated earlier, are recurring drought, agricultural expansion, overgrazing and increased human settlements.

3.4 Transformations to Alternative Activities for Livelihood in Hadzabe

With the ecological constraints affecting natural food availability and supply in the Yaeda Valley, the Hadzabe have transformed into new means of production to ensure they continue to survive despite the changing nature of the environment. The community has accepted changes and has started to practise other livelihood economies to sustain life and livelihood as the environment continues to change. These transformed activities include small-scale agriculture, business, tourism activities, security and vocational activities (mainly carpentry and masonry). These new activities are indicated in Figure 5, according to their importance as mentioned by respondents during data collection.

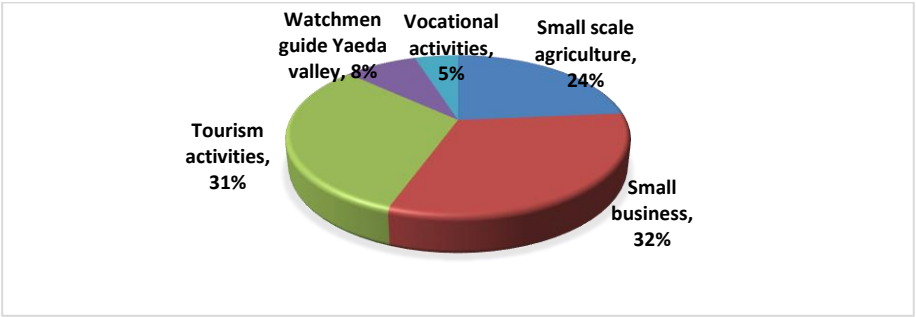

Figure 5: ***Recent Activities Performed by the Hadzabe***
Source: Field survey, 2020

In other words, it was informed and stated during the interviews and FGDs that these activities are also used as ways of conserving the environment. Since the Hadzabe turned into other alternative ways of sustaining livelihood, forest exploitation has been reduced, leaving it to regenerate and develop its ecology. Forest products, wildlife and the general ecology and nature continue to regenerate as overdependence and overexploitation is reduced due to people now focussing on new means of survival.

Study participants mentioned engagement in small businesses (32%) as the most preferred activity in solving challenges related to livelihood. The Hadzabe, as people of culture, have been trading using their own cultural tools: by exchanging with migrants and even selling their cultural handcraft products to people visiting them in the Yaeda Valley. They exchange honey and other traditional commodities to the Sukuma and Nyiramba, who in turn provide them with food—mainly maize or meat especially during the hot season. Small shops—famously known as kiosks—were found in Domanga and Mongo wa Mono, although they had very few items on the shelves. Food products in these small shops were not available.

Tourism was also stated as a new activity that is carried out in the valley, and very supportive in livelihood as it generates a lot of income. In the study, 31% of all respondents mentioned tourism as a good and simple way of sustaining livelihood due to the fact that the area is on the root circuit and northern root corridor. Tourism suits youths more, and even the respondents mentioned tourism to benefit more those aged between 25 and 35 years. Cultural tourisms, as practised by the Hadzabe within their vicinity, has assisted them in supporting livelihood needs. They get money by showing traditional dancing, hunting and gathering techniques, and by making and selling cultural products. The Dorobo safari tented camp in the valley was reported to activate and catalyse tourism development among the youth, who are employed as tour guides, watchmen in the camp, as well as drivers for those with driving licenses.

The study findings revealed that agriculture (24%) was another option taken by the Hadzabe as a strategy to solve livelihood dynamics. The respondents informed that they cultivated cereals—mainly millet, sorghum, maize and sweet potatoes—on their small plots found around their homesteads. Most of the crops grown are perennial and rain-fed crops, adopting what immigrants are doing. To the Hadzabe, agriculture is a tough job as it is not their culture. Weather changes, planting and weeding, harvesting and storage facilities were found to be very tedious compared to foraging. A study by Pryor (2004) indicated that foragers' transformation to agricultural activities have saved them from famine and hunger as this has helped supplement more food compared to what they earn from nature.

