COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR ENVIRONMENT AND DEVELOPMENTSTUDIES

IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN FOUR KEBELES OF DUGDA DISTRICT

BY: FEYISSA DEFAR

ATHESIS SUBMITTED TO CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN ENVIRONMENT AND SUSTAINBLE DEVELOPMENT

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DECLARATION

I, the undersigned declare that this Research Project is my original work and all sources of Materials used for the thesis had been accordingly acknowledged.

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CERTIFICATION

This is to certify that FEYISSA DEFAR has done a study on the topic "IMPLICATION OF SAND MINING ON THE ENVIERONMENT AND THE LIVELIHOODS IN FOUR KEBELESOF DUGDA DISTRICT." This study is his original work and all the sources of materials used for the thesis had been duly acknowledged.

Advisor's Name: **ENGDAWORK ASSEFA (PHD)**
Signature: _____
Date: _____

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ABSTRACT

This study examined the effects of sand mining on the environment and livelihoods of people in some selected Rural Kebeles (RK) of Dugda District in East Shawa Zone of Oromiya Regional State. Sand mining sites were provided legally registered and licensed by governmental stakeholders to the people engaged as the sand miners. In District 22 kebeles out of the total 40, the society are directly or indirectly the one benefited from or exposed to it and the study area was quantitatively and qualitatively factors which are not addressed yet. This study had endeavored to seek to fill the gap with the aim of ensuring that maximum benefits are gained from the operations of sand mining without causing much destruction to the environment and other livelihood activities especially farming.

In this study, primary data collected from four RKs in the District namely; Birbrsa Gale, Dongorota Gusa, Oda Boqota and Sera Wakale. Three hundred thirty seven (337) respondents were chosen using the systematic sampling and purposive sampling for 22 key informal interview techniques in the research. Data from the respondents were collected using field observations, questionnaires and interviews. The quantitative data were analyzed using such as Chi-square and Correlation, crosstab and compared means. The qualitative data were analyzed using content and thematic investigation of actions as they unfolded in the field. The study found that, primarily unemployment influenced people into sand extraction or harvesting. Also, very high incomes and regular revenue from the sales of sand were created to be some of the positive effects of sand mining on livelihoods and source of taxation for Meki town and the District as well. Sand contributed its own role for construction industry to the regional and national level.

Sand mining was found to have negative effects on livelihoods damaged public and private properties by unplanned pathway trucks destroyed roads; farmland, vegetation and caused dust during dry season and muddy during the rainy season, road vehicle trafficking in the area caused accidents. Sand mining caused effects on the environments (Meki river) by depth many holes dug in different places as people engaged increased, the river bed has expanded in both directions north-south of kebeles, as well as the river bed degraded by sand miners path time to time and vegetation roots destroyed and fall down on the river surrounding, The study found that, although sand mining supports the livelihoods of some people, it also has the able to devastating the environment and destabilizing the livelihoods of farmers and communities through various negative actions. The study recommends that, sand mining rules and regulations enforced into the laws be established and enforced by levels of concerned government body at the grass root to be functionalized. Such a move could prevent the sand miners from causing unwarranted destructions to farmlands, vegetation and water bodies (river). Again, sand mining sites should be properly demarcated and operated by the local authorities to confirm that, environmental impact assessments are done on such lands prior to mining the sand.

Keywords: sand mining, environment, livelihood, sustainable development, life cycle

ACRONYMS

CSA	Central Statistics Agency
DFID	Department for International Development
EPFCCA	Environmental Protection, Forestry and Climate Change Authority
EPM	Environmental, Planning and Management
GIS	Geographical Information System
GOV	Government
GPS	Geographical Positioning System
HH	House Hold
LDC	Least Developed Countries
LUAO	Land Use and Administration Office
MSSE	Medium and Small Scale Enterprise
MDA	Mining Development Authority
OPEDC	Oromiya Planning and economic Development Commission
ORS	Oromiya Regional State
KII	Key Informant Interview
PEDO	Planning and Economic Development Office
RK	Rural Kebeles
SD	Sustainable Development
SEM	Sustainable Environmental Management
SM	Sand Mining
SNNP	South Nation Nationalist People
WWF	World Wildlife Fund
UN	United Nations
UNEP	United Nations Environment Programme
US	United State

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CHAPTER ONE

1. INTRODUCTION

1.1. Background

Sand is a natural aggregate formed by rock erosion over thousands of years. Evidence of sand used as an aggregate material for different civil constructions dates from ancient times. The mortar used for bounding Egyptian pyramids blocks was a mixture of clay and sand or a mixture of mud, lime and sand. Jackson et al. consider that the mortar produced by Romans 2000 years ago (as a combination of limestone and volcanic sand) had an essential role for preserving the buildings over centuries. The situation is not completely different today, as sand is still used intensively in the construction industry, but currently there are also many other industries that use this natural resource. Thus, sand is used as a main component in various construction materials such as cement, mortar, tile, brick, glass, adhesives, ceramics, etc.; and it has an important role in water filtration, in chemicals and metals processing and in plastic industry. These multiple utilizations led to an exponential consumption growth and this trend is expected to continue due to population growth and increasing standards of living (Dan Gavriletea, 2017)

Over 70 countries many sand miners are operating illegally according to widespread reports in local media, extracting dwindling supplies of river and coastal sand, often with the support of complicit governments. Unsurprisingly, violence follows in their wake as well as damage to rivers and ecosystems(WWF, 2018)
The importance of sand in the developing world cannot be neglected. We need it to build the houses we live in, make glasses we drink from and to create computers we work on, and yet it is being extracted faster than it can be replaced. A lack of oversight and monitoring is leading to unsustainable exploitation, planning, and trade. Removal of sand from rivers and beaches has far-reaching impacts on ecology, infrastructure, national economies and the livelihoods of the three billion people who live along the world's river corridors (Hackney, 2019).

When populations grow and urbanization rates increase, so does the demand for sand used in construction. Such high demand rates have often contributed to the use of unsustainable methods for sand extraction and illicit sand mining. These adverse effects of sand mining are causing erosion, sandy beaches and river banks damaging local wildlife, killing aquatic ecosystems, and making areas more vulnerable to flooding and adversely affecting tourism. Sand mining destroys the aesthetic beauty of beaches and river banks, and also makes the ecological system in these areas unstable (Nag, 2018).

Excessive sand mining is a threat to bridges, river banks and surrounding structures. Impacts include degradation of beds, coarsening of beds, lowering of tables of water near the streamed, and instability of channels. Continued extraction also causes the whole streambed to degrade to the excavation depth. Sand mining generates extra vehicle traffic, which negatively impairs the

environment. Where access roads cross riparian areas, the local environment impacted (The Ojos Negros Research Group, 2004).

After water, sand has quickly climbed the list of endangered natural resources as the second most mined natural resource with many pointing to the construction industry as the main driver of global sand scarcity. For a sense of scale, between 2011 and 2013, China used more sand than the United States did throughout the 20th century. This rising demand for sand not only has devastating effects on the environment, including a rapid intensification of (LieslFrankson, 2019).

Sand is the world's most important raw material, after water. But those miniscule grain ' freely available stocks are slowly becoming scarce. How does it intend for scientists to improve that? Our everyday life is built on sand. It can actually be found almost everywhere: in glass, toothpaste, hairspray, and even in engines and microchips for aircraft. Around 3 metric tons of sand per metric ton of cement is required when it comes to concrete production. UNEP estimated in 2014 that between 26 and 30 billion metric tons of sand are poured / shoveled into cement mixers worldwide every year - and this amount is set to increase (Infra Bazaar, 2186).

It also highlighted that demand for sand has increased threefold over the last decades, driven by changing patterns of use, growing populations, increasing urbanization and rapid development of infrastructure. "Unlike other important environmental concerns such as air pollution, sand mining has not earned the attention it deserves." Even unsustainable sand mining has significant impact (MayankAggarwal, 2019).

Sand traditionally has been a local product. Demand will increase further as urban areas continue to expand and sea levels rise. Major international agreements such as the 2030 Agenda for Sustai nable Development and the Convention on Biological Diversity promote responsible allocation o f natural resources, but there are no international conventions to regulate sand extraction, use and trade (http://www1.basf.com, 2017).

Sand and gravel materials are often used in Ethiopia’s construction sector. However, the impacts of sand mining on the water body’s habitat and biodiversity are not yet considered in the country. Sand is mainly used for house construction and is in high demand in newly developing countries like Ethiopia, as the construction sector is one of the driving forces for fast economic developme nt (de Leeuw et al., 2009). Though sand mining brings economic and social benefits and plays a r ole in the development of many countries, excess extraction of sand has led to degradation of the environment (Sonak et al., 2006) (TokySiddiquee, n.d.).

Similarly, in Oromia Regional state, the rapidly growing population in urban areas has contribute d to increased demand for sand resource to meet the rising needs of building and construction ind ustry. This increased demand of the resource is making sand harvesting to be widespread, highly unregulated, and uncontrolled and being carried at alarming rate.

Out of 20 zones that located in the Oromiya Regional State, East shawa zone, mostly in the rift-valley area, is known by the mineral resource like stone, sand and others that is used for industry and different construction purpose that is approved by study. Especially, minerals mining used for different construction sector that are contributed for the Regional state of Oromiya as well as for the nation, the source of these minerals is East Shawa that playing a great role contrib ution, obviously known (Oromiya Rural Land and Environmental protection Bureau, 2016).

Extensive and uncontrolled sand mining has been ongoing in East shawa zone, Dugda District. It is in this context the research was conducted to understand the state of sand mining in this distric t of the rural kebeles (RK) where the sand mining or extraction widely undertaken by industry/ originality mining, private sector (Darba and Dangote which are extracted in two PAs pumice as raw materials consumption for their Cement Factories) and many legal established micro and small scale enterprises groups that participated on both sand and pumice minerals mining activities are identified that covered large land areas of PAs in the district; and implications that have been affecting the local communities.

1.2. Statement of the Problem

Mining of sand is a major source of income and employment for some people. Globally, many people are increasingly being influenced into sand mining on daily basis (Robert, 2014). This trend of mass movement of people into sand mining has become a major concern for people living in the sand mining fringe communities (Saviour, 2012, Mensah, 1997). However, all the efforts by various governments in curbing this phenomenon have not been very successful; due to the benefits associated with sand mining and other factors (Kusum, 2015).

The effects of sand mining on the environment and livelihoods have been extensively covered in the literature. For instance it has been noted that, unscientific sand mining degrades the land through disturbance of aquifers, leading to water crisis and dangerous ecological problems in the affected region (Saviour, 2012; Ashraf et al., 2011; Ghose, 1989). Other studies have also revealed that, the environmental problems created by indiscriminate sand mining threaten the livelihoods of people residing in the sand mining fringe communities. These livelihood challenges are sometimes manifested through the depletion of ground water which reduces water availability for industrial, agricultural and domestic purposes. Also, the destruction of agricultural lands and damages caused to farm roads by sand miners lead to loss of employment to farm workers and people who depend on such lands for their survival (Hoering, 2008; Viswanathan, 2002). According to Willis and Garrod (1999), sand mining is a major cause of conflicts in the sand mining fringe communities, because of the excessive noise, water pollution, unpleasant landscapes and other negative effects.

