



**The Impact of Refugee Camp Settlement on Host Community
Environmental Sustainability: Case of Bambasi Refugee Camp
Benishangul Gumuz Regional State.**

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Declaration

I hereby, the undersign fully confident to declared this thesis research work was my original work, and all the sources and materials used to write this thesis research have been properly indicated and acknowledged with completed reference.

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Final approval of this thesis research was for final graduate research thesis, we certified that we have read and evaluated the thesis research prepared by **Ahmed Almajub Ajaki** entitled “**The Impact of Refugee Camp Settlement on Host Community Environmental Sustainability: Case of Bambasi Refugee Camp Benishangul Gumuz Regional State**”. We as the committee, certified that the thesis work is original and recommended to be accepted for final graduate requirements for the fulfillment of the degree of Master of Arts in Environment and Sustainable Development.

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List of acronyms

ARRA:	Administration of Refugee and Return Affairs
CRRF:	Comprehensive Refugee Response Framework
EO:	Earth Observation
ERDAS:	Earth Resource Data Analysis System
ETM:	Enhanced Thematic Mapper Plus
FAO:	Food and Agriculture Organization of the United Nations
GE:	Google Earth
GIS:	Geographical Information System
GPA:	Global Plan of Action
IDP:	Internally Displaced People
IOM:	International Organization for Migration
KML:	Keyhole Markup Language
LULC:	Land Use Land Cover
NGO:	Non-Government Organization
OAU:	Organization of Africa Union
OLI:	Operational Land Imager
SPSS:	Statistical Package for the Social Sciences
SRS:	Self Reliance Strategy
UN:	United Nation
UNCED:	United Nation Culture Education and Development
UNHCR:	United Nation Higher Commission for Refuge
USGS:	United States Geological Survey
WFP:	World Food Program

***The Impact of Refugee Camp Settlement on Host Community Environmental Sustainability:
Case of Bambasi Refugee Camp Benishangul Gumuz Regional State, Ethiopia***

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Abstract

Ethiopia has a long-standing history of hosting refugees. The camp settlement was mostly settled in an area with high environmental sensitivity, poor pre-existing developmental infrastructure, and a high level of poverty. The objective of this study was to assess the impacts of refugee camp settlement on the host community environment sustainability in the Bambasi refugee camp. The challenge and constraints for environmental sustainability in the refugee camps were identified in the reviewed literature. The study has used both qualitative and quantitative research approach with mixed explanatory methods to understand the impact and relationships between dependent and independent variables through research. Particularly, the research design combines the household survey of socio-economic data analysis from target populations with the observation of satellite imagery data for the classification of land use land cover change detection from the year 2005 to 2020 in the study environment. The study found out that the humanitarian response and its performance was very poor and not satisfied the basic demand of refugee, the refugee camp infrastructure was very low such as poor shelter condition and poor supply of alternative energy source, poor economy condition pushes refugees to highly depend on the surrounding environment. The establishment of the Bambasi refugee camp has increased the population in the study area and became a burden on the natural environmental resource around the host community. Furthermore, the satellite imager of the LULC result indicated that the agricultural land class use increases by 21% from 1594.6 hectares (48%) in 2005 to 2307.8 hectares (69%) in 2020. Conversely, the LULC change detection finding confirmed that the forest land class has decreased from 1110.4 hectares (33%) in 2005 to 171.6 hectares (5%) in 2020 due to an increase in the population of the refugee camp area. It was concluded that in the long -run the establishment of refugee camp settlement has put the host community's environmental sustainability in danger. Finally, the intervention needs to be recommended for the humanitarian agency to develop alternative energy source, infrastructure, and active environmental planning and management project that should include the indigenous knowledge of the community and minimizing dependency of both refugee and host community on the surrounding environmental resource.

KEYWORDS: *Environmental sustainability, Impact, Economy condition, Infrastructure, Refugee camp, LULC Change detection.*

CHAPTER ONE: INTRODUCTION

1.1. Background of study

The IDPs and refugees are among the most pressing issues for environmental impact in the world. According to, most recent report there are about 70.8 million forcibly displaced people worldwide and more than 25.9 million refugees were recorded (UNHCR, 2019). Refugees are a person forced to leave their country of origin because of different factors. The multiple factors that contribute to the influx of refugees are war or conflict, persecution, and other natural disasters. As far as known, Ethiopia has a long history in host multiple refugees' influx with significant growth in the number of about 964,798 registered refugees and asylum seekers (UNHCR, 2020). Currently, Ethiopia has about 26 refugee camps that host the sixth-largest refugee population in the world and the second-largest refugee population in Sub-Saharan Africa, after Uganda (Abebe, 2018).

The origins of refugee camps are more difficult to trace but it is taken as an organized settlement for relief assistant. Even though the refugee settlement in the camp fully depends on different relief assistants, the prolonged presence of refugees in the camp and donors' felt to provide adequate refugee assistant aid has caused a high impact on the host community's natural environment. The refugee camp has serious disruption on natural resources resulting in deforestation and land degradation. Therefore, Refugees are often seen as an economic, social, political, or environmental burden or as a threat to host societies and states (Salmio, 2009).

Consequently, the major environmental problems in Ethiopia were declines in soil fertility and water quality, loss of biodiversity, deforestation, and soil erosion (Cheever & Howell, 2011). The increases in demand for using the natural forest for wood fuel, shelter construction, and charcoal by refugees are identified as the main drivers for deforestation around refugee camps and it is a significant and real critical environmental problem resulted in soil erosion and natural resource degradation (FAO, 2018).

Generally, to understand the impact of a refugee camp; Environment can be defined as "a set of physical, chemical and biological aspects and social factors that impact, directly or indirectly, upon living things and human activities in the short and long term". Refugees are a person with a

problem in need of humanitarian support for basic needs and protection. Therefore, UNHCR as a main coordinating agency for global refugees issue assistance, it is important to address the environmental burden of a refugee camp on the local community in a sustainable manner which ensures the current environmental impacts are mitigated and not compromise the need of future generations.

1.2. Statement of problems

The environmental impact of refugee and IDPs are the main challenge facing the world today. The sudden rise of population densities in refugee-hosting environments can adversely affect the natural environment and development activities of host countries. Particularly, refugees living in the confined area have a negative environment including deforestation; de vegetation; erosion; degradation and pollution of water sources and catchment areas; illegal fishing; and overgrazing (Miller, 2018). The major factors which challenged and influenced the refugee camp and host community environment have direct and indirect relation with economic, social, political, and demographical characteristics. Particularly, the factors that mitigated refugees' environmental impact have also positively influenced the successful host society's environmental sustainability (Jacobsen, 1997a).

The capacity of humanitarian organizations in provided protection and relief assistance to fulfill the refugee demand-based assistance was certainly a cause for serious concern. The issues of environmental degradation were theoretically questionable, and there was a need to examine the more complex interrelationships between environmental impact drives and change, rather than focusing on simple cause and effect (Black, 2014). According to the most recent data, Ethiopia has about 964,798 refugees spread across 26 refugee camps, urban areas, and settlement areas. In Ethiopia, less than 8% of refugee households have access to improved cooking energy, and 54% of shelter gaps were identified (UNHCR, 2020). Despite the different approaches of humanitarian and NGOs response to mitigate the environmental impact around refugee camp, still, a refugee in Ethiopia faces the issue of a renewable and sustainable source of energy supply. As a consequence, the inadequate supply of energy needs for cooking and lack of shelter construction materials in the refugee camp was the most serious environmental impact drivers which significantly contribute to forest degradation and deforestation in the Bambasi refugee camp and surrounding area.

The refugee settlement patterns, existing socio-economic conditions, and the relationship between the host and the refugees can determine the nature of the impact on the host community. It has important to understand the environmental impact caused by ongoing land degradation and deforestation in most areas affected by refugee settlements due to competition over natural resources in the surrounding refugee camp area.

Even though most scholars studied environmental sustainability and refugee impacts, but, not elaborated on the refugee basic demands and their fulfillments at camp and the adverse effect on the host community and their environment. While, the researcher identified these as broad concept gaps during the literature, articles, and other related studied researches review.

Consequently, the social interaction of the refugee community with the host community and their interdependence of one to another, the culture of the host community and the way of managing and other constraints or challenges that affects the environmental sustainability and the administration around the research study area, all these were identified as a research gap. Finally, the study would attempt to fill the gap based on the identified broad concept and research gaps by focusing on the investigation of the impact of refugee camp settlement on host community environmental sustainability as the main initiated central theme of these research studied.

1.3. Objectives of the study

The study was aimed to address the following general and specific research objectives.

1.3.1. General objective

The general objective was to assess the impacts of refugee camp settlement on the host community environment sustainability in the Bambasi refugee camp.

1.3.2. Specific objectives

This research proposal specifically aimed:

- To assess the major refugee camp settlements' basic demand fulfillments and its impact on the environment.
- To assess the impacts of the refugee camp settlements on the host community socio-economy and the surrounding environment.

- To assess Land Use Land Cover (LULC) change information of study area in specific to environmental perspectives.

1.4. Research questions

Within the scope of the topic, the study has addressed the following research questions:

- What kind of environmental impacts are emerged due to refugee camps?
- What was the socio-economic status of the study area?
- What was the status of the environmental management practice of the study area?
- In what way the refugee community basic demand fulfilled?
- What was the environment looked like before and after refugees arrived?

1.5. Significance of the study

The study has significant importance in raising awareness of refugees, host communities, government, and other concerned body want to understand the environmental impact and major impact drives related to refugee camp settlement in the host community environment. Moreover, the study also contributes by developing new knowledge about the influence of refugees on the host environment by linked the basic demand fulfillment of relief assistance with the socioeconomic condition to significantly understand the area of improvement to develop the effective and sustainable intervention. Also, the study finding contributed to any government and humanitarian organization whose working in the area of environmental-related planning and implementation to develop healthy communities, the wise use of environmental resources, and to improve socio-economic stability.

Furthermore, the study helped as a field of further research and input action to refugees and host communities to reduce the impact of refugees on the host community environment by academicians, policymaker, and implementers at national, regional, and international actors level.

1.6. Scope and limitation of the study

The research was more specific and the desired scope of the study area was limited to the assessment of the impact of refugee camp settlement on host community environmental sustainability around the Bambasi refugee camp at Bambasi Woreda of Benishangul Gumuz Regional State. The study assessed the major status of refugee camp settlements and its impact

on the environment and the unit of analysis was limited to assess the refugee basic demand condition, infrastructure, environmental protection, socio-economy condition, and its impact on principles of environmental sustainability.

The study has sampling limitations. The first limitation was the study samples were limited to the host community living within a 10-kilometer square radius of the Bambasi refugee camp. The second limitation was sampling the study used a purposively selected number of refugee respondents due to homogeneous characteristics in living conditions, socio-economy condition, and their culture which were managed and administered by the researcher to generalized the study results.

1.7. Organization of the study

The thesis research has been organized into five different chapters. Chapter one begins with a brief introductory background of the topic, statement of the research problem, research question, and objectives, and the justification of the study. Chapter two related literature reviews. Chapter three outlines research methodology and materials applied in field research, it was beginning with the description of the study area, research design, sampling techniques and producer, data collection methods, and data analysis methods. Chapter four about results and discussion of major research findings. The last chapter five was the conclusion of the major findings of the objectives of the study and the recommendation of the researcher as a possible point of action that should be undertaken to address the problems.

CHAPTER TWO: RELATED LITERATURE REVIEW

The literature reviewed was organized into two parts. The first part covers the theory of refugees and refugee camp, trend, and the response of refugees at the global and national levels. The second part reviews literature related to environmental impact in refugee camps using the different methodologies of study and its implication for refugees and their host community environment.

Even though, it was a new issue for this research; background history of refugees and different research done related to refugees, refugee host environment, refugee integration, and refugee camp-related study was reviewed. Particularly, the understanding of push factors in the refugee influx the Kunz's theory divides the refugees into three distinct groups based on attitude and displacement factors. First, the majority identified refugees are those who have left their home areas because of active or latent discrimination against the group to which they belong. Second, events related refugees are those who feel irreconcilably alienated from their fellow citizens. Third, self-alienated refugees are those who feel alienated from their society not by any active policy of that society, but rather by some personal philosophy.

The refugee-related theoretical knowledge was very important in providing reliable information for a better understanding of the research gap and problem of study. According to, the most recent research literature on the impact of refugees on the host community's environment has been guided and inspired by the Maltus population theory. The sudden increases in population growth due to large numbers of refugee's influx have affected the natural resources of the host country community's environment. Apparently, (Black, 2014) suggested a different view that population growth rather has a positive effect on agriculture activities which results in a socio-economic change of the host community or the country in general. Therefore, this study will focus on selective review and analysis of existing theories and concepts that give emphasizes to both the negative and positive impact of refugees on the host community environment.

2.1. The world refugee situation

The empirical analysis of the total world refugee situation and its changes over time must be mainly based on UNHCR official statistics, which in turn are primarily derived from information collected by the High Commissioner from individual states. The current issue of the displaced population across the world has some critical gaps in institutional mandates. Particularly, the

entire groups of forced migrants like internally displaced persons are neglected and left unprotected and often unassisted under UNHCR institutional mandate rather than publishing an annual trend report.

Globally, the refugee protection was guided by the 1951 Convention relating to the Status of Refugees and its 1967 Protocol was the core of the international protection system, complemented by regional treaties and declarations that also address the rights of refugees. But international refugee law does not operate in isolation. It is best understood in conjunction with international human rights law, starting with the 1948 Universal Declaration of Human Rights, and with international humanitarian law (Nicholson & Kumin, 2017).

According to, recent UNHCR report “By the end of 2019 there are about 70.8 million displaced populations were forcibly displaced as a result of persecution, conflict, generalized violence or human rights violations. Out of 70.8 million, 25.9 million persons were refugees across the world, 41.3 million Internally Displaced Persons, and 3.5 million asylum seekers”(UNHCR, 2019). Developing regions hosted 84 percent of the world’s refugees under the UNHCR mandate. According to UNHCR 2015, global trends report on average 24 people were forced to flee each minute in 2015, four times more than a decade earlier, when six people fled every 60 seconds. In the year 2018, about 13.6 million new displacements equated to an average rate of 37,000 people being newly displaced every day (UNHCR, 2019). The majority of the displaced population about 84%, are hosted in developing countries (i.e. low and middle-income countries), some of them among the poorest countries in the world.

Large world refugee populations are concentrated in some of the world's ecologically most vulnerable areas, and they are capable of contributing to the environmental degradation and the deterioration of living conditions in the host community environment (Hakovirta, 1993). Many pieces of literature show that the chances of refugees returning home seem to be very poor indeed in many of the open refugee situations that have emerged since the late 1970s.

According to, (Elise et al., 2008) the success and failures of humanitarian response were judged primarily in terms of technical standard of aid delivery and fulfillment of the required basic need for refugees and threatened host community.