Other activities performed by the Hadzabe to realize livelihood needs include working as watchmen and on vocational jobs. The study findings indicate that about 71% of the youths were subjected to change from being hunter-gatherers to thinking about new ways of life. Being professionals in hunting and gathering using traditional weapons has, to some extent, made them qualify for watchmen

jobs in and out of the Yaeda Valley. Most of the youths were employed in companies locate in Haydom, Dongobesh and Mbulu towns. Despite their skills in working as watchmen using traditional weapons, they still complain about low pay that does not suffice their livelihood needs. They further reported that being Hadzabe, they are underrated and demoralized by their bosses, hence they sometime leave jobs without being paid.

Despite the establishment of vocational activities, most of the youth who attained this knowledge were constrained by the lack of capital to invest in buying the tools needed. However, those with masonry skills used them occasionally in building houses both in and out of Yaeda. Generally, the study findings reveal that engaging in activities that are non-traditional, is a cultural shock to the local people. Working as watchmen is considered degrading because it involves spending sleepless nights guarding a fellow man's house while he is inside sleeping. Again, building or construction of houses is done by women in the culture of the Hadzabe.

3.5 Land Use Conversions in the Yaeda Valley

With the current global changes, it is also obvious that the historical land used by foragers for hunting and gathering has changed and been reduced not only in terms of its size, but also in resource supply. As spatial temporal movements and natural population increase, the carrying capacity of land and threshold have been under pressure as the increasing number of people need to survive by exploiting natural resources.

In the Yaeda Valley, like in other world forage homelands, land has been scarce as people move into Hadzabe residences accelerating land conversion, encroachment and general degradation. The UCRT (2010) indicate that changes in land use as a new aspect to the Hadzabe has triggered and altered foraging activities. Through observation from all the studied villages, changes in land cover could be noticed, especially the reduction of vegetation since most parts of the land have been converted into settlements, agricultural and livestock keeping areas, tourism campsites, plantations, and some into reserves (Photo 1: A, B, C and D).

A: Prepared Farm for Planting

B: Settlement nearby Reserved Area

C: Harvested Millet farm

D: Reserved Area for Cultural Uses

Figure 6: ***Changes in Land Cover and Use***
Source: Field Survey (2020)

Sixty-four percent of the respondents in the studied villages reported that land use change in the Yaeda Valley was an outcome of immigrants and poor administration that allow people to move into the valley without control. Once immigrants arrive in the valley, the first thing they do is to grab land: either by bribing local leaders or invading and taking large tracts. Similar results have been reported by Mollel (2014) and Fred (2014), who show concern regarding the shrinking of land that has been encroached by intruders engaging in agriculture, charcoal-making, lumbering, and grazing.

The rate of land conversion in the studied village varied from one place to another. The state of land conversion differed due to the rate of migration, population growth, investors on land, available uncultivated (virgin) land, reachability and connectivity of the area -- e.g., Mongo wa Mono village—as well as the presence of other economic activities like fishing and tourism. The study findings indicate that land conversion was more serious in Mongo wa Mono village as its population was larger than in other parts. It was noticed that because of land grievances and conflicts, some Hadzabe had moved out to Ngorongoro and Karatu searching for more suitable living places as most of their earlier land had been turned into hunting blocks or reserves owned by the government through the Tanzania National Parks (TANAPA).

During the interviews some elders reported that, to the Hadzabe, it is evil and unethical to destroy anything that is a source of food. On the given satellite maps for each village studied, it is indicated that change in vegetation cover took place on buffer zones approaching Hadzabe reserved areas and normal settlements. The encroached areas introduced new economic activities that changed land and its topography, as indicated in the Figures 4A, B and C.