Ethiopia has a huge potential of various mineral resources, but not yet well explored and exploited, and hence its contribution to the overall economy or GDP is low. However, as reported by the World Bank Group (2014), its contribution to the foreign exchange earnings reached about 10% of which the artisanal mining takes the lion’s share of over 65%. The

artisanal mining also significantly contributes to the employment of at least 1.26 million people and supports the livelihood of over 7.5 million populations. Strong governance and management of the Artisanal mining sector will help the government of Ethiopia capture the positive benefits of Artisanal mining while ensuring that any negative environmental, social and economic impacts are minimized or eliminated(Ethiopian Ministry of Mines and Petroleum, 2019).
Issues relating to environmental sustainability and the protection of other livelihood activities during sand mining described for concerted efforts by all the stakeholders in the sand mining by Medium and small scale enterprises/MSSE/ sand miners to find a way out. However, the roles of established institutions in the sand mining MSSE/pumice mining industry are not properly researched hence the need for further investigations into that. Sand mining activities in these communities are done on farmlands and water bodies like rivers. This situation has the tendency of causing harm to the livelihoods of some farmers in these communities, when their farmlands are used for sand mining. Again, sand mining in places with vegetation could also lead to the degradation of the environment in such areas. It is for this reason that, an inquiry into the upsurge in sand mining activities in those communities was deemed necessary.

The Study Area that had been undertaken, Dugda District is one of the 11 districts of East Shawa Zone in Regional State of Oromiya is located in the central part of Rift Valley. The district is highly enriched with two different minerals such as sand and pumice mining which are used for construction purpose. Common Minerals under extraction in the district are sand, pumice and 'sadeka' stone mining. There are about 59 micro and small scale enterprise (MSSE) established cooperatives which most of them are working on sand and pumice mining activity in more than 22 Peasant associations/communities of which 2 kebeles are 01 and 02 in Meki town and the rest are in the RKs of the district (Dugda district PLEDO, 2010 E.C).
Through the aforementioned opportunities and constraints are the true highlight of sand/pumice mining in LDCs including, our nation and region, now are the communities in the district are exposed to the environment and livelihood problems in which the need focused researchers. It is hardly surprising that to identifying the factors causing environment effects and livelihood problem the district local community a grass root level which in the area. Generally, the study area quantitatively and qualitatively factors which are not addressed yet. That is, research that examines the effect of sand mining on livelihoods, the environment and also assesses the roles and challenges of the local authorities in the sand mining industry is lacking, in the selected study communities and the Dugda District as a whole.
It is this gap that this study had seek to fill with the aim of ensuring that, maximum benefits are gined from the operations of sand mining, without causing much destruction to the environment and other livelihood activities especially farming. District mining Councils include (EPFCCA, MDO & LUAO). Thus further, the key objective of the needed research is to explore the factors that affected people in sand mining, as well as to discover information about how sand mining practices impact living conditions and the environment. The study further explored the challenges faced by local GOV and NGO institutions, and how they handled sand mining issues.

The following research questions were advanced for the study, based on the above discussions:
i. What are the drivers that influence people into sand mining?

ii. How does sand mining affect the livelihoods of the people in the study area?

iii. How does sand mining distress the environment (biodiversity, water bodies)?

iv. What are the roles stakeholders in ensuring sustainable environment and livelihoods security?

1.3. Study Objectives

The general objectives of the study were to examine the effects of sand mining on the environment and livelihoods of communities in the Dugda District. The specific objectives of the study were to:
i. Ascertain the drivers that influence people into sand mining;

ii. Examine the effects of sand mining on the livelihoods of the people in the study area;

iii. Investigate the extent to which sand mining has affected the physical environment;

iv. Assess the role of stakeholders in ensuring sustainable environment and livelihoods.

1.4. Research Propositions

The study had been guided by the following propositions:
i. Unemployment is an important driver which influences people into sand mining.

ii. Higher income gaining is a major positive effect of sand mining on livelihoods.

iii. Deforestation is a factor of the negative effects of sand mining on the physical environment.

iv. Government and non-governmental agencies deliver adequate support to farmers who have been adversely affected by the operations of the sand miners.

1.4.1. Limitations of the Study

In the time data collection the writer has been faced with different problems. The absence of required data at the district, zone, and region even at the national level as it might or not the first research on this research title. The coverage area of the study was very huge in the sense that, it was covered 4 PAs sites in the Dugda district in the East Shawa zone of the region. This was make movements from one place to another difficult in terms of no transport facility for research er and enumerators, longer distances to travel and time constraints. Also, there were problems wi

th acquisition of data from some of the respondents. In addition, involuntariness of individuals to give the right information (data) which was already at their hand was main problem. That is, mo st of the respondents, especially the sand miners left for work very early in the morning and was returned home late. These were made it difficult to have easy access to them for the needed infor mation. There were also problems of funding the study in terms of providing for transportation c osts (logistic) including per diem and equipments such as cameras and writing materials.
Notwithstanding these limitations, the study was successfully carried out by take on certain justifying measures. For instance the problem of large coverage area, time and longer distances to travel on foot and by motor bike (3 persons including the driver) was solved in oriented data collector and supervisor more research assistants to assist in the data collection exercises. The problem of lack of easy access to some of the respondents was resolved by call them during their non-working days. Some of them were also visited in their work places. Financial assistance was covered own also beg from offices and family members to cater for transportation costs, payments to the research assistants and also to procure equipment such as stationeries cameras for the study.

1.4.2. Significance of the Study

This study was necessary because there is limited information about how sand mining relates to livelihoods and the environment. Meanwhile, sand mining had become a key component of livelihood activities for many communities in the district, zone, and region and in the nation level. The study was determined the livelihood challenges and opportunities associated with sand mining in the affected communities. It has brought to light the extent of destructions caused to the environment by sand mining in the communities involved. This study was beneficial to the policies necessary for ensuring SEM during and after SM was highlighted. This provides directives to the government through the EPFCCA and other ministries in ensuring proper environmental management in the ORS and the country as a whole. This study is invaluable to the sand mining communities because, it had come out with strategies that could be adopted to protect those whose livelihoods are limited as a result of the sand mining work. Farmers, especially those in the study areas, would therefore be relieved from the threats of unsustainable sand activities, hence produce enough crops or other alternative method to ensure food security. The study had also relevant in promoting education on the risks of sand mining in the regional state and the country as a whole in terms of livelihoods security and environmental safety. Finally, the study is produced a document that could be useful to other scholars intending to undertake research on the risks of unguided sand mining on livelihoods and the environment.

1.4.3. Scope of the study

To make the study more manageable, in terms of the geographical area, the type of respondents to be studied, the issue to be analyzed and the breadth and depth with reference to the topical scope is made. Therefore, the study is bordered from the viewpoint of manageability.

Accordingly, data collection was made based on sample survey to cover more relevant information regarding sand mining effects on the environment (land degradation on the river and farmlands) and positive and negative livelihoods and the role of stakeholders on the issues.
The survey included sample farmers and MSSE sand miners' households in Dugda District. Efforts were made to cover four selected Kebeles with systematic representation and with reference to the study topic. Purposive sampling techniques used for KII respondents.

1.4.4. Organizations Thesis

This study is tried to evaluate the implications of sand mining on livelihoods and the environment in some selected communities in Dugda District. The thesis is organized into Five (5) chapters. Chapter One focused on the general introduction, which includes the background to the study, the statement of the problem, the objectives, the research propositions, limitation , scope of the study, and the significance of the study and organizations thesis. The Second Chapter held the review of related literature and Conceptual issues. The Third Chapter saw methodology and the study areas. It highlighted the location and size, vegetation, population and the economic activities, Environment condition of the study areas. Chapter Four covered result and discussion of the research socio-demographic characteristics of the respondents and the factors that influence people into SM, the effects of sand mining on the environment and livelihoods, and how the stakeholders are responding to the consequences of sand mining and Chapter Five addressed the summary, conclusions and recommendations from the study.

2. CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1. Definition and Overview of Sand Mining Activities

Sand is a mixture of small rock grains and granular materials that is primarily characterized by thickness, being finer than gravel, and coarser than silt. And it is from 0.06 mm to 2 mm, in thickness. Particulate matter larger than 0.0078125 mm but smaller than 0.0625 mm is called silt. Sand is made by erosion or broken pebbles and weathering of rocks, which is carried by seas or rivers. And freezing and thawing during the winter break rock up the sand will be made. Sometimes Sand on beaches can also be made by small broken-up pieces of coral, bone, and shell, which are broken up by predators and then battered by the sea, and even tiny pieces of glass from bottles discarded in the sea and other mineral materials or the bones of fishes or other oceanic animals. Sand can be also considered as a textural class of soil or soil type. A sandy soil is containing more than 85 percent sand-sized particles by mass. Sand consists essentially of unconsolidated granular materials consisting of either rock fragments or mineral or oceanic materials. It is made mostly of silicate minerals and granular particles from silicate rock. Quartz is generally the most dominant mineral here as it possesses highly resistant environmental properties. Certain rising rock forming minerals such as amphiboles and micas occur in sand as well. Strong minerals like tourmaline, zircon etc. can also be found in smaller amounts in the sand. But most sand on the beach, from a high level, is made up of gray or tan quartz and feldspar. Nevertheless, quartz–also known as silicon dioxide–is the most common mineral in sand. This is formed by the combination of silicon and oxygen. Feldspar is the most abundant group of minerals on the surface of the earth and forms about 65 per cent of the earth's rocks. They transport these teeny tiny granules to the beach when the wind and sea whip up on the shores, and make up the sand with this combination(Augustine, 2013).

“Sand mining” is a practice that is used to extract sand, from various environments, such as beaches, inland dunes and dredged from ocean beds, and river beds of deltaic regions. The mining is in operation in all the continents of the Globe. Environmental problems occur when the rate of extraction of sand, gravel and other materials exceeds the rate of deposition (PodilaSankaraPitchaiah, 2017)

Sand mining is the process of extracting sand from an open pit, sea beaches, rivers and ocean bed s, river banks, deltas, or inland dunes. The extracted sand can be used for various types of manuf acturing, such as concrete used in the construction of buildings and other structures. The sand ca n also be used as an abrasive or can be mixed with salt and applied to icy roads to reduce the mel ting point of ice (Nag., 2018).

The activities of sand and stone mining in Ethiopia dates back to time immemorial. However, there is limited information about the exact period this phenomenon began in the country (Biney, , Roberts, G., Amuzu, Bannerman, 1993; Sakey, 1991; Biney, 1982). This could be explained by the fact that most of the sand miners fail to register their activities Effects of Sand Mining on

Livelihoods. The effects of sand mining on livelihoods could either be positive, negative or a combination of both (Akabzaa, 2009). The consequences of sand mining activities are considered positive when desired or profitable outcomes emerge from it. It may be viewed as negative when unintended or destructive outcomes are experienced. The effects of sand mining activities are addressed in the following sub-sections.

2.1.1. Positive Effects of Sand Mining on Livelihoods

Notwithstanding the numerous challenges associated with the activities of sand mining, it is also believed to have significant contributions to livelihood enhancement and economic development of many nations. For example, the total amount of money earned from the exportation of sand globally by countries such as Germany, Turkey, India, Italy, Belgium and others in the year 2010 amounted to over $31 billion (United Nations Commodity Trade Statistics, 2010). Sand mining is also a major source of employment for many people around the globe (Asha, 2011).