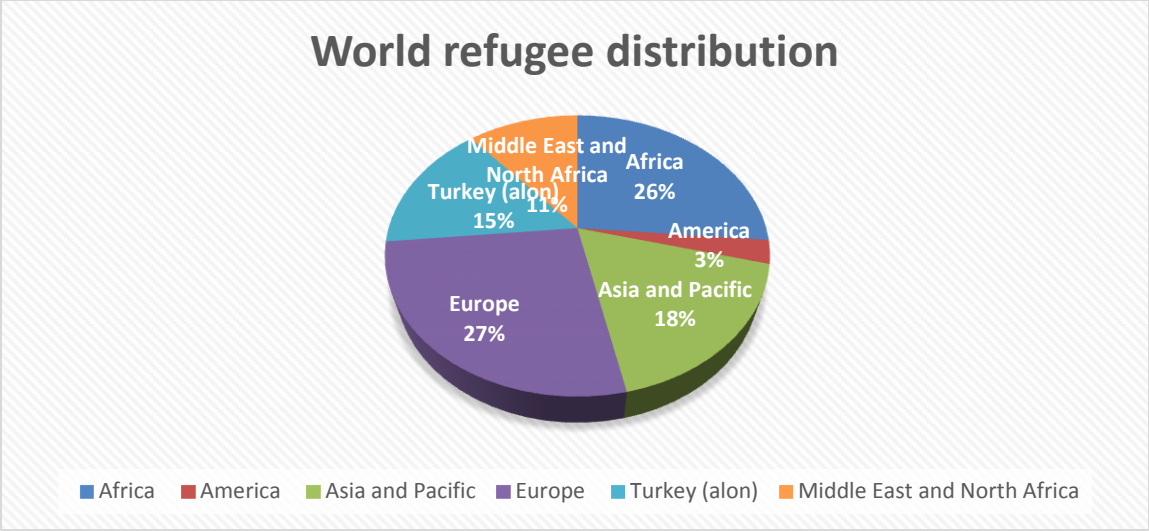


Figure 1: World refugee population distribution (UNHCR, 2018)

2.2. The refugee situation in Ethiopia

Ethiopia has a long-standing history of hosting refugees. The overall coordination of the refugee protection and response system in Ethiopia is led by ARRA, while operational response coordination is UNHCR, supported by UN agencies, partners, and donors. The country maintains an open-door policy for refugee inflows into the country and allows humanitarian access and protection to those seeking asylum on its territory. In 2004, a national Refugee Proclamation was enacted based on the 1951 Convention relating to the Status of Refugees; and its 1967 Protocol; and the 1969 OAU Convention (FDRE, 2004).

Refugee protection in the country was provided within the framework of these international and national refugee laws as well as the core international human rights treaties that have been ratified by the country. The continued insecurity around neighboring states country has resulted in sustained refugee movements, either directly as a result of internal conflict and human rights abuses or as a result of conflict-related to civil war and drought due to food insecurity.

The majority of refugees in Ethiopia have primarily settled in a region characterized as ‘emerging regions’ that have the poor pre-existing developmental infrastructure and a high level of poverty (Yuan, 2008). Although Ethiopia grants prima facie recognition to refugees coming from most of its neighboring countries, it has made qualified reservations to some articles of the 1951 Refugee Convention, including the right to education and access to wage-earning employment, while local integration was unthinkable for the passed some decad.

Later, globally the UN changed refugee and migrants policy since the pledges were made 20 September 2016 Leaders' Summit for Refugees and Migrants at the United Nations General Assembly in New York to improve the protection of refugees and share burden and responsibility (UN, 2016).

Besides that, Ethiopia pledged to expand the out of camp policy to all refugees as defined by his country's laws and policy documents and in line with the above UN refugee and migration policy declaration. The policy changes were reflected in the Comprehensive Refugee Response Strategy, which envisages enhancing the self-reliance of refugees and host communities through socio-economic integration and facilitating voluntary repatriation and resettlement opportunities (FDRE, 2019).

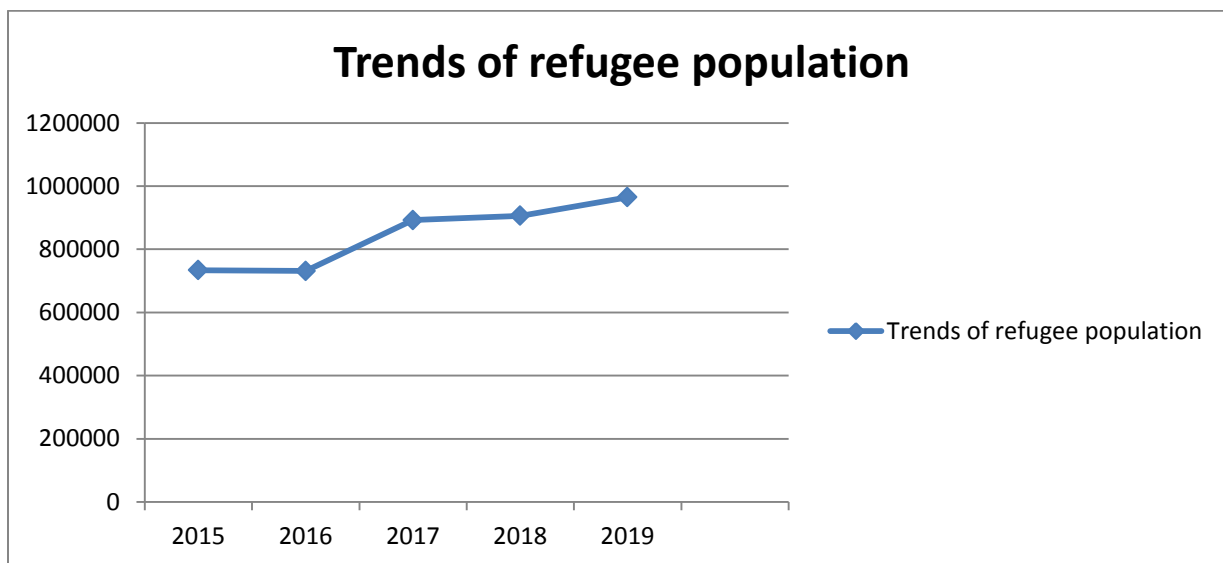


Figure 2: Ethiopia refugee population trends from 2015 to 2019 (Source: UNHCR)

2.3. The environmental protection in Ethiopia

The experiences and impact of continuous refugee's influx presented multiple environmental challenges to the host community around the refugee camp. While, the Ethiopia constitution article 44 stated that everyone has the right to live in a clean and healthy environment and the government was made every effort to provide those clean environments (FDRE, 1995). Even though, environmental policy Ethiopia provided basic and comprehensive principles and guidelines for environmental protection and management, the concern for environmental

degradation in Ethiopia has been growing in recent years (Cheever & Howell, 2011). The Constitution also holds the government and the people of Ethiopia responsible for the conservation of natural resources and the maintenance of ecological balances. Several proclamations and supporting regulations were made that contain provisions for the protection and management of the environment which reflect the principles of the Constitution.

The concern for environmental impact was a relatively new issue area for UNHCR's and global agenda in general. Formerly, until the 1990s, the UNHCR did not have any comprehensive long-term policy on the environment (Salmio, 2009). The issue of the environment became the UN agenda for the international and refugee regime's later since UNCED in Rio de Janeiro in 1992.

However, some literature confirmed that environmental conflicts can raise around a refugee camp area between refugees, the host community, and government and relief agencies. UNHCR (2001), the cause of conflict can be complex and effective responses are not directly the environmental intervention. In the case of Ethiopia, the local communities and the local government officials expected the UNHCR to support both community projects and refugee-specific projects. Moreover, a study done in Guinea identified that any initiative and efforts to address environmental impacts in refugee-hosting areas are should be carried out in an integrated socio-economic and comprehensive environmental planning manner.

2.4. Impact of refugees camp environment

The sudden and large-scale refugee population movements can adversely affect the environment of host countries (UNHCR, 2001). UNHCR was globally mandated to coordinate refugee protection and assistance, but not have development projects in host communities area to reduce the impact on the environment. Therefore, the environmental impact has created an enormous challenge for agencies working with refugees. In reality, the refugee burden on the host country has challenged the continued willingness of host governments to provide asylum, while they wait for permanent settlements (Bernstein, 2018). Significantly, in the year 1994 UNDP field mission group identified the serious and the potential of environmental impacts of Rwandan in zaire refugees and submitted the proposal to various donors for possible interventions (Biswas & Quiroz, 1994).

The natural environment were affected by an increase in refugee and migration pressure as main drivers factors which has cause and effect relationship. Many works of literature reviewed reflected and given greater emphasis on environmental change causing migration while migration or refugees' impact on the environment was little attention was given globally (Hugo, 2008). As consequence, environmental impact declined agricultural productivity or fisheries' productivity, environmental change has affected economic factors such as income, especially those of rural people around the refugee camp. The environmental impact may occur slowly, during the gradual change of rainfall patterns, reducing outputs and incomes over long periods but an event like a cyclone can also result in loss of livelihoods overnight (IOM, 2014). Moreover, other dimensions of environment like political drivers can also be affected by environmental changes, when, for example, the scarcity of essential resources such as water can precipitate or exacerbate conflict.

Indeed, there was much evidence shown the environmental impact became an issue of greater concern not only to host country governments but, also to the 'international community' supported refugee populations and donor agency (Kaiser & Taylor, 2019). The prolonged presence of refugees in the camps was depriving refugee's civil and political rights, rendering them dependent on relief, robbing them access to socio-economic and cause high impact on the host community natural environment (Miller, 2018).

A research project undertaken in Ethiopia and Djibouti in 2016 by an interdisciplinary team was focused on natural-resource evaluation and local perceptions of the resource-sharing challenges (Smith et al., 2019). The research findings suggested that implementing organizations must do much more to communicate with local refugee and host communities and that national government and international partners have an opportunity to use greater collaboration throughout-of camp solutions to foster resource-sharing and human-capacity-building solutions.

2.4.1. Environmental impact of hosting refugee

Deforestation surrounding refugee camps has increased and created substantial environmental degradation due to a lack of renewable energy use in the camp (Lyytinen, 2009). As consequence, land degradation resulting from a large number of refugee's influx was one of the major causes of a negative impact on the climate and the environment in general. In recent years much research suggests that the concern of refugee-hosting countries was a negative impact of

refugee camp caused due to environmental degradation and natural resource depletion. According to, case study done in Tanzania the environmental degradation in the refugee-affected areas has created problems between the refugees and the local communities (Berry, 2008). The sanitation and environmental issues were great concerns to the local community due to the massive cutting of trees for cooking fire in the early days of the refugee's presence.

The insufficient supply of household fuel and building materials in and around refugee settlements push refugees to use collected forest firewood or cutting down trees to build houses or, in the case of long-term settlements, clearing large expanses of land to cultivate crops, increased environmental damage through rapid deforestation (Salmio, 2009). Some research finds recommended that there was an urgent need to promote environmental protection practices that have encouraged a more sustainable use of the natural resources in the host environment areas (UNEP, 2000).

2.4.2. Socioeconomic impact of hosting refugee

Refugees mostly survive on rations and non-food items provided by the World Food Programme and other humanitarian agencies (Hakovirta, 2019). Most of them sell part of their food and non-food items to buy various food and non-food items; others exchange food and NFIs with goods. The recent research finds out that the economic impacts of refugees on host-country economies within a 10-km radius of three Congolese refugee camps in Rwanda found that cash aid to refugees creates significant positive income spillovers to host-country businesses and households (Zhu et al., 2016). The refugee camp restriction policy of movement affected both skilled and unskilled refugees' employment opportunities and higher education as well as access to justice was also affected (Callaghan & Sturge, 2018).

According to, research done in Uganda found that refugee has a positive impact on the host economy in human capital as a source of labor and employment opportunities due to long time interaction emerged in camps (Ahimbisibwe, 2018). Therefore, refugees impose a variety of security, economic and environmental burdens on host countries, but also embody a significant flow of resources in the form of international humanitarian assistance, economic assets, and human capital (Porter et al., 2008). These refugee resources represent an important state building contribution to the host state, but security problems and other hindrances inhibit the state's ability to access and The burdens and benefits associated with the refugee presence are not distributed

evenly among local hosts. Some communities stand the chance of benefiting from the presence of refugees and international relief agencies to a large extent, while others struggled to maintain access to even the most basic resources (Boamah-gyau, 2008). The revised “Refugee Proclamation No 1110/2019” of Ethiopia, enables refugee integration to host community and refugees to move freely from camps and access education, employment opportunity, and sharing of resources with host community (FDRE, 2019).

The theory of change argues that Zero hunger, environmental conservation, climate change adaptation, and sustainable economic development cannot achieve without resilient agricultural livelihoods. While FAO’s theory of change is based on the principle that refugees, when not stigmatized as a burden for the host country and host population, are an asset, regardless of sex, through the skills and manpower they offer to the positive development of a nation.

The social impacts of refugees on host countries are difficult to measure (Miller, 2018). Consequently, the refugees' difference in cultural linkages with the host community is always a risk that results in social tensions, conflicts, and even violence (Tripkovic, 2017).

According to, some research studied the destruction of local communities in the face of economic and cultural globalization in a way of political and cultural resistance and simultaneously explores the attempts at community rule erasing and the related possibilities of rethinking economic development in more sustainable local ways (Dalby et al., 2019). Therefore, community solidarity and the impact of power differentials were promoting integration in shaping patterns of social connection (Tripkovic, 2017). Thus, the increase in refugee influx has decreased the availability of firewood and greater involvement in trade arising from the existence of the camps has added workload on women. However, improved access to services like safe drinking water, health facilities, energy use, and improved shelters has positive impacts on social life women (Obara, 2010).

2.5. Refugee and environmental sustainability

There was an urgent need to promote practices that were encouraged more sustainable use of the natural resources in the refugee camp areas. According to, Comprehensive Refugee Response Framework, UNHCR seeks to create new opportunities to improve the living conditions of both the refugee and the host communities. It aims to leverage the people’s skills and knowledge,

introduce new business models, bolster the local economy and create new infrastructure in a remote and ardent part of the country (World Bank, 2018).

The FAO roadmap for refugee response enables refugees and host communities in viable, market-oriented agriculture production, together with the private sector, throughout agriculture value-chains have a comparative advantage for refugee durable solution (FAO and UNHCR, 2018).

According to (Miller, 2018), the issue of sustainability raised at global reforms to speed up local integration in protracted refugee settings, refugees, and host communities needs more capacity-building support around natural-resource management and resource-sharing. There was study which found the integration into local or host communities can be very effective for both refugees and their hosts, but these tend to relate only to specific contexts: where population densities are relatively low such that there are labor shortages, where the refugees belong to the same ethnolinguistic group as their host populations, or where there has been a history of movement between the source and host regions (Porter *et al.*, 2008). Achieving productive or sustainable relationships between long-term refugees and their local host populations continue to tax governments, international agencies, development practitioners, and academics. Moreover, low levels of refugee education limit the opportunities for working-age adults and the chance of getting employment (Huang, 2017). Experience has shown that sustainable environmental management practices are best achieved with the full and meaningful participation of the affected communities (UNHCR, 2001). The one principle of refugee protection was burden-sharing where states assist each other in looking after refugees (Ahimbisibwe, 2018).

2.5.1. Improving refugee energy access

The energy uses by refugees was one of the neglected humanitarian response programs. Especially, energy in humanitarian settings provided through the distribution of cooking stoves and torches or solar lanterns included in emergency supply kits, while firewood is supplied for cooking. According to (GPA) current energy access and practice in the situation of displacement are often inefficient, polluting, unsafe, expensive, and inadequate for displaced peoples, harmful to the surrounding environment, and costly for implementers. Replacing refugee camp energy sources with sustainable energy solutions would have an advantage for a refugee as well as for the host community and their environment.