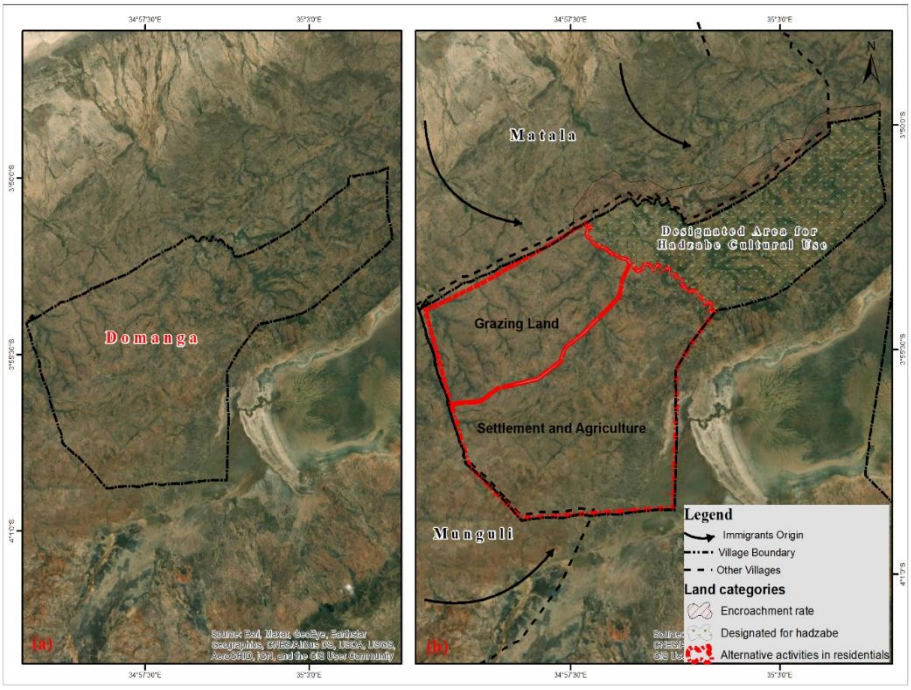

Figure 4A: *Land Conversion from Hunting to Settlement and Grazing at Domanga Village*

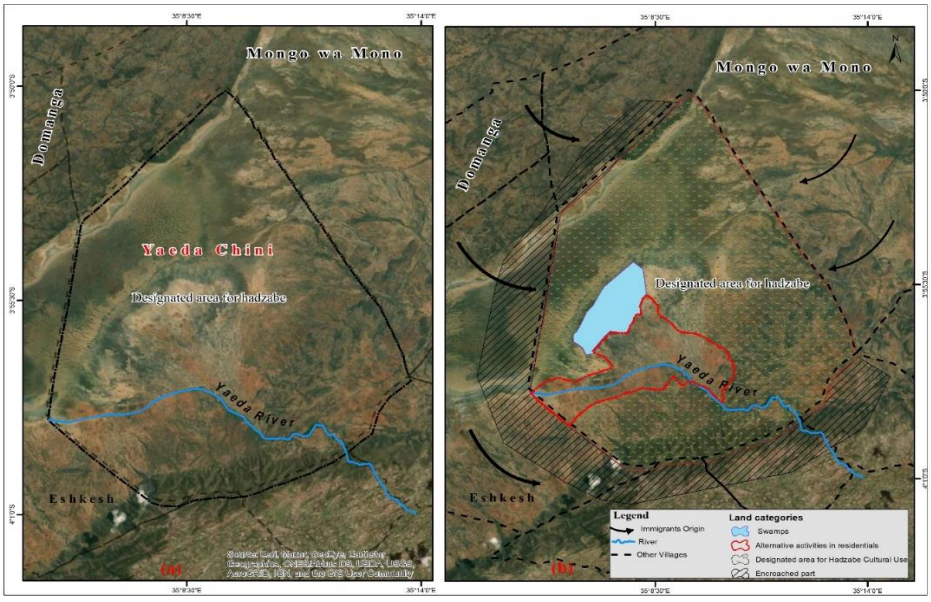

Figure 4B: *Land Converted to Agriculture, Encroachment Development in Yaeda Chini Village*