A survey conducted by the Sand Times in 2010 discovered that, the activities of sand mining employed the majority of the people in the North Stradbroke Island (Sand Times, 8th September, 2010). The significance of sand to the construction sector cannot be ignored. The activities of sand mining produce aggregate materials such as gravel and sand that are used in the building of houses for shelter, landscaping and infrastructure development activities such as roads, railway lines and other general construction uses. For example, very large quantities of sand are required for building houses, motorways and railway lines (Velegrakis, Ballay, Poulos, Radzevicius, Bellec, Manso, 2010)).Sand and stone mining further leads to increasing sales of goods and services such as selling of water, foodstuffs and high patronage of taxi cabs in areas where these activities occur (Asante, Kabila, Afriyie, 2014), (Salifu, 2016).

2.1.2. Negative Effects of Sand Mining on Livelihoods

Sand mining is viewed by many scholars as an activity that destroys livelihoods of people. The extraction of sand and gravel resources has adverse environmental impacts which eventually pose livelihood risk to people (Sonak et al., 2006; Kelley, Ramsey and Byrnes, 2004; Kondolf, 1994).

The activities of sand mining also leads to the destruction of public properties such as roads, electricity poles, telephone masts, underground pipes and other social amenities which supports people's livelihoods (Saviour, 2012; Collins and Dunne., 1990; Viswanathan, 2002). Sand mining activities further weaken the livelihood foundation of people because it brings about land use conflicts due to its numerous negative externalities (Turner et al., 2007; Rodriguez and Beard., 2006; Willis and Garrod, 1999). The section that follows provides a detailed discussion of the negative effects of sand mining on the environment. This is the same phenomena in developing countries including our nation, regional state and districts of sand mining that the research study area will be undertaken (Salifu, 2016).

2.2. Effects of Sand Mining on the Environment

Sand mining and the exploitation of natural resources across the globe, have significant adverse effects on the environment (Awudi, 2002; Akabzaa, 2000). The negative impacts of sand mining on the environment can be categorized as follows: damage to riparian and non-riparian habitat and organisms, destruction of water bodies; and damage to public and private properties.

The activities of sand mining lead to the destruction of vegetation, agricultural and non-agricultural lands (Aromolaran, 2012; Hedge, 2011). Sand mining along streams has led to the destruction of several hectares of fertile streamside lands annually. Also, a lot of valuable timber resources and wildlife habitats have been lost to the activities of sand mining. Sand miners have created gullies on agricultural lands and forest reserves in several places (Tariro, 2013). The scooping of sand from the ground destroys the vegetation cover and the soils which serve as the habitat for wildlife. This situation destabilizes the ecosystem of living organisms thereby imperiling their lives (Lawal, 2011; Ambak and Zakaria, 2010; Phua et al., 2004). The extraction of sand from river beds creates gullies on the floors of the rivers. These deep pits on the river beds degrade or lower the groundwater table; consequently, wells in such places become dry (Peckenham, Thornton, Whalen, 2009; Selvakumar ,Venkataraman, Sundaravaradarajan, 2008; Hemalatha, Chandrakanth, Nagaraj, 2005),(Salifu, 2016).

2.3. The Roles of Institutions in providing environment sustainability and the Livelihoods

Institutions are organizations with a mission to achieve or regularize practices which have been performed over time (Leach, et al., 1999). Institutions can also be described as policies, laws, rules and norms governing the behavior of something (Bandaragoda, 2000; Coward, 1980). Institutions can be in the form of explicit rules such as written laws, procedures and constitutions, or they can be implicit rules such as social conventions, norms and traditions (Scoones, 2009; Jepperson, 1991). A lot of organizations provide services to rural communities, with the aim of securing their livelihoods.

Any analysis of rural livelihoods should therefore consider the wide range of institutions and organizations operating at different levels, from within the household through to the national and international level (Laughlin, 2004).

In the context of this study, sand mining which is associated with the destruction of large tracts of lands is regarded as a shock to the affected communities. Under the circumstances, the role of various institutions in providing livelihood security becomes paramount.

Notwithstanding these roles, there are contestations about the performance of these institutions when it comes to dealing with the impacts of sand mining on residents of sand mining fringe communities. It remains to be seen whether these institutions play their roles as expected.

Although other studies about sand mining in nation or region level did not undertake also dealt with the effects of sand mining on the environment and livelihoods, the roles and challenges of the local authorities in the sand mining industry clearly not practically applied. Therefore the holistic examination of the implications of sand mining on livelihoods, the environment and the assessment of the roles and challenges of the local authorities in the sand mining industry, as espoused by this study is a novelty (Salifu, 2016).

2.4. The Concept of Sustainable Livelihoods

Associated with the concept of sustainable livelihoods are fundamental to the debate on rural development, wealth creation and the management of the environment (Scoones, 2009). Helmore and Singh (2001) identified sustainable livelihood as one that maintains ecological integrity of the environment. The term livelihood has however attracted different definitions from many scholars. According to Chambers (1995), a livelihood consists of the resources that are used by individuals in undertaking an activity, with the aim of making ends meet or gaining a living. A livelihood as explained by Ellis and Freeman (2004), comprises the occupation that help people to earn a living as well as the resources, capabilities and institutions that constraints or assist people in pursuing a given livelihood activity. Chambers and Conway (1991) also provided their definition for livelihood. A livelihood in their view consists of the assets of individuals, their capacity or potentialities and all the activities that are needed for their survival or a means of living. A livelihood is said to be sustainable when it has the ability to withstand difficulties and regain its strengths from stress and shocks to enhance its capabilities, whilst not subverting the natural resource base (Chambers & Conway, 1991).

Livelihoods refer to the whole complex of factors that allow families to sustain themselves materially, emotionally, spiritually and socially. Central to this is income, which could be in form of cash, or in the form of natural products directly consumed for subsistence such as fuel or building material (Shepherd 2005)

2.6 Conceptual Framework of sustainable livelihood

This section focuses on the conceptual framework that was used in discussing and analyzing the study. The framework was adopted from the Sustainable Livelihood Framework by the Department for International Development (DFID, 1999). The concept of livelihood has attracted the attention of scholars and development agencies all over the world for some time now. The prominence of this concept dates back to the works of Robert Chambers, Conway and others in the mid-1980s. The DFID designed a Sustainable Livelihood Framework in the year 1999 and it has been used by many including Dauda, Mariwah, Abane (2011), Cahn, (2002), and Brycesson (1999) to analyze rural livelihoods. For the purpose of this study, the DFID‟s Sustainable Livelihood Framework has been adapted, modified and used as the conceptual framework that underpins the study. The framework as illustrated below is in five parts namely the Vulnerability

Context, Livelihood Assets, Organizations and Institutions, Livelihood Strategies, and Livelihood Outcomes.

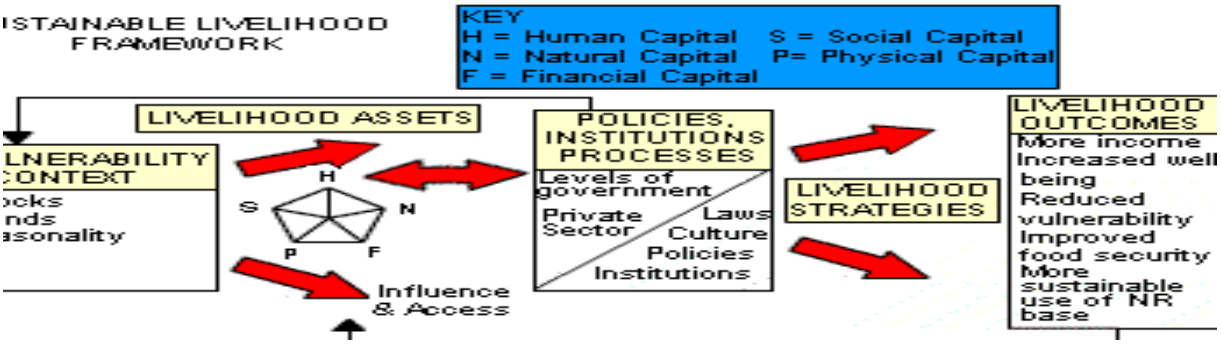
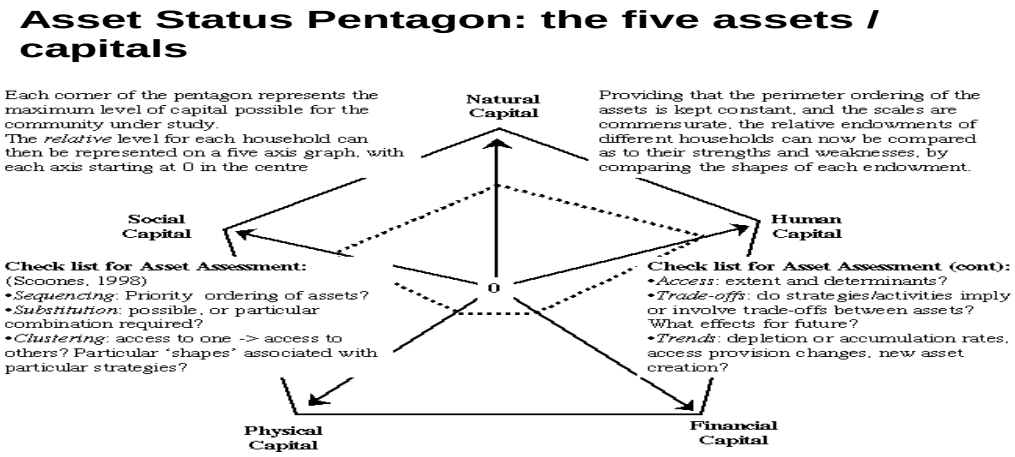


Figure 2.1 DFID's SL framework Table (Krantz, 2001)



Source (Krantz, 2001)

Simplified definition of 5 capitals

1. **Social capital** - The social resources (networks, membership, relationships of trust, access to wider institutions of society) upon which people draw in pursuit/search/ of livelihoods

Other related categories of capital that some scholars also use:

- **Cultural capital** - The practices, traditions, and resources that are central to a people's identity and the means and processes to maintain these.
- **Political capital** - The policies and legislations, political supports, governance processes, and formalized institutions that facilitate or hinder the transformation of the other capital assets

2. **Natural capital** – The natural resource stocks from which resource flows useful for livelihoods are derived (e.g. land, water, wildlife, biodiversity, environmental resources)

3. **Physical capital** - The basic infrastructure (transport, shelter, water, energy, and communications) and the production equipment and means that enable people to pursue their livelihoods.

4. **Human capital** - The skills, knowledge, ability to labor and good health important to the ability to pursue different livelihood strategies

Other related categories of capital that some scholars also use:

- **Personal capital** - The intangible inner resources of an individual, such as self-perception, self-confidence, self-esteem, commitment, motivation, hope, and emotional wellbeing

5. **Financial capital** - The financial resources which are available to people (whether savings, supplies of credit or regular remittances or pensions) and which provide them with different livelihood options.

2.7. Conceptual Framework

In the context of the SL framework, trends could be in the form of changes in the population, resources, and technology in the areas concerned. Also, seasonality may be experienced in prices, production, and employment opportunities. Shocks are the factors that can destroy assets directly (in the case of floods, storms, civil conflict, bush fires etc.). They can force people to abandon their home areas and dispose of assets (such as land) prematurely as part of coping strategies. Examples of shocks include natural shocks, human health shocks, economic shocks, and crop/livestock health shocks (DFID, 2000).