Morganeet al., (2017) argue that Increase the number of livelihoods programs. Access to sustainable energy sources is concomitant to questions of income, and improved access to employment would help refugees living in the restricted camp to move up the energy ladder. The food provided by WFP to refugees is required cooking to use and undoubtedly refugees will continue safer with inadequate access to an improved energy source like collection fuelwood

2.5.2. Refugee and host community livelihood

Refugee livelihoods were hampered by encampment policy which restricts the movement of refugees to engage in economic activities in the host country. Addressing short-term livelihood needs for newly arrived refugees and host communities to increase and diversify agriculture production, contributing to household food baskets and enabling the maintenance of a productive asset base and environmental protection (FAO, 2018). Promoting participatory environmental management was more feasible if the activities are undertaken to support the target groups' livelihoods, both in kind and in cash. The humanitarian agency provides relief to a refugee in the form of basic needs (food, health care, shelters, and other services) to a refugee in the camp with the assumption that the refugee in the camp situation was a temporary settlement and it will soon return to their country of origin (Jacobsen & Fratzke, 2016).

Therefore, livestock plays an important role in livelihood in the human experience of forced displacement particularly the settlement of encampment (Alemayehu & Ayalew, 2019). Particularly, animal husbandry has a significant impact on the refugee camp environment.

Livestock production is a contributing factor in species extinction, desertification, and habitat destruction by clearing forests and converting land to grow feed crops and for animal grazing. Furthermore, nomadic group refugees bring their herds with them and keep these in refugee camps were put pressure on local environment resources (Martin, 2005).

2.5.3. The relief and environmental project

The benefits of environmental interventions are the cost-benefit analysis of host country environmental damage (UNHCR, 1959). The ongoing and new crises left an estimated 25.9 million refugees in the world in need of international humanitarian assistance (UNHCR, 2019). Such assistance directly requires the presence of well-organized international humanitarian

agencies supporting large groups of vulnerable people escaping war, famine or disaster has significant implications for the host country local economies and the environment.

Relief is understood as support to populations that have lost their ability to help themselves. Environmental mitigation projects in the refugee camp and host community area have realized that, even during short periods of refugee presence, the socio-ecological problems of refugees and the local population cannot be dealt with in isolation of each other (Hoerz, 1995).

According to, a study done in northern Uganda on the application of a developmental ‘Self-Reliance’ strategy (SRS) to refugee management, they identify that working through district development plans, has faced considerable obstacles due to the host community and government wider political agenda (Kaiser & Taylor, 2020). Moreover, recently some literature has shown that sustainable response to the world protracted refugee crises must do far more to engage refugees as empowered agents, rather than as passive recipients of aid (Huang, 2017).

Globally, to minimize the impact of refugee donor states may engage in an environmental project in financial burden-sharing with countries of the first asylum in several ways, including through bilateral assistance or multilaterally through contributions to international organizations (Milner, 2016). Particularly, the demands for investment in the environment and infrastructure was come from the need to maintain, modernize, or replace existing infrastructure and for additional infrastructure to support new ways of working and living for an increase in the refugee population (Intosai Wega, 2013).

2.6. Land use land cover change

Land use and cover changes were play important role in the detection of the larger problem of global environmental change. The alteration it effects on the surface of the earth hold major implications for sustainable development and livelihood systems and also contributes to changes in the biogeochemical cycles of the earth, affecting the atmospheric greenhouse and other trace gases. There was significant variation between various sensor instruments’ capability and wealth of information captured and also the applicability depends on the objective of the intended study. There is also a clear variation in the spatial and spectral properties of satellite images acquired by different versions of a particular sensor instrument.

According to research done at Yida refugee camp in South Sudan by used Earth Observation (EO) approach for the assessment of the environmental impact of refugee and IDP Camps

identified that vegetation change and detailed LULC change investigations were important to the made evaluation of the implications of observed changes for human well-being and ecosystem integrity (Hagenlocher, 2011). The potential land-use change implications due to the presence of the refugees are vegetation destruction and deforestation at the campsites and surrounding areas (Biswas & Quiroz, 1994).

2.7. Conceptual framework model

The environmental impact of refugees is determined by several factors in the host-context (Jacobsen, 1997a). Regards, the issue of the environmental impact of refugee camps on the host community and surrounding environment was neglected by host governments, UNHCR and other refugee supported international donors, including NGOs. Therefore, several conceptual issues relating to environmental impact, and refugees are generally defined from the outset.

The term “environmental impact” is also defined to underline what happens when refugees settle in the area of the refugee camp in the host community. According to the Cambridge Dictionary, the term environmental impact is defined as “the effect that the activities of people and businesses have on the environment”. (Miller, 2018) argue that understanding the impacts of hosting refugees is important to plan mitigation responses that minimize the costs and risks assumed by host countries and local communities by maximizing utilization of resources efficiently and effectively to promote environmental sustainability.

Additionally, the impact of refugee camp presence on the host community environment was studied by use of variables such as the size and type of the refugee settlement; international aid and support to the host communities; the history of interaction between the two groups; pre-refugee economic states of affairs in the hosting areas; and cultural similarities or differences among the different communities (Berry, 2008).

Accordingly, the concern of the environmental impact around refugee camps on the natural environment of the host country is a real issue that needs intervention. As an extended concept of EIA, the application of GIS and Remote Sensing is another important tool used in the refugee camp to make assessment and monitoring of environmental changes (Braun et al., 2016). The GIS and remote sensing provided information for humanitarian organizations to design

environmental projects that contribute to mitigating environmental impact and conflict between refugees and host communities.

Refugees can be settled in several possible ways, each associated with different environmental outcomes. One way is for refugees to self-settle (or spontaneously settle) amongst the local community, where they remain unregistered, often receiving unofficial assistance from local people in the form of loaned housing or food provisions, or sometimes loaned or rented land. Alternatively, refugees settle (either voluntarily or with the active encouragement of the host government and relief agencies) in various types of camps and organized settlements where they are registered and receive official assistance (Jacobsen, 1997b). One type of organized settlement is emergency relief camps and reception centers, which are set up by UNHCR and the host government during the emergency phase of an influx, and are intended to be temporary.

Even though, some literature reflects about positive impacts of refugee's settlement brought new resource and labor opportunities; the negative impact of refugees on the environment are common issues and cause a burden for hosting country society in resource competition mainly deforestation and the fuelwood crisis, land degradation, unsustainable groundwater extraction, and water pollution. Therefore, to minimize the environmental impact of refugee camp the following factors should be considered such as pre-influx ecological conditions, settlement patterns of refugees, size and location of camps, land allocation, host community land-use patterns, assistance programs, and government policies towards the environment, development, and refugees.

The environmental impact study was focused on the core principle of environmental sustainability, the conceptual framework was considered the interrelationship between causal-effect factors and enabling factors to investigate the complex environmental impact caused due to refugee camp relief and population activities.

Environmental sustainability has been defined in many different ways but, for this research study environmental sustainability was defined as the responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality.

Therefore, the conceptual framework for host community environmental sustainability was developed based on the relationship between core pillars such as the economy, society, and the

environment. Based on empirical and theoretical study analysis the study identified constraints and challenges of environmental sustainability that why the study developed this conceptual framework by considering the research gap.

Then the conceptual framework was developed by considering the interrelationship between independent and dependent variables or causal and effect factors. The study used to understand the relationships between socio-economic condition, infrastructure, and environmental protection with environmental sustainability around refugee camp that expected to be studied through research. Finally, the conceptual framework of studied research has developed as shown in the next figure.

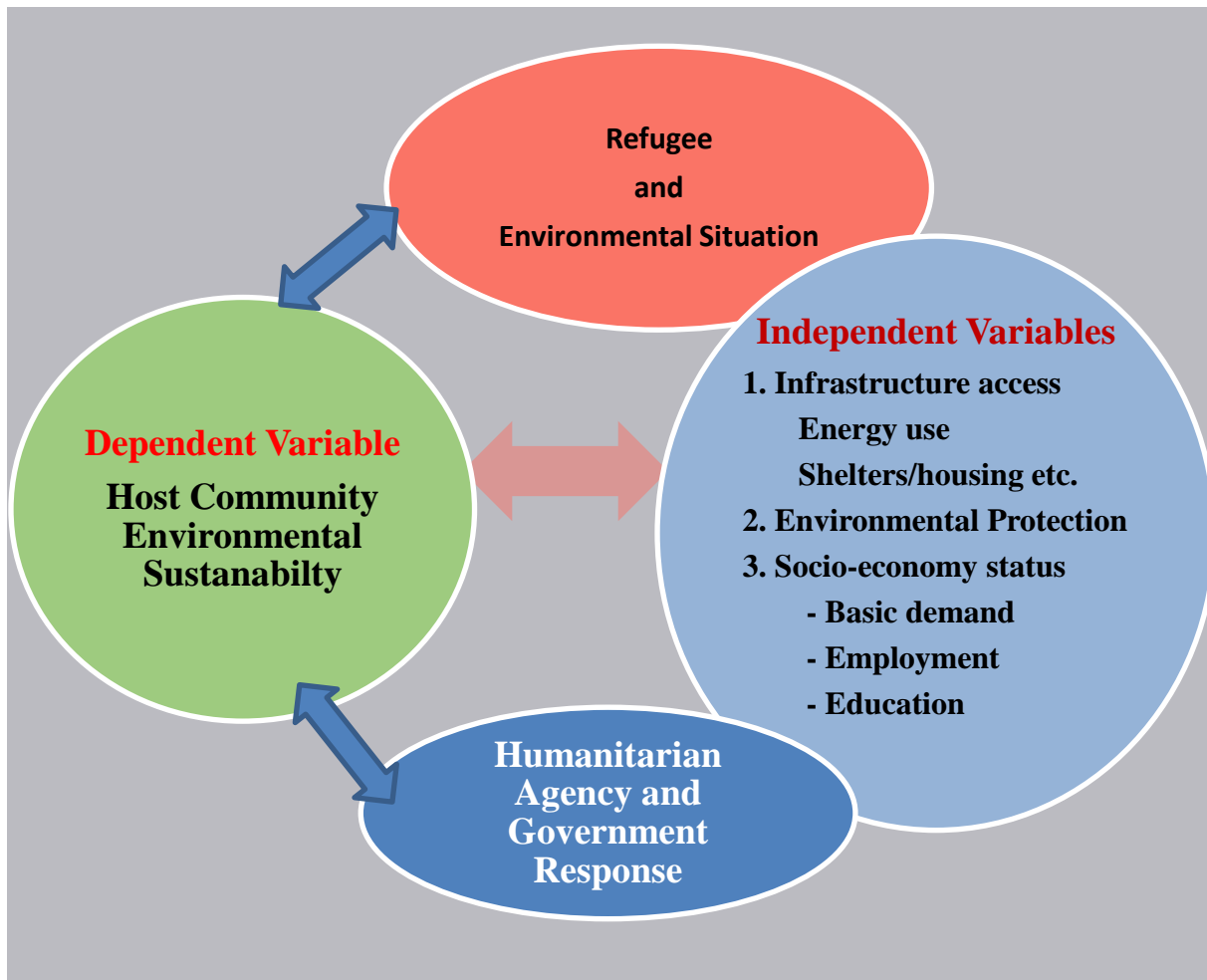


Figure 3: Conceptual Framework model of study

Source: Outer construction, 2020

CHAPTER THREE: MATERIAL AND RESEARCH METHODOLOGY

The methodology and materials of the study were designed to make the greatest possible contribution to the research objectives mainly focus on the analysis of the drivers which lead refugees to pressure on the host community environment. Accordingly, the study used both qualitative and quantitative research approach with mixed explanatory methods. The GIS and remote sensing tools have been used to detect the change in land use a land cover change of study area. The status of basic need provision for refugees and, the socio-economic situation of the study area was addressed. Besides, it was being compared with satellite imagery from 2005 and 2020 to determine the land cover changes in the refugee camp and surrounding environment.

3.1. Description of the study area

The study was conducted in Benishangul Gumuz Regional State Assosa Zone Bambasi Woreda around the Bambasi refugee camp. Bambasi refugee camp was originally established in early 2012 by the Government of Ethiopia Administration for Refugee and Returnee Affairs (ARRA) and United Nations High Commission for Refugees (UNHCR) for Sudanese refugees fled the civil war in Sudan Blue Nile region to seek international protection in the Western part of the country. This refugee camp is located in Ethiopia Benishangul Gumuz National Regional State Assosa Zone Bamebasi Woreda in Wameba Kebele catchment area 733 kilometers away from Addis Ababa and 50 kilometers from Assosa town in the South. While the refugee camp currently held about 17279 officially registered total refugee populations in need of concern as January 2018 UNHCR report.

The majority of host communities living in the study area was ethnically Berta people practicing mixed agriculture as a major livelihood and economic activity. Since the settlement of the refugees in the area of the Bambasi refugee camps being a major center in the area for services, shops, and social amenities, the host community was naturally inclined to look towards the camps for a wide range of benefits from the multilateral humanitarian response.