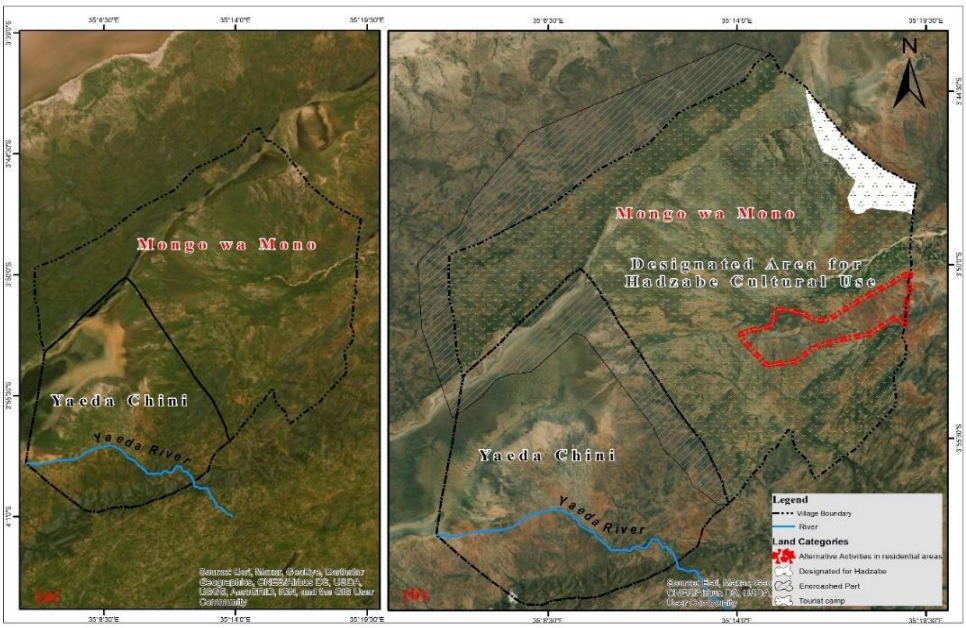

Figure 4C: ***Established Agriculture, Settlement, Campsites, Hunting Blocks at Mongo Village***
Source: Field survey (2020**)**

3.6 The Future of Hadzabe's Livelihood Sustainability

About 84% of the study participants were concerned with the current livelihood situation in the Yaeda Valley. They even failed to predict their future in relation to the availability of food and natural resources, especially forests; as well as weather and climate conditions. The impacts of these phenomena affect flora and fauna that are used as the main sources of livelihood. During data collection, about 71% of the FGD members and key informants complained that all the suffering they were going through was a result of uncontrolled immigration, which continue to take place unabated up to the present. They acknowledged the fact that there have been some efforts made by the Mbulu District Council to control the movement of people into Hadzabe land, but some local leaders have been bribed to undermine the effort. Nepotism has also played a part.

During discussion with the FGD members throughout the studied villages, most of the youth said they preferred to engage in small business and beekeeping, while the rest mentioned activities like agriculture, tourism, carpentry and masonry. Some wanted to be employed as soldiers, as indicated in Table 2.

Table 2: Optional Activities by FGD Members as Alternatives for Livelihood

Activity mentioned	No of respondents	Frequency (%)
Small scale business	12	29.2
Beekeeping project	09	21.9
Agriculture	07	17.7
Tourism (tour guides, operators, drivers, watchmen)	05	12.1
Formal employment (police, soldiers, teachers)	04	09.7
Carpentry and Masonry	04	09.7
Total	**41**	**100**

Note: Some activities were mentioned more than once across studied villages

Source: Field survey, 2020

The beekeeping project, according to Four Corner Cultural Programme (4CCP) director (an NGO supporting the Hadzabe in different livelihood projects, and owned by the Haydom Lutheran Hospital in Mbulu) was being handled largely by women. Moreover, the tourism sector in Hadzabe is an emerging activity, therefore the majority of the youth are yet to familiarize themselves with this sector.

4. Conclusion and Recommendations

The study has revealed that there are transformations in the Hadzabe community on their livelihood system and general change from hunting and gathering to other economic activities. The transformations in the area are due to a combination of several factors, including contact through migration. Also, climate change has altered the environment, especially forests that make Hadzabe's habitat and source of food. Further, policies, acts and laws imposed on resource-use, governance and education have had positive contributions on the changes being experienced. The impact of these have led to transformations and better living conditions by the Hadzabe starting permanent settlements, and practicing agriculture to ensure food sustainability. Also, Hadzabe children are now going to school to acquire knowledge and skills that will help in transforming their community and environment.

Despite the positive changes found in this society, the Hadzabe face clean water shortage, insufficient natural food, land encroachment problems associated with land-grabbing, ownership and uninformed land use planning. Therefore, immediate solutions from stakeholders and other development partners to solve these problems are needed. The study concludes and recommends that there are changes being aggravated by several factors; hence, these changes need to be disseminated and advocated positively to expose the Hadzabe to the current state of science and technology, and enable them use the available resources sustainably for their future. They should be made aware of the changing environment and how to develop food-storage techniques for the future, especially during times of adverse conditions.

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