Figure 2.2 shows that convinced groups of people in the study areas were originally tackle with either vulnerable situations or saw some prospect in the new livelihood activity (sand mining). The vulnerable condition in this context were in the form of drought, bush fires, flooding, pest harass and diseases which led to unemployment, low productivity and low incomes in their previous jobs. The opportunities were also in the form of employment generations, higher and quick income related with sand mining activities. The vulnerability/opportunity framework was made up of trends, shocks and seasonality. Examples of tendency included the request of technology in farming such as the use of chemicals for weeding which eventually made manual weeding ineffective. Consequently, people employed in the weeding segment of agriculture were thrown out of job. Trends also included the emergence of quick and higher income from sand mining relative to the accessible jobs. Shocks included drought, bush fires, floods, unfavorable weather conditions and other natural disasters which may guide to poor crop yields and low income. Seasonality can also be related to the changes in weather conditions that make it impossible to engage in one's work especially farming.

Some of these people used their available livelihood assets (human, political, physical, environmental and social capital) to participate in sand mining activities in the light of certain vulnerabilities / opportunities. It is necessary to remember that on these livelihood tools, sand mining operations succeed. First of all, the sand miners required human resources such as expertise, skills and energy to be able to start the sand mining operations. They also wanted financial assets to buy sand mining equipment. Natural assets have become helpful, such as the land on which the sands are mined.

Moreover, sand mining also makes physical property such as the tools and technology needed for the work, as well as the roads for sand transport, easy. Lastly, sand mining activities required social assets that included networks, social relationships and the leadership needed to run the job smoothly.

The sand miners' use of these livelihood assets produces either negative or positive impacts. Conceptually, an increase in sand mining activities would result in more sand extraction and consequently increase the earnings of sand miners and landowners. This would lead to an improvement in sand mining workers' livelihoods and in reducing poverty by those who depend on them. It will also facilitate local authorities in sand mining areas through the various taxes and charges on sand mining to generate more revenues for development projects.

An increase in sand mining activities would result in the provision and growth of social facilities such as schooling and health care, highways, and drinking water. Most of these mining operations will be carried out because of the unlimited exposure to land / river sand mines and the reality that sand mining doesn't necessarily need challenging equipment.

The problem of the sand mining activities is the environmental degradation with its associated problems, such as the loss of flora and fauna. The skeleton additionally associates sand mining with the destruction of water sources, productive land, and farmers' livelihoods.

This condition is often correlated with the lack of employment and growing deprivation that is pulling more people into the sand mining businesses. Numerous local authorities or institutions are collectively influencing the drivers who influenced people into sand mining, the livelihood assets available to people and their livelihood activities. These are the organization, regulations, and laws that form livelihoods (Safo- Kantanka, Attah, Ofosu, Akuto, Beurden, Krah, and Ahiagble, 2006).

In this context, the organizations or stakeholders include the Authority for Environmental Protection, Forestry and Climate Change, District / mining Councils, Bureau of Medium and Small Enterprise and Industry and Land Use and Administration and Agricultural Sector and Non-Governmental Organizations. These bodies make laws, rules, and policies regulating sand mining activities to ensure sustainable development. They are responsible for reducing the use of sand resources and thus protecting people against the negative effects of sand mining. It is an appeal to remember that local authorities' presence brings various results that may be either positive or poor. Livelihood outcomes are successes or contributions of livelihood approaches (Rouse and Ali, 2001). It must be recognized that the desirability of livelihood outcomes is often determined by the suitability of livelihood approaches implemented (Salifu, 2016).

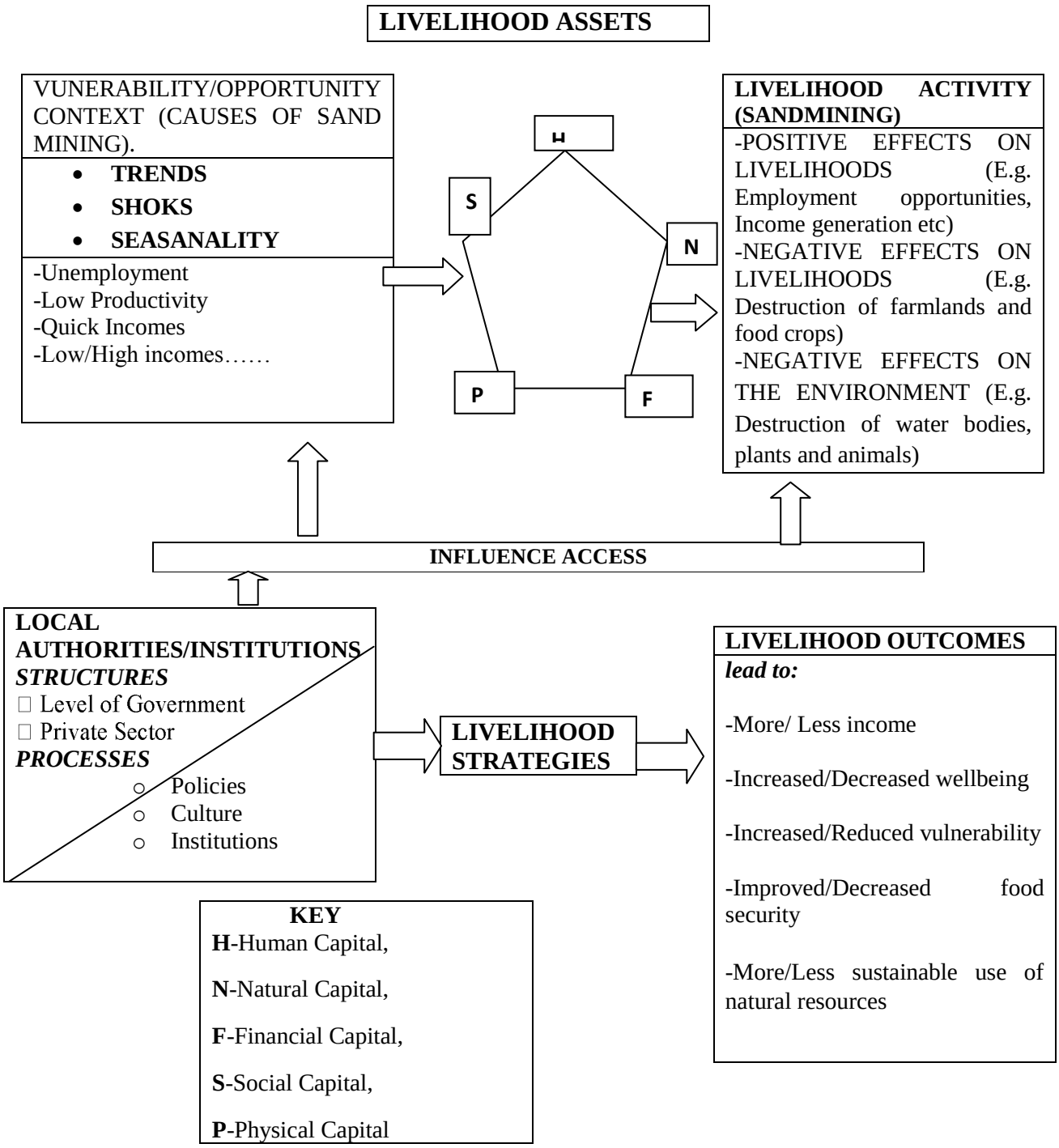


Figure 2.2 The Adapted Conceptual Framework

Source: Adapted From the DFID Livelihood Framework, 1999 (Salifu, 2016).

2.8. Sustainable Developments (SD) in mining life cycle

Villas-Boas et al. (2005) declared that sustainability is different from SD, although the terms are used interchangeably. The former is a characteristic of healthy social and environmental systems

and refers to the ability of systems to withstand externally imposed shocks and return to normal functioning. Sustainability, defined on this basis, is not a characteristic of non-renewable minerals. On the contrary, SD necessitates the integration of environmental policies and development strategies so as to satisfy current and future human needs, improve the quality of life, and protect the environment upon which our life depends. By this definition, minerals are clearly a part of SD.

According to McCullough and Lund (2006), the mining industry is oriented towards reducing the operational risks and maintaining the social license for resource extraction. This implies Concept of SD by creating a sustainable livelihood (employment, community, development, and infrastructure), optimization of resources, and minimizing environmental and social impacts of mine closure. According to Rajaram et al. (2005), no mining operation can continue to be extracted forever and mining leads to the completion of non-renewable resources, which can have negative effects on the environment. Therefore, mining cannot fit in SD format; though, it could be considered sustainable if a balance is established between the three dimensions of economic, social, and environmental sustainability(Asr et al., 2019).

Figure 2.3 Sustainable Mining Practices (Laurence, 2011).

Sustainability for this study is looked at from the standpoint of the impact of exploitation of the sand resource to the physical and environmental profiles, social and economic profiles in the study area. As it is the case from literature review, most sand miners (and other artisanal miners) are apathetic about the physical, environmental and social disorders associated with the activity, and for the few who are otherwise sensitive, the policy and regulatory frameworks if any, do little to support them. The benefits of sustainable exploitation of sand, management and conservation of the physical and natural environments, cannot be overstated, listing a few, it ensures equitable sharing of the accruing benefits, sustainable incomes and employment opportunities, safeguarded and enhanced environments, protected biodiversities, enhanced sceneries, managed land degradation, improved welfares and preservation of water sources (Augustine, 2013)

CHAPTER THREE: RESEARCH METHODLOGY

3. Description of Study Area

The district undertakes its administrative duties and responsibility with in 36 Peasant associations and three urban Kebeles Oda, Melka Dubbisa and Bole Meki town is the capital town of the district.

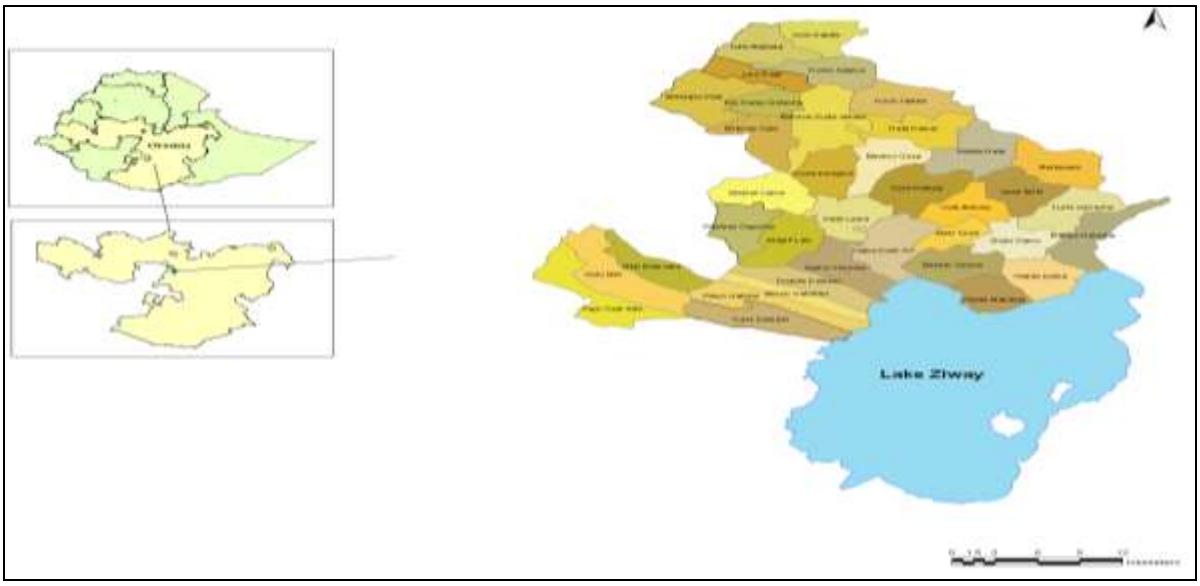


Figure 3.1: Studied Area of Dugda District Map

Because of geographical location (i.e. near to the largest market centers like Adama, Finfinne Shashamane and Awasa) the district has a great advantage for accessing the local products to the market and creates ideal condition for provision of the demanded commodities to the local communities. It is also found in the floor of Rift Valley. Dugda district has a total surface area of 959.45 km^2 (95,945 hectare). Meki is the capital town of the district.