3.1.1. Location of the study area



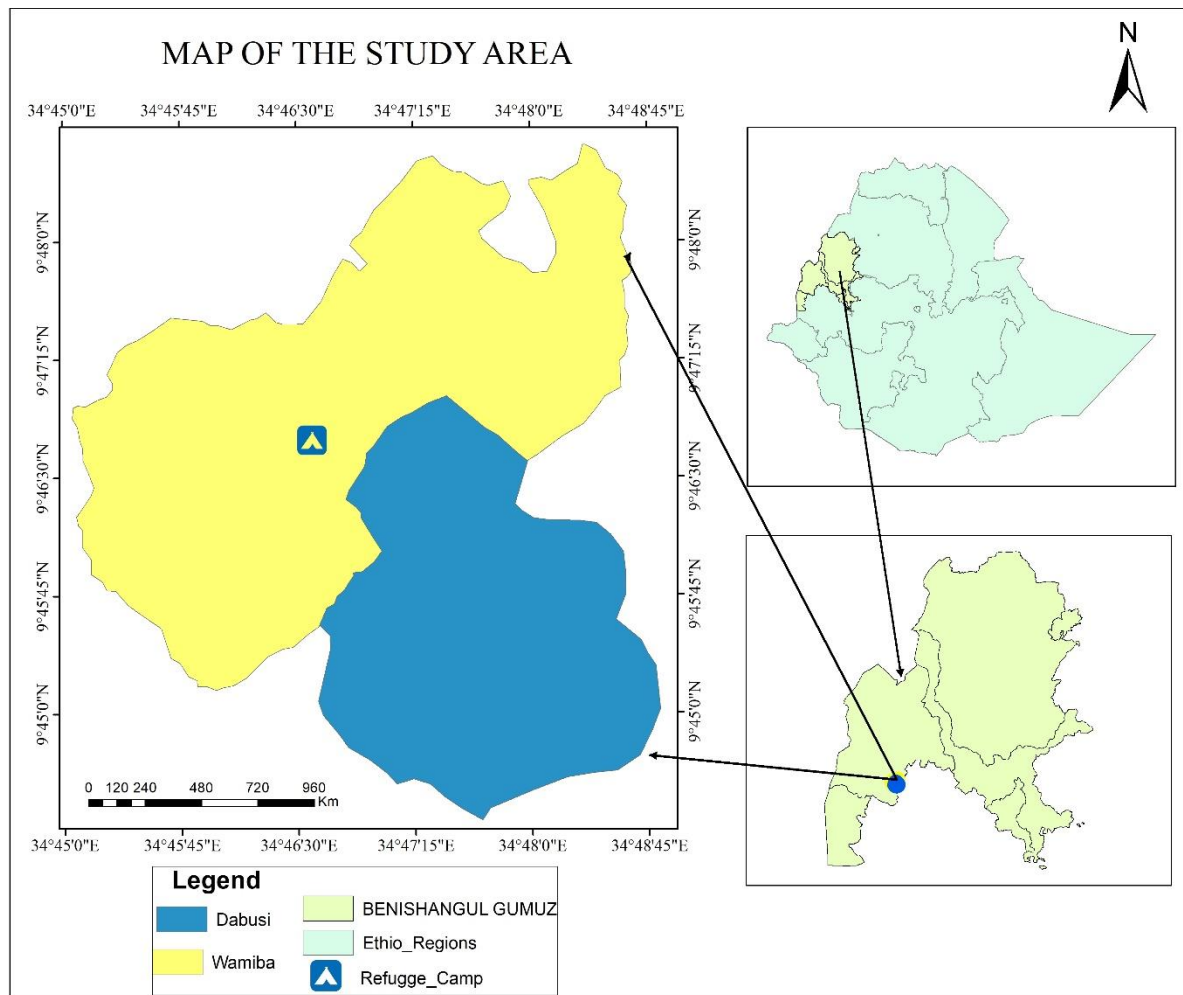


Figure 4: Location map of the study area

3.1.2. Climate condition

The climate condition of the Bambasi woreda was characterized by, the average annual rainfall is 1381.42 mm, while the mean annual maximum temperature is 28.37 °C. The area is characterized by unimodal rainfall distribution with the rainy season extends from March to November and one distinct short dry season extending from December to February. Typically, during the onset of the main rainy season, the first two months receive a small amount and gradually reach their peak in August. More than 55% of the mean annual rainfall falls from June to August. The mean maximum monthly temperature is about 28.37° C. Mean maximum monthly temperature reaches its peak during March followed by April and February, with a temperature of 32.69° C, 32.05° C, and 31.96° C, respectively; whereas, the lowest mean minimum monthly temperature occurs during December with a temperature of 13.28° C. This

climate diagram of Bambasi Woreda shows water stress in January, February, and November, and excess water in May, June, July August, and September (Mosissa et al., 2019)

3.1.3. Biophysical environment

The physical and natural environments of the study area were rich in natural resources that contribute to the development of the community. But Environmental and natural resource degradation is the major concern which consequently affecting the livelihoods of the local community due to degradation of vegetation leads to soil infertility and soil erosion and its associated environmental problems in the farming areas.

The vegetation type of the area was characterized by riverine forest, woodlands, bushland, shrublands, grassland, and bamboo thickets (INBAR, 2010). The problem of deforestation, particularly bamboo degradation is serious in the area mainly associated with human interference as a source of income. The forest cover change was induced by factors such as traditional agricultural production systems, improper grazing systems, illegal logging, and wild.

3.1.4. Socioeconomic characteristics

Predominantly, a community of study areas was practice mixed agricultural activities both crop farming and livestock production as dominant economic activities. Although there was a high potential for agricultural development, traditional farming practices and inadequate involvement of women in all aspects of development activities affected the sustainability of the environmental productivity of the area. Even though there were inspiring developments there was still inadequate infrastructure and logistical constraints in terms of transportation and communication.

The limited development of infrastructure was reflected in the refugee host areas such as energy source, standard high referral level healthcare, and higher-level education system, and high standard asphalt road are among the major challenge encountered in current refugee local integration response. Unemployment, lack of knowledge and access to alternative on-farm and non-farm income-generating opportunities, poor access to improved health services, and limited social and economic infrastructure, broadening the vulnerability of refugee-hosting communities in general and women-headed households in particular.

The majority of refugees were ethnically from Sudan Blue Nile State and both refugees and host populations shared a common language, culture, and religion, and also some have similar sub-clan identities.

3.2. Research design

This study was a mixed research type with a quantitative and qualitative method of approach. The research design was exploratory. The qualitative data used and considers the availability of required information by selecting the research site which focuses on a multi-dimensional view on the impact of refugee camps on the surrounding environment and the relationship with host communities. Particularly, it focused on the assessments of environmental drivers ‘in the camp and host community environment before and after the opening of the refugee camp.

To collect relevant data from both primary and secondary sources, this research used different data collection instruments. These instruments were household survey, interview, focus group discussions, and Field Observation with additional GIS and remote sensing imagery data of the study area.

3.3. Sampling techniques and producer

The research uses a non-probability sampling technique to determine the proper representative of a sample size to possibly reducing sampling error. Remote sensing and GIS techniques were used to collect the biophysical data, mainly for land use land cover change, while a survey method followed with a multistage sampling procedure was employed mainly to collect the socioeconomic data.

There are two Kebeles of the host community and one refugee camp in the study area. The study area was selected purposely by taken the consideration of environmental sensitivity, the potential of overutilization of woodland resources, and limited time and cost which contributed to the achievement of the objective of the study research in the selected target population.

The study area was approximately covered about 10 km². These were the entire area used for socio-economic surveys and land use and land cover change digital imagery data collection and analysis. Then the study population was summarized from the refugee camp and two representative Kebeles, namely, Womeba and Dabuse were selected purposely for the household survey.

Table 1: Study area population by households of each Kebeles.

S.no	Name Kebeles	Total Population	Total households	Remarks
1	Womeba	2500	500	

2	Dabuse	2495	495	
3	Refugee camp	17279	2130	
	Total	22274	3125	

Source: Bambasi Woreda Health Office and UNHCR (2020) fact sheet.

Moreover, based on the actual list of household numbers of each Kebeles and refugee camp the sample size will be determined using the following equation adapted from Watson for known population size (2001).

$$n = [Z^2 * N * P (1-P) / e^2 * N * Z^2 * P (1-P)] / R$$

Where:

n = Sample size

N = Total number of households = 3125

P = Population proportion (assumed 0.5 for maximum sample size)

e = Sample error or precision level (usually an alpha level of 0.05)

Z = Value of 95% confidence interval = 1.96

R = Estimated response rate (0.8 for this study)

These 3125 households are used as the target population and based on the above formula the actual sample size is about 320 households.

The proportion of sample households are determined from each Kebeles or host community and refugee camp based on the proportion allocation formula.

$$[N_i/N] * n$$

where

N_i- the total household heads in each Kebele

N- the sum of all household heads in the sample Kebele

n - Sample size of household heads in the study area

- Womeba Kebele = $500/3125 * 320 = 50$
- Dabuse Kebele = $495/3125 * 320 = 50$
- Refugee camp = $2130/3125 * 320 = 218$

Table 2: The number of sampled households per Kebele Kebeles and Refugee camp of study area.

S.no	Name Kebeles	Total Population	Total HHs	Calculated Sample Size	Remarks
1	Womeba	2500	500	50	
2	Dabuse	2495	495	50	
4	Refugee camp	17279	2130	100	*The calculated sample size was 218 for refugees but, we took 100 samples because of homogeneity in the life condition of refugees in the camp.
	Total	22274	3125	200	

This sample size was representative of the target population which enabling a generalization of the findings with a confidence level of 95% and a confidence interval of 5%.

Additionally, land use land cover of the study area was classified based on satellite imagery of Landsat ETM+ of 2005 and Landsat OLI of 2020. To classify land use land cover map of the study area rule of thumb was used for the sample size to collect a minimum of 50 samples for each land cover class.

3.4. Data collection methods

The research used both primary and secondary data collection methods. The primary data was collected directly from refugees and host community households level respondents using a survey questionnaire and secondary data was obtained through a review of relevant literature from the internet and review of different documents. The cross-sectional households survey was used for socio-economic and demographic data collection. Household-level data will be collected through an open and close-ended survey questionnaire. The households survey data collected question prepared in two separate one for refugee and the other for the host community. The respondents are contacted by the research person and trained data collectors from the study area. Therefore, this method takes a lot of time, effort, and money but the data collected are of high accuracy, current, and relevant to the topic.

Additionally, satellite earth observation imagery data was acquired from the USGS data source. From the USGS data source, Landsat 7(ETM+) of 2005 and Landsat 8 (OLI) of 2020 was acquired. The description of the satellite imagery was presented in (table 3) below.

Table 3: Details source and type of imagery data characteristics.

Image	Acquisition date	Path	Row	Resolution	Source	Application
Landsat-7 ETM+	8/01/2005	171	053	30 m	https://earthexplorer.usgs.gov/ .	LULC change detection
Landsat-8 OLI-TIRS	10/01/2020	171	053	30m	“	“

3.5. Data analysis methods

3.5.1. Descriptive data analysis

The analysis respondents' response from local community households, refugees, and humanitarian and government field staff view about what the refugee camp environment has been looking before and after the settlements of refugees. The data of the refugee camp's impact on the natural environment was analyzed by using qualitative and quantitative methods of data analysis.

Moreover, based on the objectives of the study the researchers used different methods of data analysis such as descriptive analysis (summarizing sample information), inferential statistics to generalize the result obtained as comparatively, causality or relationship was used in this study. Firstly, the quantitative data were arranged, organized, and then codified before being subjected to analysis. Secondly, data analyzing software and tools such as SPSS to facilitate the process of data analysis. The qualitative data types were condensed, narrated, and interpreted to make them meaningful information. Data generated from secondary data sources were checked for reliability, suitability and adequacy then used to supplement and validate data generated through primary techniques. Lastly, the main findings of the study were presented through tables, percentages, figures, photographs, and maps.

3.5.2. Satellite imagery data analysis

While the digital imagery data from remote sensing geographical information for LULC change was analyzed LULC between 2005 and 2020 using time series image classification as the unit of analysis. Accordingly, the refugee camp and host community environment were digitally

analyzed using satellite imagery data to compared land use land cover change before and after the refugee arrival of the study area. To map land use land and cover the most common data source was USGS (united states geological survey) data source. The procedure followed by the researcher to map LULC was presented in the result and discussion part of this research.

3.5.2.1. Image preprocessing

Layer Stack and Sub Setting: Before doing any processing with each image combining multiple bands of a satellite image into one file using ERDAS Imagine was carried out. By Using Arc-GIS Then the image was extracted by mask using the study area vector map of the study area.

Radiometric Correction: Any image that involves radiometric errors was corrected to avoid radiometric errors. This is due to the emitted or reflected electromagnetic energy is observed by a sensor onboard an aircraft or spacecraft, the observed energy does not coincide with the energy emitted or reflected from the same object observed from a short distance. This is due to the sun's azimuth and elevation, atmospheric conditions such as fog or aerosols, sensor's response, etc. which influence the observed energy. Therefore, to obtain the real irradiance or reflectance, those radiometric distortions must be corrected. In this study, radiometric correction such as haze reduction and noise reduction was done to enhance the visualization distortion using ERDAS 2015.

Image Enhancement: Image enhancement techniques are improving the quality of an image as perceived by a human, these techniques are most useful because many satellite images where examined on color display give inadequate information for image interpretation (Ramachandran et al., 2000). This study was employed **false-color combination (FCC)**, **Principal component analysis (PCA)**, and histogram equalization to enhance visual interpretability of the image in determining major land use/land cover types of the images of the study area.

3.5.2.2. Image classification

Image classification is the process of creating thematic maps from satellite imagery. A thematic map is an information representation of an image that shows the spatial distribution of a particular theme (Lilles and Kiefer, 2000).

This study was used the supervised maximum likelihood classification method for the detection of land use land cover in the study area. The supervise maximum likelihood classification was done by identifying homogeneous representative training sites of the major cover types (e.g. forest, bare land and built-up area, etc). From each cover type, 5 samples were taken based on the knowledge and familiarity of the area. In this typical classification, all images were classified using the Maximum Likelihood Classifier Technique in ERDAS Imagine 2015 software. For this study, four (4) major cover classes were identified these are agricultural land, forest land; and built-up area, and bare land was identified. The description of the land use land cover classes as indicated in Figure 5.

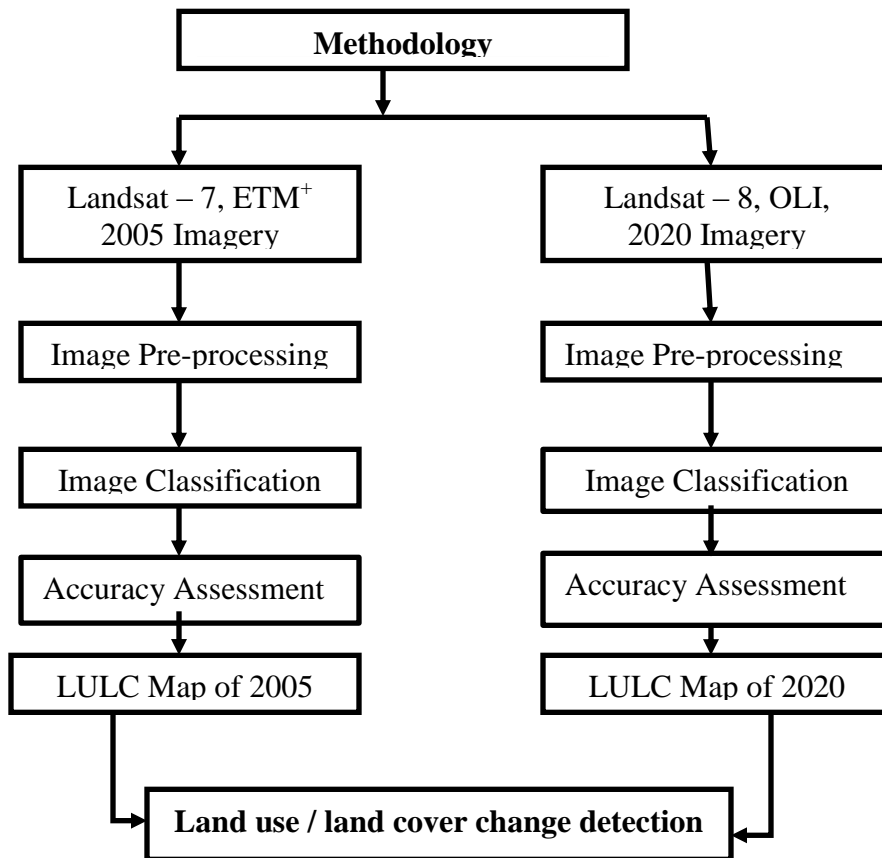


Figure 5: Flow chart of the methodology for land use/land cover and change detection

Source: Author Survey's (2020)

CHAPTER FOUR: RESULT AND DISCUSSION

This chapter deals with the main finding of the research, it provided a description of the main environmental drives and factors that follows the establishment of the Bambasi refugee settlement and the surrounding environment. The Environmental impact cannot be easily understood without taking complex demographic social, economic, and political, etc. factors into account. Thus it is important to understand how these environmental causal and effect factors relationship results analyzed.

4.1. Demographic characteristics and respondents data analysis result

Table 4: Refugee and Host Community Demographic Characteristics

Measure	Category	Host Community			Refugee		
		Frequency (N = 100)	Percent (%)	Valid Percent	Frequency (N = 100)	Percent (%)	Valid Percent
Sex	Male	49	48.5	49	22	22	22
	Female	51	50.5	51	78	78	78
Total		100	99	100	100	100	100
Age	18-30	12	11.9	12	8	8	8
	31-40	44	43.6	44	51	51	51
	41-50	34	33.7	34	35	35	35
	51-60	4	4	4	6	6	6
	Above 61	6	5.9	6	-----	-----	-----
Total		100	99	100	100	100	100
Marital Status	Married	48	47.5	48	84	84	84
	Single	9	8.9	9	4	4	4
	Divorce	29	28.7	29	9	9	9
	Separate	14	13.9	14	3	3	3
Total		100	99	100	100	100	100

Measure	Category	Host Community			Refugee		
		Frequency (N = 100)	Percent (%)	Valid Percent	Frequency (N = 100)	Percent (%)	Valid Percent
Education	Illiterate	34	33.7	34	79	79	79
	Reading Writing	36	35.6	36	11	11	11
	Primary 1-8	17	16.8	17	7	7	7
	Secondary 9-12	13	12.9	13	2	2	2
	TVET	-----	-----		1	1	1
Total		100	99	100	100	100	100
Occupation	Agriculture	72	71.3	72	14	14	14
	Employee	12	11.9	12	10	10	10
	Private business	13	12.9	13	56	56	56
	Homework er	3	3	3	20	20	20
Total		100	99	100	100	100	100

Source: Author Survey's (2020)

Table 4 Showed the demographic characteristics (gender, age, and marital status) and their frequency data results collected from the overall selected or the sampled 200 number of respondents. Based on the data above, amongst the respondent's 71 were male participants and this covered 71%, and 129 were female participants and this also covered 129%, of overall respondents and a total of 100% of the sample size respondents were actively participated in answering the questioner.

Based on the above table 4 data results showed the majority of respondents were found age the between 31-40 age ranges, their total number was 95 household heads and this also covered 95% of overall respondents. Beside of this, the respondents those found the age between 41-50 ranges were having taken second place, a total number was 69, and this respondent shared or covered 69%, of overall respondents, at the same the respondents those

found the age between 18-30 ages were 20 of overall and covered 20%, have taken third place and also the respondents found the age between 51-60 were 10 household heads of overall respondents were covered 10%.

Regards, to the marital status of the respondents of the above table 4., data results showed, majority household heads were married and have taken a total number was 132, covered 131.5%. And also 38 number of the household heads were divorced and covered 37.7%. At the same time, the small number of households were single and separated, this indicated the above data was 13 number of households were single and covered 12.9% and also 17 of overall households were separated and covered 16.9%.

The educational background of the respondents above table 4 data results showed the majority of households was illiterates and their household heads numbers was 113 and covered 113%, similarly, 47 household heads were being able to reading and writings, this also covered 47% of overall household respondents those answered the questioner .in the same way small numbers of the respondents was engaged in primary and secondary schools, a total of their statistical data results above showed 24 and 15 out of overall household heads and shared 24% and 15% of the selected numbers of respondents. only 1% of the respondents were answered as graduated from TVT college.

In general, the educational background of the respondents of this study was mixed or consists of massively illiterate, primary, and secondary school's participants. The statistical data results above or table 4 showed the majority of household heads were engaged in agriculture and the remaining was involved in different business-oriented activities. Based on the data above amongst the respondents those engaged themselves on agriculture was a total of 86 and covered 86% of overall, the remaining part of the respondents was involved in private business and their exact figure above showed 69 and covered 69%. similarly, amongst the respondent, those engaged themselves in homemaker and employee their actual data above showed a total of 20 and 12 of overall household heads and shared 20% and 12% of the respondents.

4.2. Descriptive result and discussion

As discussed before data collection was conducted by classifying the sampled or the selected community into two parts or host and refugee community with an equal share of the number of household heads or respondents and fairly distributed the questionnaire for both parts of the participants. And hence to administer or manage the data entering, coding, editing, and analysis the researcher used two different SPSS software or the data were entered separately in different SPSS software. Based on their statistical data results for both host and refugee community respondents answer the descriptive analysis parts of the study were discussed below.

Table 5: The organized environment management committee at the host community

Organized Environment Management Committee at Host Community			
	Frequency	Percent	Valid Percent
Yes	60	60	60
No	40	40	40
Total	100	100	100

Source: Author Survey's (2020)

Table 5 showed the host community respondents' answers to the question had asked regarding the organized environmental committee of the study area. So data results above indicated that the majority of host community respondent response was no, there actual response figure above indicated 60 of overall respondents or household heads and this also covered 60% of them and the remaining parts of the respondents answered yes, their response data was 40 of household heads and this also covered 40% of overall participants.

Regarding the environment management question the researcher tried to dig out the fact through different research questions especially through interview question the majority of the respondent said as they are not actively participated in environmental protection and management work, due to their misunderstanding about the concept of environment, their whole over-involvement was highly reduced or below the expected level.

Above all the government mobilization and awareness, creation role was seldom or not that much done. Based on the interview question, the respondents who answered yes were additionally expressed their environmental protection work was not consistently done based on environmental managing action plan but in line with their agriculture farming and

harvesting period. So one can understand that it needs high attention and the great participation of all concerned bodies such as the community, government, and nongovernment organizations.

Table 6: The host community respondent participate in environmental planning and implementation

	Respondents Participant in Environment Planning and Implementation		
	Frequency	Percent	Valid Percent
Yes	48	48	48
No	52	52	52
Total	100	100	100

Source: Author Survey's (2020)

As discussed before the above table 6 also indicated that the respondents answer regarding the question about sustaining environmental planning and implementation, but the majority of the respondents answered no which showed above was 52 of overall host community respondents or household heads and this also covered 52%.in the same way those answered yes were, their actual data above was 48 and covered 48% of the overall participants.

Even though household involvement was very important to sustain the environment or to keep the balance of nature, but the activities like afforestation, preserving or maintaining the land from degradation, preventing deforestation, and other environment sustaining mechanism were seldom used by the host community.

Based on the interview question and obtained results, the majority of the household heads had no participation in environmental plan and implementation, rather their day to day activities was engaged on other livelihood fulfillments, that's why the host community neglected to sustain the environment protection activities. According to UNHCR operational handbook, the refugee camp environmental projects were required monitoring and evaluation systems that go beyond financial accounting. Therefore, the environmental impacts are best judged at the local level where possible, refugees and the host community should be involved in the selection and monitoring of environmental indicators (UNHCR, 2001).

Table 7: The host community respondent about the access to infrastructure after refugee presence

	Host community respondents about the access of infrastructure after refugee presence		
	Frequency	Percent	Valid Percent
Good	81	81	81
Fair	19	19	19
Total	100	100	100

Source: Author Survey's (2020)

The host community looks at the establishment camp and the presence of refugee camp has a positive impact in bringing new resources for social infrastructures and services closer to them. The infrastructure access data in table 7 above frequency result were 81% good, 19% fair. Evidence suggests that physical and social infrastructure (including roads, bridges, airstrips, and school buildings), health, education, and water supply may be strained by a refugee presence, they also present political opportunities for the host government (Miller, 2018).

Table 8: The host community farmland productivity progress as a result of the refugee Camp establishment.

	The respondents answer for farmland productivity progress as a result of refugee camp establishment		
	Frequency	Percent	Valid Percent
Very High	3	3	3
High	18	18	18
Low	46	46	46
Very Low	33	33	33
Total	100	100	100

Source: Author Survey's (2020)

The farmland productivity of the host community data results above showed the majority of the respondents were answered their farmland productivity was low, based on the data in table 8 above frequency results their actual figure indicated 46 of the overheads and this also covered 46% of overheads and also amongst the respondents 33 of them were answered very low and they covered 33% of overall participants. And hence the majority of the household

heads incurred to lose their farmland due to their low self-investments in their land preservation activities.

Similarly, the results obtained from respondents showed, most of the time the household heads farmland productivity were depend on using scientific farm or agricultural inputs like urea and inputs were more practicable rather than the host community to passionate about addressing the constraint of low land productivity and continually implementing of environmental sustainability activities. The remaining parts of respondents were answered high and very high and also this covered 18% and 3% of the overall households. Despite all these facts host community land and environment were subject to caring the burden of the refugee community and also they equally sharing energy like forest wood and other home construction purposes, the forest was deforested.

As a result of these, the farmland productivity was highly reduced and this indicated that the external pressure was being affected both the host community residence livelihoods and the environmental sustainability. The majority of the host community practices traditional agriculture in small farm sizes. Technology and improved inputs have not yet reached the host community around the Bambasi refugee camp. Meanwhile, the host community is not capable to either buy such technology or skills to operate them given the fact that most of the host community farmers are depends on traditional poor agriculture practice.

Therefore, to minimize the refugee impact, the humanitarian agency expected to start the provision of host community with improved seeds, fruit trees, and well-organized extension services has increased agricultural productivity and has a positive impact on camp area environmental sustainability.

Table 9: The host community respondent answer for their farmland effect as a result of refugee camp establishment.

	The respondents answer for farmland productivity progress as a result of refugee camp establishment		
	Frequency	Percent	Valid Percent
Very High	47	47	47
High	39	39	39
Low	14	14	14
Total	100	100	100

Source: Author Survey's (2020)

The above table 9 showed the respondents response regarding the question of their land effect as a result of refugee community establishment and the majority of the respondents were answered very high land effect and their data results above showed was 47 and covered 47% of the household heads and also amongst the respondents, those answered highs were 39 and covered 39% of overall household heads. Even though the host community land and environment protection culture were very less or unusual, the external pressure or the refugee community adverse impact was had made the challenge severe or too complicated the matter as long as the refugee community equally shared the existed natural resource for energy and other building purposes despite the refugee community not equally shared the environmental impact. According to Mr. Stone's research encouraging and enabling a more sustained and sustainable livelihood approach in a refugee camps has much need original concepts of the agricultural and micro-credit projects and attempted to turn it into reality. (Stone, 2005)

Table 10: The refugee Out of Refugee Camp Movement

	The out of the camp movement for refugee respondents		
	Frequency	Percent	Valid Percent
Yes	72	72	72
No	28	28	28
Total	100	100	100

Source: Author Survey's (2020)

Table 10 above showed the respondents answered the question regarding the refugee community movements out of their residents or out of camp, so the majority of the respondents answered yes and their actual data above indicated 72 of overall household heads and covered 72% and also among the respondents those answered no were 28 and covered 28%. Based on the above results the majority of the refugee community were moved from place to place to fulfill their livelihoods.

Based on interview results the majority refugee community was depending and share their daily life activities and engaged themselves through the different sources of incomes like cutting forest wood and sale to the town community, sale their labor force to host community, and earned a wage, fetch water, etc. One of the most visible ways in which refugees directly contribute to the host community economy is by exercising their purchasing power. Refugees are regular customers for host community businesses and the settlement areas. The scholars

suggest that Interventions that aim to promote refugees’ sustainable livelihoods must be based on a sound and comprehensive understanding of existing markets and the private business sectors within which refugees are making a living (Betts et al., 2014).

The study tried to identify the environmental impact in the Bamnasi refugee camp. The environmental impact was due to the movement of refugees from place to place and an equal share of host environmental resources has been quite significant particularly in affected the host community environmental sustainability.

Table 11: The source of energy used in the refugee community (Refugee)

	The source of energy used for cooking by the refugees		
	Frequency	Percent	Valid Percent
Kerosene Stove	2	2	72
Firewood	77	77	28
Charcoal	7	7	
Both firewood and charcoal	14	14	
Total	100	100	100

Source: Author Survey’s (2020)

The above table 11 showed the respondents results regarding the question that the source of energy the refugee used for cooking and other purposes. Hence the majority refugee community response above indicated that they were used firewood and their actual data was 77 of overall heads, covered 77% and only a few numbers of respondents answered as they were used charcoal and their actual data above showed 7 of the respondents and this 7% household heads and also among the refugee respondents 14 of participants were used both firewood and charcoal, covered 14%, and a total of 98% of the respondents were engaged on forest cutting for energy since they have not optional alternative energy resource like electricity power due lack of access of infrastructure on the area. Therefore, study result shown that the majority of refugee community incurred to depend on the environment like the host community share which caused the negative environmental impact around the refugee camp.

Particularly, the source of energy for cooking in the Bambasi refugee camp was the major driver for deforestation. The loss of natural forests has a serious economic and social cost for

the host community which caused negatively affected the environmental sustainability of the area. what makes a difference between the host and refugee community, to some extent the host community involved in the replacement of forests especially during their harvesting period but the refugee community had no involvement. Only a few respondents answered as they were used kerosene stove, their actual data above table showed 2 of overall respondents and 2% of overall household heads, and most of them were served on the refugee administration level.

Table 12: The source of income for refugee residents

	Frequency	The source of income	
		Percent	Valid Percent
Labour force wage	21	21	21
Agriculture	6	6	6
Mining	24	24	24
Trade	6	6	6
Ration aid	43	43	43
Total	100	100	100

Source: Author Survey's (2020)

Table 12 above showed the respondents' results for the question regarding the refugee community source of income and among the respondents, those who answered the question was 43 of overall heads were replied as their source of income was ration aid, and this covered 43% of them. In the same way among the respondents, those answered the question was 21 of overall heads were answered as their income was wage income and covered 21%, and also those engaged and earned their income from mining, their data results above showed that 24 of overall respondents and covered 24%, and also the small number of respondents were answered as earned their income from agriculture 6% and trade 6%, and both covered a total of 12%.

In general, based on the statistical data results from the majority number of respondents of the refugee community their source of income was none ration aid which means (wage income 21%, mining 24%, agriculture 6%, and trade 6% of the respondents. The analysis results show that the refugee daily livelihood in the Bambasi refugee camp was covered by other source incomes that covered about 57%.

This means as a result of the ration aid was no sufficient to fulfill their daily basic needs and the refugee community actively seek other sources of income to fill the gaps and this adversely affects the hos community socio-economy and their environmental sustainability.

Table 13: The refugee shelter condition in the Bambasi refugee camp

	The refugee shelter condition		
	Frequency	Percent	Valid Percent
Fair	6	6.0	6.0
Poor	49	49.0	49.0
Very poor	45	45.0	45.0
Total	100	100.0	100.0

Source: Author Survey's (2020)

Table 13 above indicated the respondents' results regarding the question for the shelter condition or status and hence among the respondents, the majority of them answered as their shelter condition were poor and very poor and their data results above showed 49 and 45, a total of 94 household heads and this also covered 94% of overall heads were living in slum housing conditions.

The refugee shelter condition was a critical issue for the refugee camp environment the only a small number of the respondents were answered fair and their actual data above showed 6 of overall household heads and covered 6%.

Therefore, the results above show that the majority of the respondent's shelter was very poor they need their option or finds another way to renovate houses or shelter and this also needs using shelters construction materials like cutting forests trees and other necessary resources for their shelters. As indicated in the humanitarian guideline for response shelter was a priority basic need that must be addressed by refugee actors organization and the weak response has affected the environment in accelerated deforestation and poor environmental condition can affect the host community living by increasing the socio-economic vulnerability.