Physical setting of the study areas

Drainage

The total area of Dugda district is fallen in the Rift Valley and Lake Basin. Meki River flows in to Lake Ziway. Its sources are streams that start from the Gurage highlands and its final destination is the Lake Ziway. As he River plays quite a vital role in the promotion of irrigated agricultural practices along its course in Dugda. The Awash forms the boundary of the district with Bora Woreda in the north and its contribution for the development of small -scale irrigated agriculture in Dugda is substantial.

Lake Dembel is one of the important Rift valley lakes Covers 1,500 (15km) ha of land. The lake has flat swampy margins on all sides except in south and south east. It is fed by a number of

streams, the most important of which are the Meki river, which drains part of west island, Katar river, which drains from the Arsi mountains to the east, and also seasonal inflow to the lake. The lake has catchments 7,025 km^2 and its overspill is carried to Lake Abjata by Bulbula River.

Climate

Agro-ecologically, the district lies b/n dry lowland 86.2 % and mid-highland 13.8 % of the district landmass with average annual Temperature varies between of 30^oC -22^oC (Max. &Min.$T^{o)}$in various month. The ecological coverage of the district is proportionally, about 55 % of the land area the district fall under usually called lowland and the rest 45 % is constituted by mid land.

Vegetation Covers

The largest proportion (62,585 Hectare or 65.23 %) of district area is devoted to cultivation land. The natural vegetation is highly distributed through human intervention. There are 414.4 hectares of lands occupied by forest in the district. The major natural vegetation of the district includes woodland and savannah of junipers and vanity of vegetation followed by sub-tropical grassland located at different pocket areas of the district. Now, however they are degraded and converted into different land uses. The areas around the lake have been left with only patches of ruminants' wood and bush lands. The dominant tree species is Acacia.

Socio-Economic Conditions

Population

In the year2010 E.C., Dugda district has a total population of 192,806 about 101,030 (52 %) and 91,676 (48%) of the district's population are males and females respectively. About 71 % of the total Population 137,236 (Male 71,246 and Female 65,990) are residing in the rural parts (Peasant Associations) of district and while the remaining 29 % (55,570) of (Male 29,783 and Female 25,787) are living in the three urban Kebeles Oda (01) ,Melka Dubbisa (02) and Bole (03).
The total number of Household is 34,476 of which 8480 Female are headed ones. In terms of age distribution 44,137 (23%) belongs to the age under 15 and 7,502 (3.9%) above age 64. And the remaining 141,167(73) % of population belongs to age 15-64. In the district belongs to young age Population that is characterized by High Fertility and Labor Force. The detail distribution of urban - Rural district's Population is listed as follows:

Table 3.1: Distribution of Urban - Rural Population

	Year	Both Urban & Rural			Urban Pop^{n}			Rural Pop^{n}		
Dugda District	2010 E.C	Male	Female	Total	Male	Female	Total	Male	Female	Total
		101,030	91676	192,806	29,783	25,787	55,570	71,246	65,990	137,236

In the district in 2010 E.C there were 36 peasant associations that have 21,116 farms HH. Whereas Meki's HH number is 14,635(5256 , 1418 and 7,961 for urban kebeles Oda, Melka Dubbissa and Bole respectively (Dugda district PLEDO, 2010 E.C).

Land-Use Pattern

Based on the general view the current land use pattern 62,585 (65.23%) ha of the district's land is under cultivation. While, the rest 3411 (3.56%)ha, 7987ha (8.32%), 12,032(12.54 %) and 10,130(10.55%) do respectively occupied by forest land, grazing/pastureland, water bodies and others of the total 95,945 ha.

Environmental Conditions

In the district, deforestation of the natural vegetation is the major environmental problem. Its proximity to major urban centers (Ziway, Meki), the highway that runs through it together with the highly growing population caused the devastation of the vegetation cover for settlement, cultivation, construction, fuel wood and charcoal production. Deforestation together with the sandy nature of the soil has brought about serious problem of erosion of the topsoil by water & wind. It has increased surface run-off which in turn has intensified gully creation.

The eventual result of deforestation is the influence it causes on the climatic condition of the area. Isolated evidences indicate that in the floor of the rift valley, which forms the greater part of Dugda temperature is constantly raising. One justification for this is the decreasing level of the lakes as well as rising salinity in both the lakes and the soil. Rainfall, too, is getting meager from time to time. The lake's region, which includes Dugda is an area where the growing period of crops is getting reduced from year to year and recurrent drought is registered. Another environmental problem in the area in the district irrigation activities are conducted along the courses of the Meki River as well as along the shores of Lake Ziway at medium and small-scale levels. Most such irrigation schemes lack the tradition of efficient water management practices that is making water available to crops in the right quantity at the right time. Dugda is prosperous in different natural resources. These are water resources, river Meki and Lakes Dembel and mineral resources (sand, pumice) etc. (Dugda district PLEDO, 2010 E.C).

Table 3.2: The situation of Sand mining activity in the Dugda District

Type mineral Mining undertaken	Total Kebeles District	Total population in 2010 E.C	Kebeles Mining Undertaken	Total Popn Mining Undertaken	People engaged to mining	Area of mining in m^2
Sand	22		22		3,426	424,573
Total	40	192,806	22	105,671	4,654	570,871

Source: Dugda district Mining Development Office, 2011 E.C

Out of the total population approximately about 55% is the residence of that are living in the area of where common mineral mining activities take place in 22 PAs in the district. Directly or directly these population are the one benefited from or exposed for different kinds of mineral mining activities. In year 2001-2011 E.C the people engaged on the sanding mining activities or the sand miners were 3,426 and the total area of land 424,573 m^2 sand mining sites was provided legally registered and licensed by governmental stakeholders.

3.1. Research Methodology

3.1.1. Research Design

The study has been adopted the mixed method approach following a case study design. This involved the triangulation of both quantitative and qualitative methods. Triangulation focuses on collecting and analyzing both qualitative and quantitative data in a single study (Creswell, 2003). The idea of triangulation in this study lies in the belief that, the validity of research findings and the degree of confidence in them are enhanced by the deployment of more than one approach to data collection (Bryman, 1992).

Source of Data

This research was employed both qualitative and quantitative research approach. Also, the study was used both primary and secondary data sources; which complement to each other. The tools of data collection were prepared such as questionnaires and checklist /guideline respectively.

Sampling Framework

According to Creswell (2003), the target population of a study is made up of the group, objects or institutions that define the objects of the investigations. Totally there are 40 kebeles including two kebeles' of Meki town in the Dugda district. The target population for the study were rural kebeles /out of 22 kebeles in which 15 are located in the north and 7 in south directions that sand mining activities are undertaking; environmentally affected directly or indirectly by (MSSE) sand miners undertook on in the surroundings of on Meki River channel valley and farmland in Dugda district was take into consideration. Depend on secondary data from Dugda District Mining Office, the place where mining activity done, specifically 4 rural kebeles were tentatively selected for the sac of convince purposes depend on sand mining site land area legally provided to the numbers sand miners selection across Meki river. These were Sera Wakale, Birbirsa Gale, Dengorota Gusa, and Oda Bokota in the district of the study for household respondents.

The study had paying attention mainly on sand miners and farmers in the sand mining locality. The selected of the 4 kebeles were influenced by the predominance of sand mining activities carried out there, and also the fact that these activities had been going on for a considerable period of time. The key informants of the stakeholders at the district and region level as well as member of RK or leaders also was included in the target population based on the fact that, as stakeholders, they played key roles in ensuring sustainable environment development and livelihood security of the people. Policies and programmes implemented by these stakeholders impinge on the livelihood of the people.

Sampling Size and Procedures

In the context of this study, the total population/household of selected Rural Kebeles in the research area represents population size, whereas the number of farmers and sand miners

household selected respondents in the RK that is included and categorized represents the sample size of the research that had undertaken in the area of the district across the Meki river.

Generally, a sample size of 337 respondents had been selected for the study. This was making up of 337 household respondents comprising 229 farmers and 108 sand miners. The 337 household respondents were selected from a total of 2,199 households in the studied targeted RK areas.

Table 3.3: Total Sample Population for the Study

UNITS	**SAMPLE SIZE**
Farmers	229
Sand Miners	108
Opinion leaders (Chiefs / councils Members) from 4 PAs	12
Representatives from the District Councils	4
Regional Mining development Authority	1
District Medium and small scale enterprises office	1
Regional /District Environmental Protection, Forestry & Climate Change Authority	4
TOTAL	**359**

Source: Field Survey, 2020

District development mining councils includes District Administration (as Coordinator), Environmental Protection, Forestry & Climate Change (Secretarial), Land use and Administrative management office and Mining Development Office (members) at district level.

Sampling Procedures

According to the number of population from the Dugda District in year 2010 E.C indicated that in the four selected kebeles household were 2,199. Out of this, 337 household respondents were selected for the study. Approximately thirty two (32%) of the number of households chosen was allocated to sand miners, likewise sixty eight (68%) was given to the non-sand miners or farmers. This directed to the selection of 108 sand miners and 229 farmers for the study. The allocation of higher sample size to the farmers was influenced by the fact that, their numbers far outweigh that of the sand miners in the various communities. The samples disseminated proportionately among the number of households in the four communities where the study was undertaken. The proportionate distributions of the 108 sand miners and 229 farmers amongst the study areas are shown in Table 4.3.

Table 3.4: Sample Size of Farmers for the Rural Kebeles

Peasant Association name	**Total population**	**Household (H)**	**Sample size of Farmer(f)**	**Sample Interval (K)=H/f**
Birbirsa Gale	3890	648	124	5
Dengorota Gusa	2545	424	93	5
Oda Bokota	3841	640	60	11
Sera Wakale	2920	487	60	8
Total	**13,196**	**2,199**		

This was achieved by dividing the total number of houses (H) in each community by the total farmers sample size (f) there. Mathematically speaking, K=H/f where, K' is the sampling interval, H' is the total number of houses and f' is the total number of farmers sampled for each community. To pick the first housing unit for the sample, the simple random sampling method was employed.

This was done by drawing numbers randomly from folded papers, each containing integers between one and the last digits of the sampling intervals. For each of the communities one such number has been drawn randomly. Houses with house numbers corresponding to the numbers drawn for each of the communities have become the first housing unit in that community for study. For houses with more than one family, one respondent (family head or his / her representative) was chosen using the lottery process. This procedure was done repeatedly until each community had exhausted the sample size assigned to them.