The refugee community living in poor environmental conditions can not contribute to the improvement of the camp's surrounding environment rather than negative environmental impact. While the refugee's basic demands were not fulfilled, they incurred to depend on the host community and their environment to sustain their life through using local forest resources for the fulfillment of their basic demand. So the environment caring for both

communities beyond its capacity, this leads to deforestation, land erosion, land degradation, productivity declined and damaged the eco-system and finally the balance of nature was changed.

To summarize the descriptive statistical data above the research study findings results showed the overall negative impacts of refugee camp settlement on the host community and this needs to take into account that environmental sustainability was under severe condition.

4.3. Inferential statistics result and discussion

4.3.1. Correlation (Association) result and discussion

The purpose of this correlation analysis was to know the strength and direction between the different factors of independent and dependent variables. The study used the Pearson correlation which “measures the linear association between two metric variables” to explore the relationship (Hair et al., 2008). Specifically, the strength of the relationships between the three dependent variables and the one independent variable was measured by Pearson’s r. The Pearson correlations were calculated as measures of relationships between the independent variables and dependent variables.

Therefore, the measured relationships were discussed in detail to understand the strength of the variable relationship. For example, the test was indicated in both directions, positive (when one variable increases and so does the other one), or negative (when one variable increases and the other one decreases (Pallant, 2010). The test also indicates the strength of a relationship between variables by a value that can range from -1.00 to 1.00; when 0 indicates no relationship, -1.00 indicates a negative correlation, and 1.00 indicates a perfect positive correlation (Pallant, 2010). For the rest of the values is used the following guideline: small correlation for value 0.1 to 0.29; medium correlation for 0.3 to 0.49 and large correlation for 0.50 to 1.0 (Pallant, 2010).

Based on the above information the research study tried to show the correlation of the different factors or independent and dependent variables and the result was presented and discussed below.

Table 14: the correlation between dependent and independent variables

Correlation between dependent and independent variables					
		Environmenta	HC	Infrastructure	HC

		l protection	economy status	access at the HC	environmental sustainability
Environmental protection	Pearson correlation	1	-0.047	0.045	0.486**
	Sig. (2-tailed)		0.645	0.660	0.000
	N	100	100	100	100
Host community economy status	Pearson correlation	-0.047	1	.319**	.757**
	Sig. (2-tailed)	0.645		0.001	0.000
	N	100	100	100	100
Infrastructure access at the host community	Pearson correlation	0.045	.319**	1	.586**
	Sig. (2-tailed)	0.660	0.001		0.000
	N	100	100	100	100
Host community environmental sustainability	Pearson correlation	.486**	.757**	.585**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).					

Source: SPSS entered data results.

Above table 14 showed the correlation between the dependent and independent variable. This research study used to host community environmental sustainability as the dependent variable and correlated with the independent variables like environmental protection, host community economy status, and infrastructural access that must be fulfilled to realize the long run environmental sustainability of the community, to discuss their relationship the correlation table above shown that there was a positive and significant relationship between a dependent variable with each independent variable. In the first place, there was a medium relationship between the independent variables of environmental protection with the dependent variables of host community environmental sustainability, and hence their results showed (0.00 and 0.486**), this indicated that the environmental protection work maximizing afforestation, preserving land from erosion and degradation, preventing deforestation and creating healthy eco-system by some amount or extent, the long run host community environmental sustainability also increased by the same amount or extent and the reverse was true.

In the same way, the correlation results above also showed there was a strong positive relationship between the dependent variables of host community environmental sustainability with the independent variables of the economic status and this showed from the above table (0.00 and 0.75**) this indicated that as the economic status of the host community was increased, the long-run environmental sustainability also increased and the reverse is true. Above all the economic status of the community, improvement helps to alleviate the challenges of environmental sustainability.

The other factor or the independent variables that correlated with the dependent variable was the relationship between the accesses of infrastructure with the environmental sustainability of the host community. The correlation result above showed (0.000 and 0.585**) there was a large relationship between the two variables. Since the produced values of each independent variables result found between the range discussed above (-1 and 1) or the correlation results above were indicated (0.00, 0.486**, 0.00, 0.75**, 0.00, 0.585**), have medium up to large relationships. To compare one variable to another any incremental works that help to improve the economic status for the host community, better address the challenges of environmental sustainability constraints and this has a strong positive relationship than other variables and the environmental protection and infrastructure access were have medium relationships.

In general, to address the constraints of environmental sustainability, accelerating the improvements of the three independent variables have a vital role for both host community socio-economy progress and to reduce the environmental impacts from the studied refugee camp.

4.3.2. Assumption test and analysis

Assumption 1: Model fit test

Table 15: The model fit test summary result of data distribution

	Value	Df	Asymptotic Significance
Pearson Chi-Square	8.040 ^a	4	0.090
Likelihood Ratio	9.629	4	0.047
Linear-by-Linear Association	0.528	1	0.467

N of Valid Cases	100		
a. 4 cells (40.0%) have an expected count of less than 5. The minimum expected count is 1.96.			

Source: SPSS entered data results.

The model fitting test helped to understand the data distribution of the research studied which was interpreted by chi-square results or the goodness of chi-square. So based on the above model fitting information results, they tried to compare the asymmetric data results with the p-value, if the P-value is ≤ 0.05 , this means there is little support for the null hypothesis (no association). Therefore, we have significant associations and we have the presence of a systematic relationship between each variable. Since the chi-square table results above showed that asymmetric sig. the value was 0.047 and which was less than the p-value of expected results, the variables that the study used had systematic relationships between independent and dependent variables.

Assumption 2: Normality test

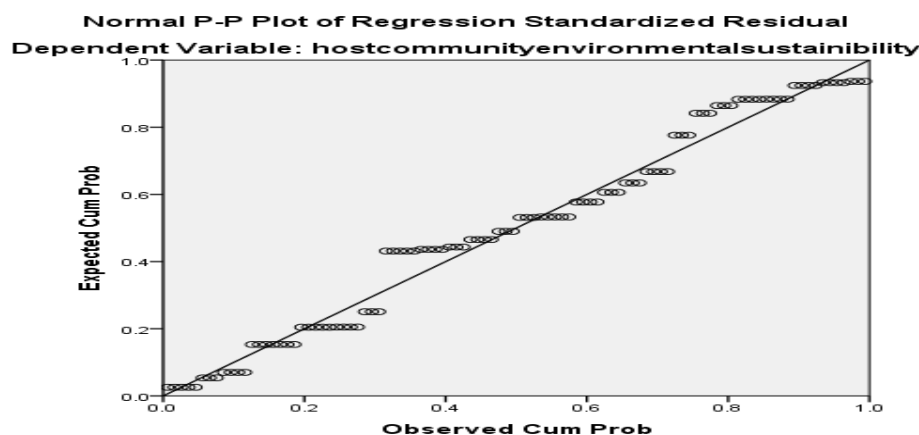


Figure 6: The normality test

Source: SPSS entered data results.

The above normality test graph or line indicated the step to determine the normal distribution of the data whether it was normal or not visualizing the fit of the normal distribution. To visualize the fit of the normal distribution, the study tried to examine the probability plot and assessed how closely the data points follow the fitted distribution line. Normal distributions tend to fall closely along the straight line and hence the probability plot test result above was indicated that the data were normally distributed and fitted.

Assumption 3: Histogram test

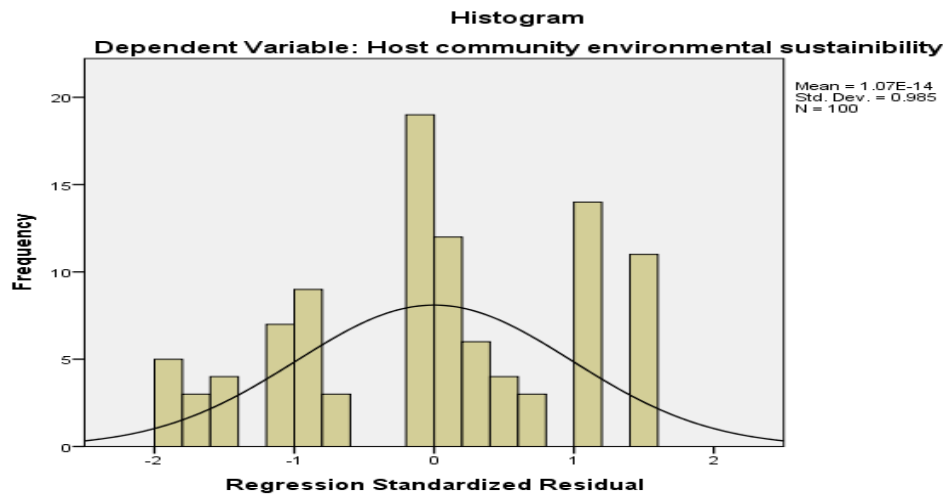


Figure 7: Histogram test

Source: SPSS entered data results

The above histogram test results indicated that in an equal-frequency histogram, the values are partitioned and each partition contains the same number of data. Since the histogram analysis can be applied recursively to each partition to automatically generate a multilevel concept hierarchy, with the procedure terminating once a pre-specified number of concept levels has been reached. The above test results also indicated that the minimum interval size above used per level to control the recursive procedure. This specifies the minimum width of a partition or the minimum number of values for each partition at each level. Histograms can also be partitioned based on cluster analysis of the data distribution.

Assumption 4: Multi collinearity diagnostic test

Table 16: Multi collinearity diagnostic test

Coefficients a										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	- 1.783	0.724		-2.461	0.016	- 3.221	-0.345		
	Environmental protection	1.096	0.048	0.501	22.956	0.000	1.001	1.191	0.994	1.006
	Host community status	1.138	0.039	0.669	29.060	0.000	1.060	1.216	0.894	1.118

Infrastructure access at host community	1.429	0.094	0.349	15.153	0.000	1.241	1.616	0.895	1.118
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a. Dependent Variable: host community environmental sustainability

Source: SPSS entered data results

The coefficient data results showed that there are serious problems with multicollinearity. Several r close to 0, indicating that the predictors are high intercorrelated and that small changes in the data values may lead to large changes in the estimates of the coefficients.

Finally, based on the above coefficient results tried to check out the absence of linear co-linearity results of vif values and Coefficients table results above are shown at the right end of the table, since found the VIF values less than 10, indicating that the assumption was met. Co linearity implies two variables are near perfect linear combinations of one another. In the presence of multi co-linearity, regression estimates are unstable and have high standard errors.

VIF

Variance inflation factors measure the inflation in the variances of the parameter estimates due to collinear ties that exist among the predictors. It is a measure of how much the variance of the estimated regression coefficient β_k is “inflated” by the existence of correlation among the predictor variables in the model. A VIF of 1 means that there is no correlation among the k th predictor and the remaining predictor variables, and hence the variance of β_k is not inflated at all. The general rule of thumb is that VIFs exceeding 4 warrant further investigations, while VIFs exceeding 10 are signs of serious multi co-linearity requiring corrections linearity implies two variables are near perfect linear combinations of one another.

4.3.3. Multi regression analysis

The multi regression analysis of this study was consists of three constant or independent variables like environmental protection, infrastructure access, host community economy status improvements, and also the dependent variables by considering or taking account, the researcher merged all related problems were organized and manipulated as host community environmental sustainability or the dependent one. So the regression results, each predictor impacts on dependent variables or the constant one, and other inferential statistical results are discussed below.

Table 17: The model summary for regression

Model Summary a										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df 1	df2	Sig.	
1	.977 ^a	0.954	0.953	0.56797	0.954	670.811	3	96	0.000	1.880
a. Predictors: (Constant), Infrastructure access at host community, Environmental protection, Host community economy status b. Dependent Variable: host community environmental sustainability										

The model summary in table 17 above represents how much the variance of the dependent variable or the host community environmental sustainability was explained by the multi regression model.

The model summary results above showed that the explanatory variables have the potentials to explain the relationships of the dependent and independent variables. Even though the results obtained or produced above were nearly the same, for analysis of this study was the researcher used the adjusted regression square results to explain the relationship between the explanatory variables and independent or constant variables.

The multi regression model summary results above indicated that an explanatory variable which is entered into the multi regression model on SPSS has a strong relationship with the dependent variable of host community environmental sustainability with coefficients results which discussed below and indicated that there were a strong cause and effect relationships between one variable to another.

The regression determination (R^2) 0.954, indicates the highest cause and effect relationships of the explanatory variables on the dependent variable. And also the adjusted R square value of 0.953 confirmed that 95.3 percent of the variation in host community environmental sustainability was explained by explanatory variables. The explanatory variables were found high prediction potential and were found strongly positive and significantly related to hosting community environmental sustainability since the p-value (sig.000) was less than the significant value of (0.01.), which indicated in the Anova table significant value results.

Table 18: The multi regression coefficients results

coefficients ^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-1.783	0.724		-2.461	0.016	-3.221	-0.345		
	Environmental protection	1.096	0.048	0.501	22.956	0.000	1.001	1.191	0.994	1.006
	Host community economy status	1.138	0.039	0.669	29.060	0.000	1.060	1.216	0.894	1.118
	Infrastructure access at host community	1.429	0.094	0.349	15.153	0.000	1.241	1.616	0.895	1.118

a. Dependent Variable: host community environmental sustainability

Source: SPSS entered data results

Based on the Sig.-values of the above coefficients table 18 results, it is possible to interpret whether each independent variable has a significant relationship with the dependent variable. The relationship is significant if Sig. value is not larger than 0.05, then the results above showed that there was a significant relationship between the independent variables like environmental protection, host community economy status, and infrastructure access and their produced sig. values above indicated that **(0.000)** with the dependent variable of host community environmental sustainability.

This means that each explanatory or independent variable was had the potential of predicting the dependent variable and also had strong cause and effect relationships between one to another or having their impacts on the dependent variable.

The multi regression coefficient results from table 18 indicated that, regarding the research study objectives, the internal and external factors have a positive or negative impact and significant influence on the explained variable or dependent variable. If any activity was done to increase or decrease the progress of each independent variable, the overall performance and progress of the dependent variable also increase or decrease.

Furthermore, the study attempted to identify which of the independent variables more contributed or predicted the dependent variable and this investigated via Standardized coefficients of the Beta value of the above table 18 results.

Based on results from the above table, the study identified that the highest beta value was (0.669) which produced by the independent variable or host community economic status was

the highest predicting potential or 66% explained the dependent variable of host community environmental sustainability than other, and hence the progressive activities which done to increase the economic status of host community also lead to increase the environmental sustainability of the community and the reverse was true. Similarly, the coefficient beta value of the independent variable of environmental protection which indicated the above-produced beta value (0.501) was preceded and has taken second place, and 50% predicted potential or explained the dependent variable and the activities which done to maximize the environmental protection were had apposite impacts for the long run environmental sustainability of the host community and the reverse was true.

Correspondingly, the independent variable of infrastructure access was found in the third place and it produced a beta value was (0.34) and 34% predicted the potential of the dependent variable or environmental sustainability of the host community.

In general, all the independent variable results produced on SPSS were enabled to conclude that the multi regression model was being explained or predicted by (0.954) or 95% of the variance of the dependent variable or host community environmental sustainability. And also the largest unique contribution provided by the independent variable was the provision of the host community's economic status and that makes a difference in addressing the constraints and the challenges of environmental sustainability for the host community.