The 108 sand miners were also allocated in proportion to the different communities, based on the number of households in each area. The convenient sampling technique was used to select this category of respondents. This was done by visiting sand mining sites and also houses where sand miners lived. One of the reasons for selecting some of the sand miners from their work places was the difficulty in getting them in their houses. That is, a lot of the sand miners usually left for work very early in the morning and returned to their homes very late in the evening. It was therefore deemed appropriate to visit sand mining sites where respondents could easily be contacted.

The purposive sampling technique was used to select the opinion leaders and the leaders of the concerned rural kebeles in the studied communities. This group of respondents was selected purposively since they are affected farmers themselves and have been in the fore front in issues of the impact of mining in their communities.

For this study, the most appropriate sampling techniques were selected through the revision visits taken from all the rural communities studied. Given the various groups of respondents and the kind of specific questions to be asked in order to accomplish the goals of this research, both random sampling methods and purposeful sampling methods were used in this analysis.

Random sampling is an appropriate strategy, according to Patton (1980), when one wants to generalize to some large population from the sample studied. Through random sampling, the likelihood of data collected being a representative of the entire population of interest is increased (ibid). Similarly, Peil (1982) states that the collection of a part to represent the whole is sampling

The random sampling technique was preferred to select the heads of households over others, because with this method the selection probability becomes the same for each case in the population. Another explanation used random sampling was to prevent prejudice by offering all units in the target group fair chances to be picked, as Nichols (1990) emphasized. It must point out, however, that the method has been slightly modified to remove gender bias in the respondent heads of households.

The purposive sampling technique was used to select the opinion leaders and the leaders of the concerned rural kebeles in the studied communities. In order to get information about the

positive and negative impact of the operations of the mines in the communities and the community capacity building programs that the mining sand miners have for adversely affected farmers the heads of the public and community relations officers were purposively selected for interviews.

The purposive selection of these groups of key informants stems from the fact that they are individuals who provide in-depth and proficient information about a particular phenomenon (Beck 2004). Purposive sampling was very relevant and useful in the fieldwork and data collection because which respondent was able to give specific information wanted. It must be stated, however, that there was bias in the selection of the leaders of the concerned rural kebeles. But nonetheless, the quality and reliance of information elicited was not affected.

3.1.2. Methods of Data Collection

Questionnaires, in-depth interview guides (IDI), and observation checklists were used for the study to collect data. The observation check list was specifically used to collect data on issues relating to the methods and equipment used at the sand mining sites. The extent of the destruction caused by sand mining to the environment, and also people whose livelihoods were influenced by the trouble as well as sand miners improved with different economic activities. To aid the observation processes, photographs of sand mining activities and impacts in the environment, were taken using digital camera. The Questionnaires were used to provide answers to questions from farmers and sand miners about their background and the factors influencing people in sand mining. They were often used to collect data on the environmental impact of sand mining, livelihoods and the positions of local authorities in the sand mining industry.

The in-depth interview guide was used to collect the views of institutional leaders and opinion leaders regarding the sand mining activities and how they work to protect the livelihoods of those affected by the negatives.

Households Survey

A household survey had been completed using standardized questionnaires built in conjunction with specified study objectives and questions. In this analysis 337 HHs with local community is engaged in a standardized interview as defined in sample size. It basically conducted data collection to identify factors and assess its contribution to the study area regarding sand mining and environmental concerns. Financial history details of respondents was included in the data to be gathered using that process.

The most Fifteen (15) in the north and seven (7) rural kebeles are located direction of the Meki River. The Procedures followed sand mining work based on sand miners engaged in RKs using in terms of the number of the household and the area of land in M^2 in given legally established & licensed, the location of RK the approximate distance km from the capital town of the district (the near, far and in between) the selected criteria has been taken into consideration. Come to the

sampling size and selection RK area of the study, to treat the untreated area and to compare and contrast the criteria was selected and reached to my decision as an option in my further study.

Depend on decision criteria mentioned as sand mining affected the human livelihood and the environment the near distance 1-5 km, in between /average distance 10-15 km and the far distance is 18 km selected to treated untreated RKs located on boarder of the Meki river across the channels in both North-South direction or valley to represent the remaining Rural Kebele (RK) since sand "mining" or "winning" or "harvesting" already formally had been begun before 10 years ago identified. So that basically out of six RK tentatively prepared to include four RKs' all of them from the North direction had selected as sampling research in the targeted district.
Finally, based on the selection of criteria had been proposed and decided the sampling PAs Birbirsa Gale, Dengorota Gusa , Oda Bokota and Sera Wakale that Sand mining extraction had been actively undergone selected and data gathered so that the research was done through in my studied area of the district.

Key Informant Interview (KII)

KII performed an evaluation of the main driving forces of sand mining and legal problems relevant to the mining method, environmental performance and subsistence for credit access and its environmental impacts centered on qualitative techniques. KII participants selected experts / leaders at district / regional land use and administration purposely from and PA community member.

Field Observation

I observed the sand mining surrounding the Meki River in the ground research area undertaken.
I've taken different descriptive notes of what's going on. During field studies photos were made.
The research centered on environmental tissues connected with sand mining and the practices carried out in the Meki River region.

Secondary data source

Secondary data sources collected from, among others, journal articles, books, statistical abstracts, legal Documents (proclamations, regulations and directives) study reports and thesis. Many secondary knowledge outlets have been obtained from the website, academic archives, universities and organizations. Historical data concerning demographic and socio-economic variables were available.

Baseline data

One of the first things you'll need to do to make a change in your community is figure out how many of the different factors and trends you're examining happen in the first place. Try to find out how common any issues and positive trends are, how often things happen, the duration and

intensity of most incidents, and so on. The study thus used baseline data on agricultural productivity, forest and grassland coverage, planting and soil conservation activities before and after sand mining to measure the sand mining activities.
Thus details is gathered from the CSA, administrative data, documentation of office data
From the district sectors, questioning main informants in detail and retrieving knowledge from informants.

3.1.3. Data Analysis

Data were gathered and edited by field survey to ensure accuracy of responses. The results for the analysis were analyzed using both quantitative and qualitative techniques. As far as techniques are concerned, the primary data obtained with questionnaires were code and enter into the electronic Statistical Framework for Service Solutions (SPSS version 20). Different types of Statistical crosstabs and means of comparison has undertaken methods research. These may relate to sample selection, sample size, and follow up on contradictory results, bias in data collection, inadequate procedures, or the use of conflicting research question (Creswell and Plano, 2007).
I was therefore taking care of the accuracy of the strategies mentioned. Regarding reliability, the study I was using hypothesis tested Chi-square α's score relationship at a significant level of confidence interval of 5 per cent. Finally, both qualitative and quantitative data will triangulate each other which the data collected through interview, key informant interview, field observation and document analysis.
Data from interview management and field findings is evaluated qualitatively primarily through direct quotes from the respondents and explanation of activities as they appeared in a written document. In addition to the comparative analysis used for physical impact, the Geographical Information System (GIS) was used to analyze the fruitful environmental impacts and demographic.

4. CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1. Socio-Demographic Characteristics of Respondents

The background characteristics of households have profound influence on their ability to make rational decisions and the type of livelihood strategies they pursue (Atamanov and Berg, 2011; Omosa, 2003; Ellis, 2000). In this section, the age distribution of the respondents, in relation to sand mining activities was examined.

Sex of the respondents

In case of sex respondents in the sampling out of the total 337, male 306 and 31 were females in which accounted 91% and 9% respectively involved. Whereas the age 30-39 years old range participated as primary and 40-49 accounts in the second place as 35% and 27% that selected in sampling of the study from age range lesson than 20 and equal to or greater 60 years old.

Distribution of the Age Respondents

Sand mining creates a center of attention younger and active people than farming or agricultural activities. This is mainly due to the labour-intensive nature of the activity, involving the use of physical energy and simple tools or instrument such as the pick-axe and shovels. This view is carried by majority of the respondents as shown in Figure 4.1 at the same time as a few of the farmers (10.9%) were within the lowest age group of 20-29 years, as many as 43.5% of the sand miners were also found in that same age group. On the other hand, whilst a few of the sand miners (1.9%) were within the highest age cohort of 50-59 years, a relatively larger proportion of the farmers (18.3%) were also in that same higher age group. The reason is that, it requires much physical strength to become a sand miner than a farmer. Sand mining is therefore unattractive to old people with reduced energy and weak muscles. Consequently, most of the youth in sand mining border communities prefer to be sand miners, even as the majority of the old people select for farming. The mass movement of the youth and the economically active population into sand mining could also be attributed to the comparative economic advantage of sand mining over farming. That is, sand miners have regular access to income than most farmers.

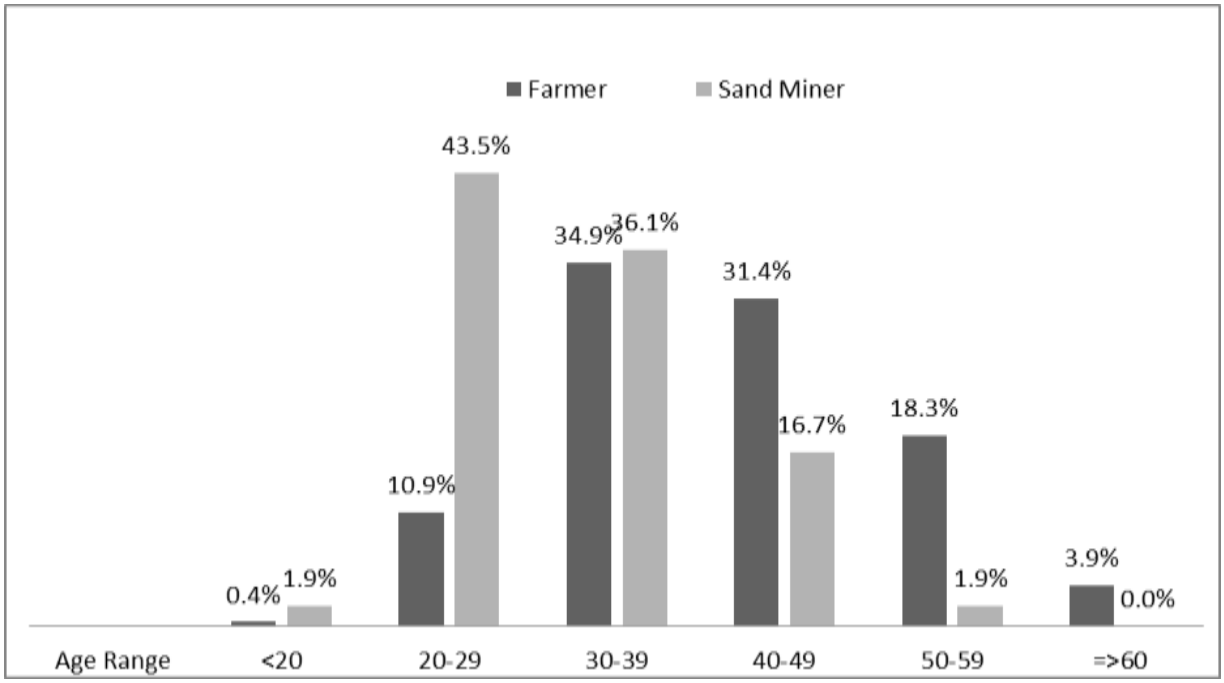


Figure 4.1: Age Distribution of the Respondents

Source: Field Survey, 2020.

The majority of the sand miners belonged to youth age categories (i.e. between 20 and 49 years), conversely majority of the farmers were moreaged (i.e. 30-49 years).

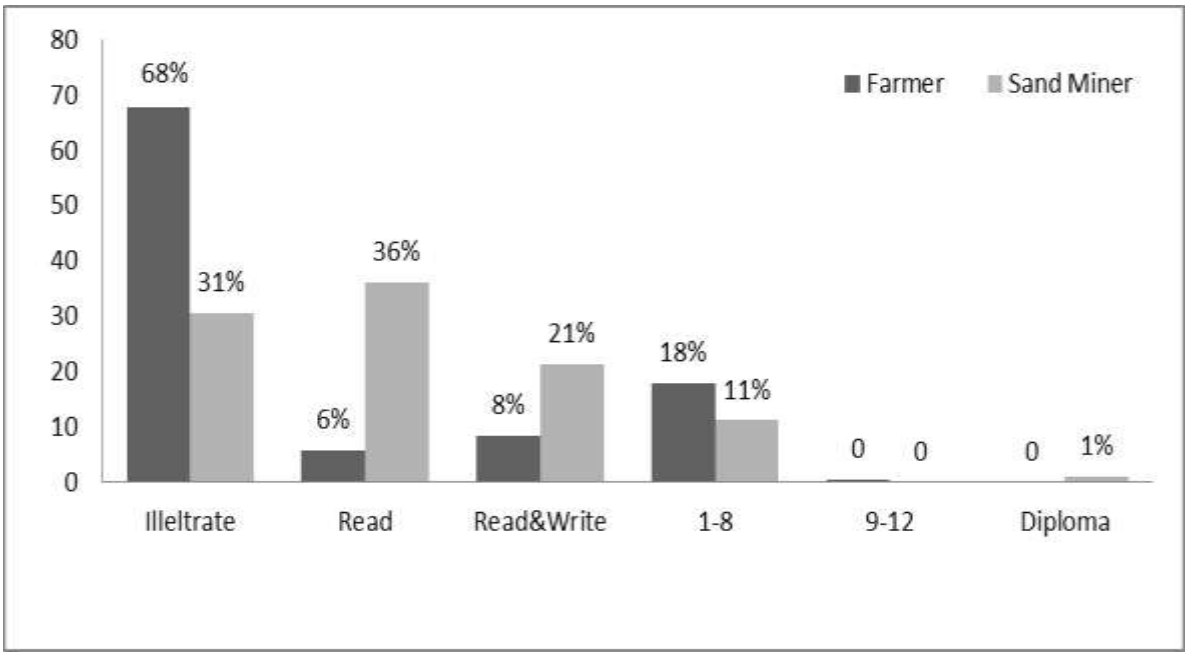
This finding is consistent with the view that, age has an influence on the choice of livelihood strategies of people (Addo, 2008). The ability to consider a particular livelihood activity is greatly affected by age. This is because growth decreases the energy required for some physical livelihood activities. There is a strong decline in economic opportunity with age and the contribution of older people to social and economic development is in many cases undervalued because of the kind of work they do (Armando, 2002). The likely implication of the age combinations shown is that, due to the youthful nature of its labor force, sand mining activities will continue to flourish. However, this condition is not good for agriculture and other livelihood activities which compete with sand mining for land use and labor.

The concept is that, to the disadvantage of the ecosystem and other subsistence practices, a more prosperous and productive sand mining community would actively grab more property. In other terms, the profitability of the communities' farming operations may be influenced by the reality that most farmers are elderly and presumably not economically involved.

Respondents Level of Education

The background of educational level indicated that most of the respondents were not go to school or they are illiterate or has no formal education that accounted or held 56% out of the total.

With respect to the situation described below the figure, lots of people in the communities had become sand miners due to the fact that, the highest proportion of the respondents had either had no formal education or had only the basic (68% for the farmers and 31% for the sand miners) as shown in Figure 4.2.



Source: Field Survey during study, 2020
Figure 4.2: Respondents Level of Education

Only farmers (14%) and significant the sand miners (60%) had the basic levels of education. It is important to note that, the respondents with no formal education or those who had only the basic levels of education have very little job opportunities in the formal sectors of the economy. This is because, the formal sectors usually demands higher levels of education and skills from job applicants.

4.2. Sand mining: the Origin, practices, mechanisms and pushing factors in the district

In the district there was not written documented found about how sand mining or harvesting begun. As far as sand is used or important for income generation purposes, the origin or trends of sand mining essential for identify the phenomenon of change. By searching elders in the area asked orally the condition of sand mining about years ago, in the middle and in recent time conditions is summarized as follows. Basically the elders provided the information of sand mining during the past of HailaSilase, Derge and until this government regime.

One of the elder residents in Oda Boqata Rural kebele in Meki town orally told about the history of sand mining started in the area said that*;*

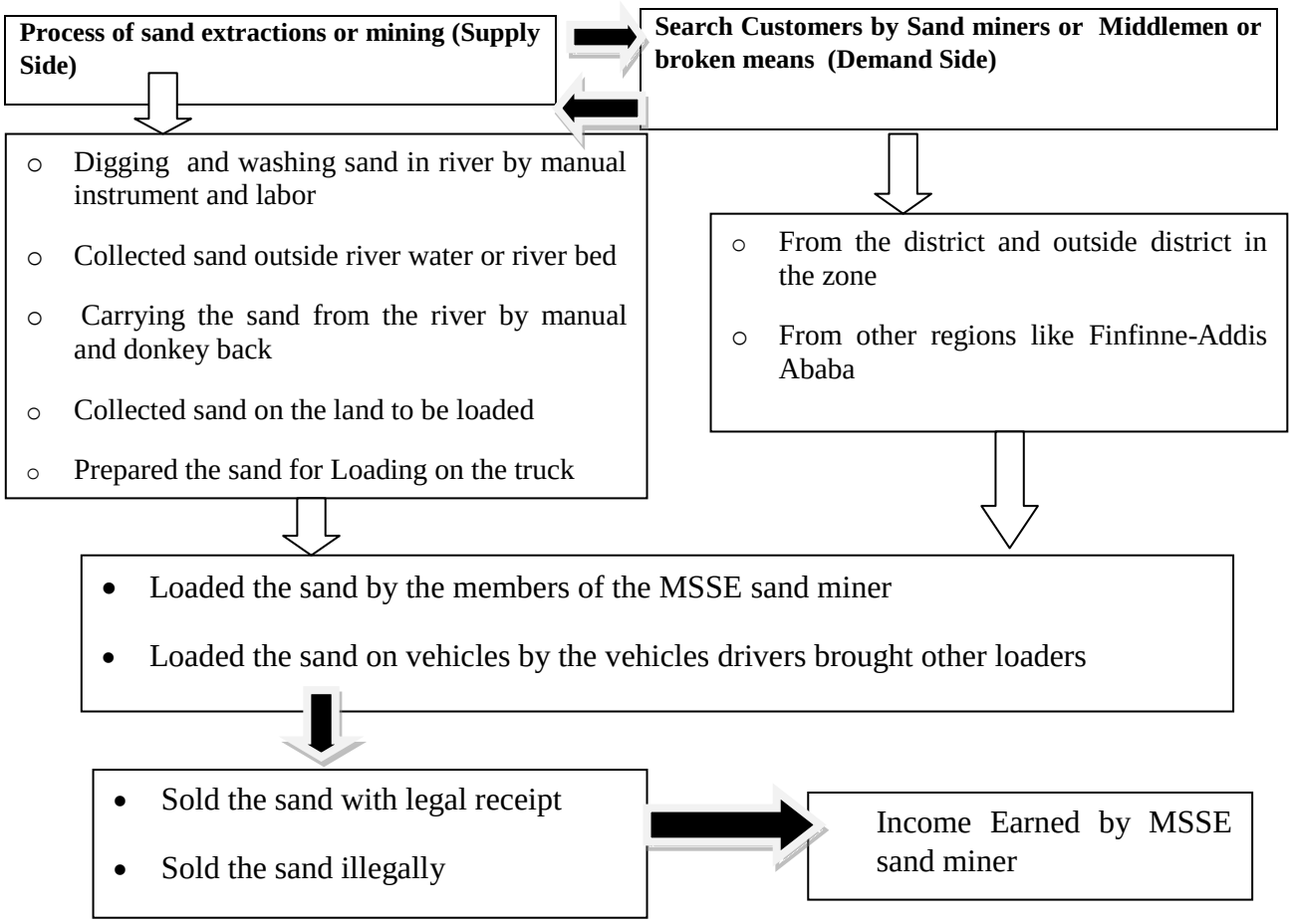
Now I am a 65 years old sand mining had begun in 1954 in the king HailaSilase the place where around today of Meki 01, specifically called group four near the bridge constructed on the river by a person Tasfay Habte he came from Saden-Soddo area and harvested the sand inside the Meki river privately started sold it. Before that value of sand had unknown residents constructed their house by wood. Then in the same regime even if I did not know the exact year the head of Catholic church Mission came to the area and constructed offices, schools and church by using sand extracted from Meki River, the behind open small trucks carrying the sand and at the time I also loaded sand has gotten 10-15 Birr per day.

The second person 52 years old investigated to the trends of sand mining in Meki River area. He remembered that the sand mining conditions as:

I knew in the Derg regime there were one sand miner cooperative organized that held 40 members in today's Meki 01 areas across the river. The cooperatives took a big and land on the river from Jallo River to Malka qunxurre area. I had been worked on privately on sand mining both digging and loading of for nine years starting from 1972. I had earned fifty percent of income as worked as digging and loading on the trucks. There was no problem on digging and loading since there was sufficient sand resource at the time. Customers were from Finfinne - Addis Ababa. The contractors name was Franko-contractor. Ministry of urban and others were also the customers the cooperatives of the sand miners. The reason customers had been come to here as the sand was known (have a name) by its supply and quality.

4.2.1. Supply Side and Demand Side of Sand mining in Dugda District

The source of Sand mining is the river or pit flood plain and the Medium and Small Scale (MSSE) Sand miners were legally organized by government stakeholders in the district. The practices of sand mining are categorized under artisanal mining that allowed manually according to proclamation of the country.



Source: field survey 2020 from sand mining sites organized by the author

Figure 4.3: Sand mining mechanism, the supply and Meki sand is demanded

4.3. Factors that push People into Sand Mining

The analysis mechanism was 'compared means' Factors push people into sand mining as dependent (list) and the remaining statements were treated as independent variables (list) to get extent of agreements criteria used for comparison in percentage wise of sand mining activities in the district.

Some drivers that influence local people into sand mining or the reasons of people engaged in sand mining in the community of targeted four Peasant Associations (PA) of the Dugda district

as far as similar questions prepared and raised to a total 337 respondents 229 farmers and 108 sand miner seasons that factors push people into sand mining depend on the different variables below indicated with the extent of agreements criteria, the following results was found.