To sum up, the research study finds out each independent variable has a positive or negative impact on host community environmental sustainability, now a day which found in doubt and however, the activity which done to accelerate the progress for each factor or independent variable by any partner, lead to overcome the challenges or constraints of environmental sustainability, concluded a positive impact and the reverse was true.

However, when comparing our study results to some related studies on refugee impact have been conducted in recent years from a different perspectives. The majority of the study result shows the impact of refugees on the host community environment around the established refugee camp settlement was the competition on natural environmental resources, jobs, housing, school, and health care facilities. As explained in the literature section another impact of the refugee camp's presence on the host community is infrastructure. In my study finding the different types of infrastructure established for the Bambasi refugee camp has impacted positively on environmental sustainability.

4.4. Land use land cover (LULC) result and discussion

The study used 2005 satellite imager data because the Bambasi refugee camp was established in 2009. The 2005 satellite imager data was important to control the comparison of the change in LULC change of the study area. The Land-use and land-cover (LULC) data provided essential information for environmental management and planning. This research studied analyzed satellite imagery data by time series land use land cover (LULC) change data in the study area of Bambasi refugee camp and surrounding host community. The land use/land cover map of the study area was generated using ERSDAS Imagine software by maximum likelihood supervised classification algorithm. In a supervised classification technique, the maximum likelihood algorithm will classify the image based on the training sets (signature) provided by the user based on his field knowledge. The training data has been given by the user to guide the software to what types of pixels are to be selected for certain land cover types. The classification finally gives the land use/land cover images of the study area. The land use land cover result is important to compare environmental impact before and after a refugee settlement and a refugee settled in the study area.

4.4.1. Land use land cover (LULC) map of 2005

Table 19: Land use/Land cover category classification in 2005

No.	Class name	Area in hectare	Area in percent
1	Forest	1110.4	33%
2	Agriculture	1594.6	48%
3	Bare land	629.7	18.8
4	Settlement	9.3	0.2%
	Total	3344	100%

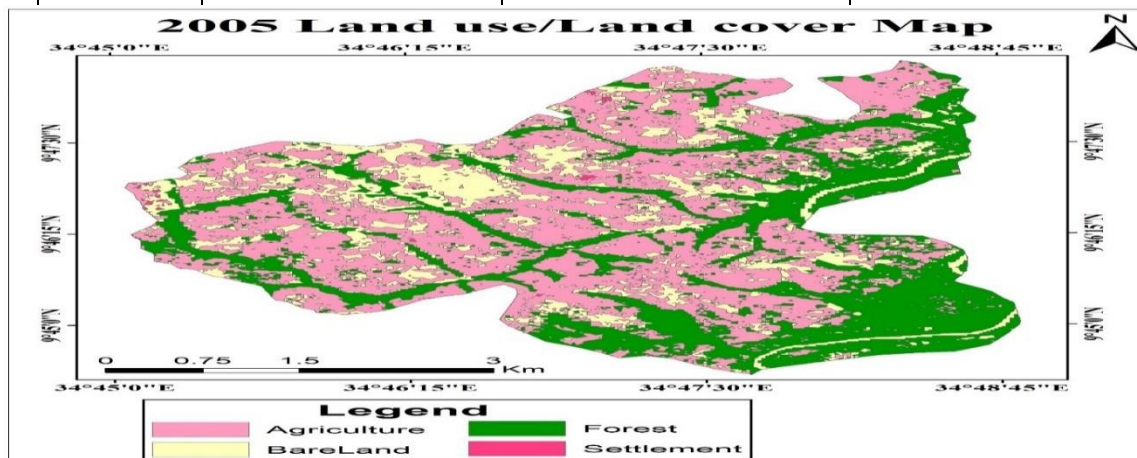


Figure 8: Land Use Land Cover Map of Study Area in 2005

Source: Author survey

As indicated in table 19 and figure 8 the LULC description of land cover category classification was agricultural have the highest share and followed by the forest land and settlement area have the smallest coverage in the study area. The shares of each of the land use/land cover were 1110.4ha (33%) forest area, 1594.6ha (48%) agricultural land, 629.7ha (18.8%) bare land, and 9.3ha (0.2%) settlement area.

4.4.2. Land use land cover (LULC) map of 2020

Table 20: Land use/Land cover category classification in 2020

No.	Class name	Area in hectare	Area in percent
1	Forest	171.6	5%
2	Agriculture	2307.8	69%
3	Bare Land	91	3%
4	Settlement	773	23%
	Total	3344	100%

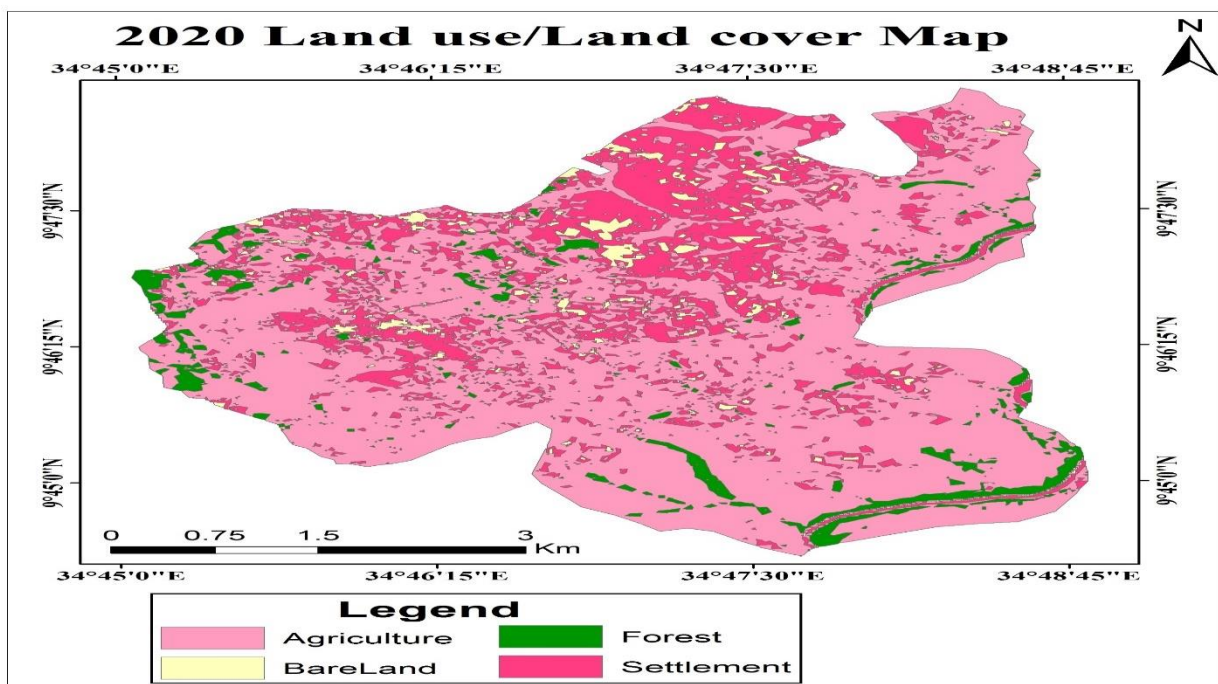


Figure 9: Land Use Land Cover Map of Study Area in 2020

Source: Author survey

The land-use/land-cover classification result of 2020 showed in table 20 and figure 9 that the dominant LU/LC classes were agricultural land and settlement area; whereas forest and

settlement covered the smallest area. From the total area of 3344 hectares; the shares of each of the land use/land cover were 171.6 hectares (5%) forest, 2307.8 hectares (69%) agricultural land, 91 hectares (3%) bare land, and 773 hectares (23%) settlement area.

4.4.3. Land use land cover classification accuracy assessment

Accuracy assessment is a process used to validate the accuracy of image classification by comparing the classified map with reference data (Caetano *et al.*, 2005). It is critical for a map generated from any remote sensing data. In this study, the Error Matrix was applied with some quality measures like the user, producer accuracy, and overall accuracy, and Kappa analysis. The common way to represent classification accuracy is in the form of an error matrix. An error matrix is a square array of rows and columns and presents the relationship between the classes in the classified and reference data.

This study examined the accuracy assessment of land use land cover classification using Google Earth. After the classification of land use land cover types, 47 Random Points were generated in Arc GIS and converting random points to KML to open in Google Earth. Each random point's value was verified from Google Earth for accuracy assessment. Google Earth model was used to measure how many ground truth pixels are correctly classified. The overall, user's, producer's accuracies, and the Kappa statistic of the land use land cover classification of both 2005 and 2020 of the study area were calculated from the error matrices as follows.

4.3.3.1. Accuracy assessment for LU/LC map of 2005

Table 21: The 2005 land use land cover error matrix for accuracy assessment

Class Name	Reference data					User accuracy
	Bare Land	Forest	Agriculture	settlement	Row total	
Bare Land	14	0	1	0	15	93.3
Forest	0	9	0	1	10	90
Agriculture	1	1	10	0	12	83.3
settlement	0	1	1	8	10	80
Column total	15	11	12	9	47	
Producer accuracy	93.3	81.8	83.3	88.8		

The overall classification accuracy was computed by the total number of correct class predictions (the sum of the diagonal value) divided by the total number of cells based on the formula below and in table 21.

$$\begin{aligned} \text{Total (overall) Accuracy} &= \frac{\text{Number of correctly classified (diagonal)}}{\text{Number of reference pixel (row)total}} \times 100 \\ &= (14+9+10+8) / (47) \times 100 \\ &= 87.23\% \end{aligned}$$

Kappa coefficient, which is one of the most popular measures in addressing the difference between the actual agreement and change agreement, was also calculated. The kappa coefficient was calculated based on the equation below.

Kappa coefficient

$$\begin{aligned} &= \frac{(\text{Total sample} \times \text{Total corrected sample}) - \sum(\text{Column total} \times \text{Row Total})}{\text{Total sample}^2 - \sum(\text{Column total} \times \text{Row Total})} \times 100 \\ &= (47 \times 41) - (15 \times 15 + 11 \times 10 + 12 \times 12 + 9 \times 10) / (47^2) - (15 \times 15 + 11 \times 10 + 12 \times 12 + 9 \times 10) \\ &= (1927) - (569) / (2209) - (569) \\ &= 1358 / 1640 \\ &= 0.82 \times 100 \end{aligned}$$

Regards, the 2005-year Land use land cover classification accuracy assessment resulted; an overall accuracy of 87.23% was achieved with a Kappa coefficient of 0.82. The Kappa coefficient lies typically on a scale between 0 and 1, where the Kappa > 0.82 indicated that there were strong agreement and good accuracy. Finally, the Kappa result was often multiplied by 100 to give a percentage measure of classification accuracy which is 82%.

4.3.3.2. Accuracy assessment for LU/LC map of 2020

Table 22: The 2020 land use land cover error matrix for accuracy assessment

Class name	Reference data					User accuracy
	Bare Land	Forest	Agriculture	Settlement	Row total	
Bare Land	12	1	1	0	14	85.71428571
Forest	0	10	0	1	11	90.90909091
Agriculture	1	0	10	0	11	90.90909091

Settlement	0	0	1	10	11	90.90909091
Column total	13	11	12	11	47	
Producer Accuracy	92.3076923	90.9090909	83.3333333	90.90909091	357.45	

The overall classification accuracy was computed by the total number of correct class predictions (the sum of the diagonal value) divided by the total number of cells based on the formula below.

$$\begin{aligned} \text{Total (overall) Accuracy} &= \frac{\text{Number of correctly classified (diagonal)}}{\text{Number of reference pixel (row)total}} \times 100 \\ &= (12+10+10+10)/ (47) \times 100 \\ &= 89.36\% \end{aligned}$$

Kappa coefficient, which is one of the most popular measures in addressing the difference between the actual agreement and change agreement, was also calculated. The kappa coefficient was calculated based on the equation below.

Kappa coefficient

$$\begin{aligned} &= \frac{(\text{Total sample} \times \text{Total corrected sample}) - \sum(\text{Column total} \times \text{Row Total})}{\text{Total sample}^2 - \sum(\text{Column total} \times \text{Row Total})} \times 100 \\ &= (47*42)-(12*14+10*11+10*11+10*11)/(47^2)- (12*14+10*11+10*11+10*11) \\ &= (1974)-(498)/ (2209)-(498) \\ &= 1476/1711 \\ &=0.86*100 \end{aligned}$$

Moreover, the 2020-year Land use land cover classification accuracy assessment resulted in an overall accuracy of 89.36% was achieved with a Kappa coefficient of 0.86. The Kappa coefficient lies typically on a scale between 0 and 1, where the latter indicates complete agreement and is often multiplied by 100 to give a percentage measure of classification accuracy which is 86%. Similarly, the Kappa result indicated that there were strong agreement and good accuracy.

4.4.4. Land use and land cover change detection from the year 2005 to 2020

Land use and land cover changes are identified as the major issues for environmental changes. After the classification of the land, the cover features the next step was land cover change detection. Land cover change detection is the process of assessing the spatial and

temporal land use/ land cover change in the study area. Land use/land covers were consecutively analyzed using satellite imagery of the 2005 and 2020 years of the study area. To generate land use land cover map both land use land cover map was overlapped analyzing by image differencing. The result of LULCC detection between 2005 and 2020 was presented in table 23 below.

Table 23: Land use land cover change detection from the year 2005 to 2020

LULC class	2005		2020	
	Area in ha	Area in %	Change in ha	Change in %
Forest	1110.4	33%	-938.8	5%
Agriculture	1594.6	48%	+713.2	69%
Bare land	629.7	18.8	-538.1	3%
Settlement	9.3	0.2%	+763.7	23%
Total	3344	100%		100%

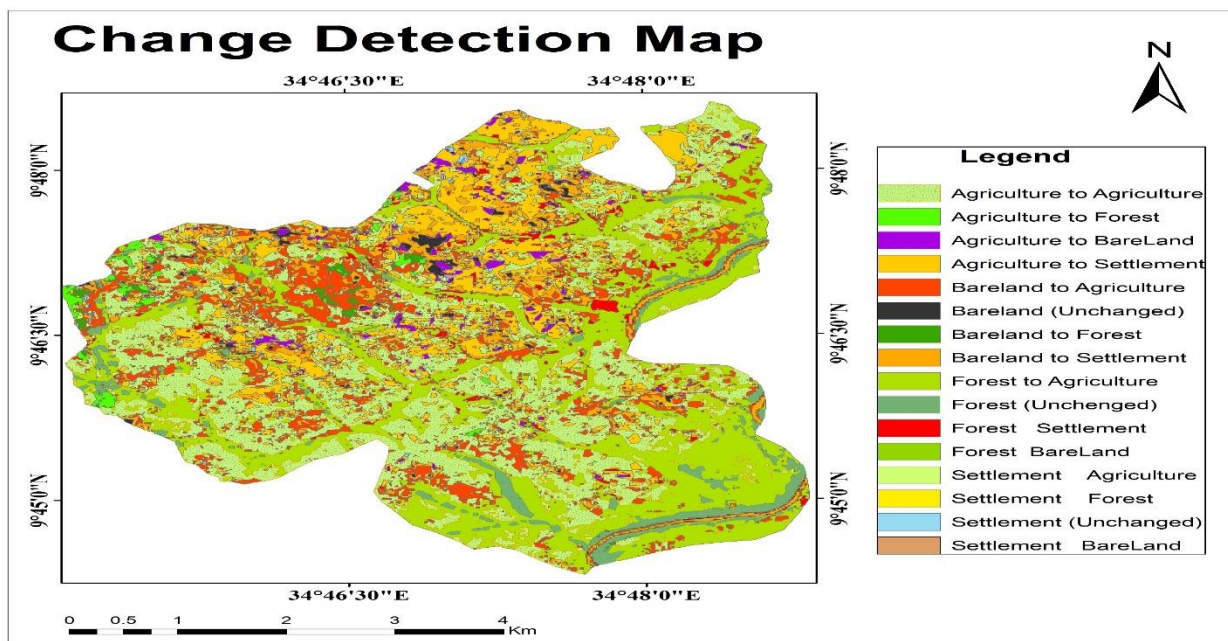


Figure 10 Land use land cover change analysis for 2005 to 2020

Source: Author survey

Additionally, to have a clear understanding of the cover changed class in the study area, the land cover and land-use change matrix were generated based on the land use land cover classification of 2005 and 2020. The major identified classes area and change statistics for both 2005 and 2020 years were summarized in table 23 and the map has shown in figure 10.

The LULC change detection summary result has shown that the agricultural land increases by 21% from 1594.6 hectares (48%) in 2005 to 2307.8 hectares (69%) in 2020.

Conversely, the LULC change detection finding confirmed that the forest land has decreased from 1110.4 hectares (33%) in 2005 to 171.6 hectares (5%) in 2020. Finally, the change detection was summarized in table 24, in which the column represents land use land cover in 2005 and the row represents land use land cover in 2020 in hectares.

Table 24: Matrix of Land Cover/Land Use Changes Between 2005 and 2020

LULC in 2005	Class Name	LULC in 2020				
		Forest area	Agricultural land	Bare land	settlement area	Forest area
	Forest area	121.85	917.75	3	66.5	121.85
	Agricultural land	28.54	1031.41	51.29	481.80	28.54
	Bare land	20.13	353.3	36	219.58	20.13
	settlement area	0.87	3.35	1.1	3.94	0.87

The study research additionally combines a geographic information system-based on land-use change detection to quantify the influence of changed land use cover classification of the forest, agriculture, bare land, and resettlement. The LULC change accuracy assessment results have reasonably indicated that the reliable land-cover features were extracted effectively from high-resolution imagery with the help of various digital image processing techniques.

Particularly, as indicated in the research objectives the research finding summarized that there was a significant relationship between land use cover and environmental impact in the Bambasi refugee camp. The LULC change result showed that the forest land and bare land has declined since refugee settlement in the Bambasi refugee camp. Consequently, the change in land use cover classification and the increase in the population of the study was one of the indicated driver factors for environmental impact. The negative environmental impact is one

of the challenges for the host community's environmental sustainability. Therefore, environmental problems identified in the area was farm and settlement land expansion, deforestation caused due to insufficient provision of cooking energy for refugees.

Regards, to LULC change detection result, has shown the key environmental concern in Bambasi camps is the fast depletion of forest resources in the surrounding camp environment with weak reforestation capacity. This finding was in line with fact that poor people are often forced to live in environmentally-fragile or degraded areas (Willis, 2005). Besides the major negative impact environmental was the change of forestland to agriculture farmland, other types of conversions including forest to settlements, forest to bare land identified in figure 10 result show that host community environmental sustainability was endangered. The links between environmental change and migration are extremely complex and an issue that demands international attention due to the potential causing host community displacement (EU, 2015).

Therefore, the research findings are directly in line with previous UNHCR research findings of the impact of environmental degradation on refugee-host relations a case study from Tanzania (Berry, 2008). According to UNHCR and other organizations working with refugees, as well as by independent researchers suggest that the presence of refugees often leads to environmental degradation and natural resource depletion both within and around the refugee settlements. finally, when comparing my study methodology with remote sensing GIS tools result with different researchers fact, it highly has a significant contribution by brought new knowledge for our field of study and to solve problems of environment in different development prospectives.

CHAPTER FIVE: SUMMARY AND RECOMMENDATION

5.1. Summary

Refugee-related environmental problems have their origin in the sudden imbalance between refugee requirements and host community or the area's environmental carrying capacity, made more serious by the absence of countervailing environmental action. The research study concluded that there were direct relationships between independent and dependent variables or a cause and effect relationship with one variable to another. So, the results were observed or find out on study, the host community environmental sustainability was found as major constraints and this may overcome, as long as the economic status improved and the reverse was true. The host community's economic conditions were one of the factors and makes the worst the challenges of environmental sustainability and this variable was the largest variable share that finds out in the study.

A key dependent variable in this research was the host community's environmental sustainability and its functional relationship has predicted by independent variables with highly significant P-value (0.000). The research finding was identified that there was a competition between refugees and the host community to use the natural resources to fulfill their basic demands. Globally, UNHCR was accountable to coordinate the fulfillment of basic needs assistance for refugees; the study area environment was still more sensitive to refugee camp activities due to lack of basics demands like ration aid was not sufficient.

Based on the results that were found out in the study, the researcher attempted to summarize the more significant results in line with each objective of the study: The first objective was to assess the major refugee camp settlements' basic demand fulfillments and their impact on the environment. In this case, the data distributed results find out on the study, the humanitarian response and its performance was very poor or not satisfied them and the study finds out that the majority of the refugee ration aid were very low, their income was very low, the shelter build for refugee was very weak even living under the shanty condition and all these incurred them to depend on the environment to fulfill the gaps and this was the major constraints and challenges the host community and their environment.

The second objective of this study was to assess the impacts of the refugee camp settlements on the host community's socio-economy and the surrounding environment. Accordingly, the research found that the majority of the study population's economic condition was poor and they engaged themselves in finding income another way through the day to day activities, as

a result of this they neglected to maintain or preserve the environment or the effort to mitigate the environment was very low, however, the long-run environmental sustainability became the big challenges. Now a day the environment protection activity was not a current source of income for the host community, that's why they seldom used such environmental protection activity at the expected level due to this the long-run environmental sustainability was found in danger.

Above all, the third objective was to assess land use land cover (LULC) change of environment in the study area. In conclusion, two-times series satellite imagery data found from remote sensing and GIS modeling estimated land-use cover change at the studied area of the Bambasi refugee camp and its surrounding environment has shown that there was a loss or decrease of forest land and in other way deforestation has increased, and this implies an adverse impact on the natural environment and the socio-economic sustainability of host community. Accordingly, the LULC change detection summary result has shown that the agricultural land class increases by 21% from 1594.6 hectares (48%) in 2005 to 2307.8 hectares (69%) in 2020. Conversely, the LULC change detection finding confirmed that the forest land class has decreased from 1110.4 hectares (33%) in 2005 to 171.6 hectares (5%) in 2020. Finally, the LULC environmental assessment results show that there were strong links between increasing refugee and deforestation in the studied refugee camp environment areas.

5.2. Recommendation

Generally, this research finding put forward the following recommendations for policy and decision-makers and academic researchers and for possible actions to be implemented by the responsible humanitarian organization and refugee host country government. Therefore, after final research results that found out the following suggestion points are recommended:

To reduce the burden and negative environmental impact due to inadequate supply of refugee household ration aid, cooking energy; and other requirements, the humanitarian agency must expand its response program to the development of alternative energy, infrastructure, and other humanitarian response that must fulfill the basic demands of the refugee.

The socio-economic condition of the host community should be improved to reduce the burden on the natural environment through different development alternatives that massively help the community.

Reforestation and other environmental protection activity should be promoted and changed to the work culture of the community and have to take into account that plantation as an income-generating activity to realize the host community economy sustainability.

The humanitarian organization, NGO, and host country government should link environmental activities with market-based income generation solutions to promote environmental sustainability.

Finally, future environmental planning and management activities must include indigenous knowledge with active community participation and should focus on minimizing dependency on the environment and way of increasing job opportunities for both refugees and the host community.

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Appendices

RESEARCH QUESTIONNAIRE

Dear participant,

This questioner is for a 2020-year regular graduate class student at Addis Ababa University College of Development Study Center of Environment and Sustainable Development. Currently, I am conducting research entitled **Impact of Refugee Camp Settlement on Host Community Environmental Sustainability: Case of Bambasi Refugee Camp Benishangul Gumuz Regional State**”. as partial fulfillment of requirements for the award of the graduate degree of Masters of Arts in Environment and Sustainable Development. Moreover, this study will have a significant contribution by analyzing the positive and negative impacts associated with refugee camp activities which support policy-makers in taking evidence-based decisions that contributing to generating new knowledge for mitigating negative environmental impact.

We would also like to assure you that we will strictly follow scientific research ethics by keeping any personal information that you provide confidentially and only used for academic purposes. The success of this study significantly depends on the quality of your response. Finally, respondents are kindly requested to answer the questions honestly and following the actual situation of provided questioners guided by researchers and nominated data collectors.

Thank you very much in advance for your time and cooperation to fill this questioner!

Appendix 1: Refugee households survey questions

1. When did you arrive in Bambasi refugee camp: _____?

2. Family size (According to ratio card): _____?

3. Age:

1. 0-4
2. 5-11
3. 12-17
4. 18-59
5. 60 and above

4. Sex:

1. Male
2. Female

5. Occupation:

1. Agriculture
2. Non-agriculture

6. Level of education:

1. Illiterates
2. Reading and Writing
3. Primary 1-8
4. Secondary 9-12
5. TVET
6. Degree
7. No response

7. Marital status:

1. Married
2. Unmarried
3. Divorce
4. Widowed

8. Sex of the household head:

1. Male
2. Female

9. Nationality: _____

10. Have you moved from place to place out of the refugee camp recently?

1. Yes
2. No

11. If the answer is Yes, for what reason do you move from place to place?

1. _____
2. _____
3. _____

12. Did you ever participate in short term skill vocational education?

1. Yes
2. No

13. If your answer to question no 3 is Yes, what was the training type?

1. Construction
2. Electricity
3. Farming

4. Services (hotels, restaurants, food, stylist, children caretaker, masseur, and so on)
5. Cooking
6. Other _____

14. What refugee camp environment condition looked like during your arrival?

1. Covered with dense forest
2. No forest
3. Agricultural farmland area
4. Open grazing land
5. Degraded land area
6. No response

15. How do you suggest your house/shelter condition you living inside?

1. Very good
2. Good
3. Fair
4. Poor
5. Very poor

16. Does the refugee have access to construction materials used for maintenance of shelter and compound fence building from relief organization?

1. Yes
2. No

If your answer is No, how do you get the construction materials?

17. What is the main source of your income?

1. Salary
2. Agriculture (Farm and Livestock)
3. Mining
4. Trades (Business income)
5. Ration aid
6. Other _____

18. Do you have access to the productive assets in the camp for additional livelihood opportunities?

1. Yes
2. No

19. If you answer Yes, What type?

- _____
- _____

20. What type of household energy commonly used for cooking?

1. Electricity
2. Kerosene stove
3. Firewood?
4. Charcoal?
5. Both Firewood and Charcoal

If using both, for which types of food are firewood preferred?

...and for which types of food is charcoal preferred?

RR 1. What is your source of used household energy?

1. Collected wood fuel from the open forest area
2. Collected wood fuel from the protected forest area
3. Purchased firewood
4. Purchased charcoal
5. Fuel supply from
6. Solar stove
7. Other _____

RR 2. Do you have livestock in the refugee camp?

1. Yes
2. No

RR 3. If your answer is yes, how do you get access to land for your livestock grazing?

Appendix 2: Host community households survey questions

- 1 Sex:**
 1. Male
 2. Female
- 2 Age:**
 1. 0-4
 2. 5-11
 3. 12-17
 4. 18-59
 5. 60 and above
- 3 Occupation:**
 1. Agriculture
 2. Non agriculture
- 4 Level of education:**
 1. Illiterates
 2. Reading and Writing
 3. Primary 1-8
 4. Secondary 9-12
 5. TVET
 6. Degree
 7. No response
- 5 Marital status:**
 1. Married:
 2. Unmarried
 3. Divorce
 4. Widowed
- 6 Household family size:** _____?
- 7 Sex of the household head:**
 1. Male
 2. Female

Host Community Socio Economy and Environment

- 1 Do you have your have land?**
 1. Yes
 2. No
- 2 If your answer is Yes, how many hector land?** _____
- 3 Do you have livestock?**
 1. Yes
 2. No
- 4 If your answer is Yes, how do you access grazing land?**

- 5 Do you have an additional source of income?**
 1. Yes
 2. No
- 6 If your answer is Yes Can you mention it?**

1. _____
 2. _____
 3. _____ etc.
- 7** What type of fuel do you use for cooking and heating?
1. Kerosene
 2. Wood
 3. crop residue
 4. cow dung
 5. other (specify) _____
- 8** Do you have a shortage of fuelwood?
1. Yes
 2. No
- 9** How can you describe your socioeconomic status after the refugee camp?
1. Improved
 2. no change
 3. decreased
 4. I don't know
- 10** How did you access infrastructure and basic services such as water, food, firewood, road, housing, etc. before the refugee presence?
- a) Very easily
 - b) Very difficult
- 11** Do you have any organized environmental management committee in the camp?
1. Yes
 2. No
 3. Not known
- 12** If your answer is Yes do you participate in the planning and implementation of environmental activities?
1. Yes
 2. No
- 13** The activities of the refugee camp increase job opportunities for the host community?
1. Yes
 2. No
 3. Not known
- 14** Do the practical activities following the establishment of a refugee camp have affected or reduced the farmland of the host community?
1. Yes
 2. No
 3. Not known

Appendix 3: Focus Group Discussion (FGD) Question for Host Community Stockholders, local Administration

- 1.** What are the major environmental issues in the host community around the refugee camp?

2. Is there any currently active environmental related project in the host community? What are these project activities?

3. Has there any conflict or tension between refugees and local communities due to natural resource competition around refugee camps? What type of resource?

4. How can you compare the forest coverage of an area in the past five years with the present?

5. What impact have you observed due to the presence of refugees in the host community environment?

a) Positive impacts

b) Negative impacts

6. What strategy do you suggest to minimize the environmental impact brought by refugees on the host community environment?

Appendix 4: Definition of research variables of this study

The study research has one independent variable and three dependent variables.

Independent variable

- Host community environmental sustainability

Dependent variables

- Environmental protection
- Economic condition
- Infrastructures

The three dependent variables used for this research study has defined as:

- ✓ Environmental protection refers to the practical activity of refugees, host communities, government and NGOs, and humanitarian agencies that contribute to the protection of the natural environment such as planting fruit trees, building trees, cooking wood trees, charcoal producing trees, and other income-generating forest plantation activities.
- ✓ Economic condition refers to the capacity of refugees and the host community to addressing the challenges of their decision on the scarcity of their basic demand and unemployment.
- ✓ Infrastructure refers to a well-designed facility that enabling improvement to the economic status and that have a positive impact on environmental sustainability in reducing the dependence of both refugees and host community on unwise use of the natural environmental resource.

Appendix 5: Photographic picture of Bambasi refugee camp