In the context of the Sustainable Livelihood Framework which was adapted for the study, some people, particularly farmers in the communities are exposed to vulnerabilities including adverse weather conditions. These vulnerabilities make farming unattractive because of its associated problems such as unemployment, low income, and low productivity. Eventually, these vulnerable people are influenced into sand mining and other livelihood activities. The framework further postulates that, some people are also influenced into sand mining because of its associated opportunities. These opportunities are in the form of employment acquisitions, higher income and among other benefits.

The pull factors were the advantages associated with sand extraction that attracted residents into it as the availability of district sand wealth. The drive factors were extracted largely from agricultural challenges, such as rising population growth, seasonal shortages, and insect and disease attacks on crops

Table 4.1: Some Factors that Influence People into Sand Mining

S. N	Factors that Influence people into SM.	Respondent	Extent of Agreement					Total	N
			Strongly Agree%	Agree%	Undecided%	Disagree%	Strongly Disagree%		
1	Economically reward than farming	Farmer	0	34	24	41	0	100	229
		Sand Miner	6	69	2	22	0	100	108
2	Provide and quick access to income	Farmer	0	72	18	4	6	100	229
		Sand Miner	2	94	3	1	1	100	108
4	Offers job opportunities to people without lands.	Farmer	7	86	6	1	0	100	229
		Sand Miner	3	63	6	27	2	100	108
5	Unemployment compel people to engage in	Farmer	3	95	1	0.5	0.5	100	229
		Sand Miner	7	63	4	26	0	100	108
6	Raise funds to the development	Farmer	5	49	12	34	0	100	229
		Sand Miner	0	81	2	16	1	100	108
7	Sand miners don't care about environment	Farmer	1	81	16	1	0	100	229
		Sand Miner	6	69	24	0	0	100	108

Source: Field Survey, 2020

Another reason for engaging in sand mining is to help the sand mining fringe communities undertakes development projects. Some portions of the taxes and royalties charged on sand mining are generally used to support development projects. People engage in sand mining to raise funds to carry out community development projects, sources of funding for community development projects.

Sand miners with name of MSSE supported different in RK and District level by contributed for example constructed kebele offices, uniform cloths for militias and other related participations.

The Oda Boqota RK resident and a member of SMME sand miner during field observation captured he responded on the participation of local development as: *we were involved in different activities of local development in the RK by contributing money example for sport purposes and by the name of MSSE sand miners. The destroyed inter-road about 2km was maintained by this year.*

Another Odaa guddicha MSSE Sand miner in Eela Gerbo Dalacha RK more described that about the contributions of sand miners in the local development as:

At the side of individual benefited there was also supported the local PA development by cover the cost of maintained the road and cloth for militias about10,000 Birr, bought the Abay Bond with the name of Cooperative 8000 birr, supported 20,000 Birr at district level for who displaced people from Somalia regional state and returned to our region.

People with no formal education or basic forms of education therefore end up either in the agricultural sectors or in the sand mining business where there are no restrictions. There is free entry and exit for anyone with the desire and strength to work as a sand miner. The above view confirms the findings by Stewart (2013) that the operation of sand mining is relatively unsophisticated, rudimentary and does not require any form of education or special training. The possible reason for the agreement in views can be attributed to the fact terrestrial sand mining.

Last but not least, unemployment is among the reasons driving inhabitants into sand mining.

Without work, people get concerned about chronic deprivation and the shame connected with it. Therefore, unemployment is capable of influencing people into any job opportunities, regardless of their impact on the environment or other activities relating to livelihood.

The study found majority of the farmers (98%) and the sand miners (70%) agreeing at different degrees that unemployment compels people into sand mining. The explanation for this is because sand mining operations mainly take place in agrarian societies. Meanwhile, agricultural activities in these areas are seasonal and are entirely dependent on rainfall and other good weather. Agricultural activities in these areas are seasonal and depend entirely on rainfalls and other good weather conditions. Because of this, farmers in these areas are unable to farm throughout the year, making them unemployed during off-farm seasons. Some of these farmers are forced by these cycles of seasonal unemployment to abandon farming and become sand miners

Farmers have to take care of themselves after all and feed their families whether the season is a good one or not. Most of the sand miners were previously unemployed, it was determined.

This view supports the proposition that unemployment is an important driver which influences people into sand mining. The view also confirms the findings of Afriyieet al (2016) that displacement from agricultural lands and unemployment explain initial entry into the extractive or the mining industry. It suggests that the more residents in sand mining peripheral areas are unemployed, the greater the amount of individuals moving into sand mining. This is especially disturbing given that there is no end in sight of the country's unemployment crisis. That is, the entire residents are potential sand miners, particularly farmers in the sand mining fringe communities.

Finally, the study found majority of the farmers (81%) and the sand miners (69%) agreeing at different degrees the factors that influence people into sand mining is because they do not care about the environment push people into sand mining as described in figure 4.4. The reason is that, sand mining activities occur mostly in agrarian communities and extracted from inside rivers and considered as if it has no impact on the rest of the environment such as land degradations, wildlife, vegetation and farmland.

Typically, the findings are compatible with the concepts underpinned by the study's modified philosophical structure. That is, there were two major reasons why people in the study communities became sand miners. The first group of people became sand miners because their previous occupations experienced some degree of vulnerability.

Such lacks became obvious by insufficient wages, restricted agricultural land exposure, and underemployment / unemployment. The second category of people became sand miners due largely to the opportunities they saw in sand mining such as the fast access to income and the high profits from sand sales.

Hypothesis test on Unemployment/Underemployment

H0: Unemployment/Underemployment is not compel engage factors that push people into sand mining

Factors push people into Sand mining		**Unemployment compel to people to engage in**					
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	N
	Total	15	286	6	29	1	337

Chi-Square Tests				
Factors push people into SM – Unemployment relation		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	71.288[a]	4	.000
	Likelihood Ratio	71.951	4	.000
	N of Valid Cases	337		
a. 5 cells (50.0%) have expected count less than 5. The minimum expected count is .32.				

The calculated Chi-square ($\chi 2$) is 71.29 while with degree of freedom 4 the critical value at 0.05 the significance level is 9.49, hence null hypothesis is rejected. That is, there is statistically significant relationships between Unemployment/Underemployment compel people to engage and factors that push people into sand mining activities in Dugda district.

4.4. Factors affecting sand mining

Several aspects were classified as impacting the sand mining. Population growth, rates of employment, deterioration of the climate, seasons, and manual labor, Educational level, sand mining areas such as river place in the upper and lower streaming positions and business/market conditions.

Population growth has generated joblessness in the district. The alternatives employed in the area next to farming are sand mining for those who do not have farmland people in their families especially for rural unemployed youth. The number of people organized by MSSE joined sand miners who took part in and extracted sand is gradually increasing from time to time.

Educational level also its own contributions affecting sand mining. As described in figure 4.2. sand miners (88 %) that involved on the sand mining activities, the sand miners are in basic level of education or no went to school of formal education as well as at read and write level that forced people into sand mining.

Gradually the quality of the sand declined due to water flow in the river is not sufficient.

Muddy surface and dumb were reduced sand quantity and consistency. As a result, sand production is declining as there are various environmental degradations such as soil eroded due to deforestation, as well as river beds which are troubled by sand miners year after year.

Seasons are affected sand mining on good or bad situations. In some areas sand mining had favorable to harvesting during rainy season. Dryness of the river has also its own contribution that factors affecting the sand mining. Water used to the irrigations and soil and water conservations of different structural work declined the movement of sand in lower streaming of the river. The quality of sand cleaning is also affected by washing water and the presence of stone in the river. Dry season suitable them in area where deep sand resource presented and easy to digging in the river. In some places, the production of sand mining was undertook in rainy season while in the other places sand mining possible to harvest both during summer and winter season by sand miners.

In Oda Boqata PA of Odaa Gudda MSSE sand miner member about the conditions of sand mining in near of Meki Town in the lower Meki town about the season, customer and price of sand they harvested:

We had got a customer during summer than dry time the season the reason is that in other many places of sand mining areas stopped the work as the river filled with water so that the customer shifted to us. Even though it is rainy season, we have a chance possible to harvest sand, get a

customer, price and sold it than the rest other places of sand mining activities taking places in this time.

Sand mining was influenced by physical labor and machine work. Sand harvesting was affected the Labor work by sand miners. It is worked by manually starting from searching for sand inside the river water, digging, bringing the land to the boarder and collecting it on the land where the truck stopped loading and loading the sand onto the truck appropriately. This all sand mining or output is done by manually working which demanded a lot of lost energy and made the sand miners exhausted.

The locations the river was determined the sand mining. The upper river sand mining was preferred as it was thick and washed by water remained there. The light and thin type of sand had been moved by water to the lower areas of the river. There is also another reason that the absence of stone in the river essential for the sand become for its quality by washing its clearness and the quantity of sand it's blocked not easily to move. The presence of stone in the river was advantageous for sand quantity and quality. The reason in the lower river streaming sand was mixed with soil resulted muddy; the sand is light and thin so that it brought lack of market.

One member of Oda Guddo MSSE sand miner at Oda Boqota rural kebeble notified on the market of sand as follows. *I have been working for six years did not stop and transferred to other economic activities. The price of sand is high (6000 Birr) in the upper streaming of the Meki River where as in the lower streaming the price is low (2000 Birr) this is because of the quality of sand declined in gradually move to the lower streaming of the river especially around Meki town. In the upper river steaming structural work has been done on soil and water conservation so that it reduced soil mixed to sand became muddy.*

Market conditions were the factor that affected sand mining and caused the area to become competitive. Condition of market linkage is one factor that has affected area sand mining.

The position performed by middle men or brokers had a major role to play on the sand price and in business communications to get the customers conditions. Sand market supply and demand mostly depend on the middle men or brokers. Most Brokers decided as a reason out the sand market how much it is sold or purchased at sand mining sites. The price of sand was also specific at the district's numerous sand mining sites.

One member of Baqaqa MSSE sand miner at Birbirsa Gale rural kebeble notified on the market of sand as follows. *We sold sand with receipts birr 1800. Most of money has taken by the brokers. The truck driver paid 300 Birr to the broker. The broker told to the trucker drivers and come to sand mining sites with the price of 3000 birr. Totally the price of one truck sand is 3300 Birr. So that 1800 birr was taken by the broker. Depend on the interest of broker the price of sand decided. Brokers also not interested to pay the tax for government. They forced us to sell without receipt to pass illegally locally known as 'cabaxaa' embezzlement way. Without receipts sold government revenue not paid and the capital of the MSSE declined as members divided the money at the moment.*

4.5. Environmental Effects of Sand Mining

River sand mining is carried out both manually and mechanically. Manual mining is more environment-friendly and the quantity of mining is practically low. This method is practiced in many developing and underdeveloped countries having small rivers with limited river bed resources. Floodplain Mining is the area just behind the levee and is occupied mainly by water during flood events. Floodplains are usually the areas evolved from deposition of sediments during migratory phases of the river channels. Strati-graphically, floodplain sediments are composed generally of channel sand at the bottom followed by floodplain silt and clay at the top. Mining of sand from the layer representing the channel sand in floodplain areas is referred to as floodplain mining. Other important alluvial sources of sand are floodplains and river terraces. Two types of mining are being practiced in these source categories. They are (a) wet pit mining and (b) dry pit mining. In wet pit mining, the depth of the excavation pit crosses the groundwater table; whereas in dry pit mining, extraction of sand is limited to the upper dry bed (Padmalal & Maya, n.d.).

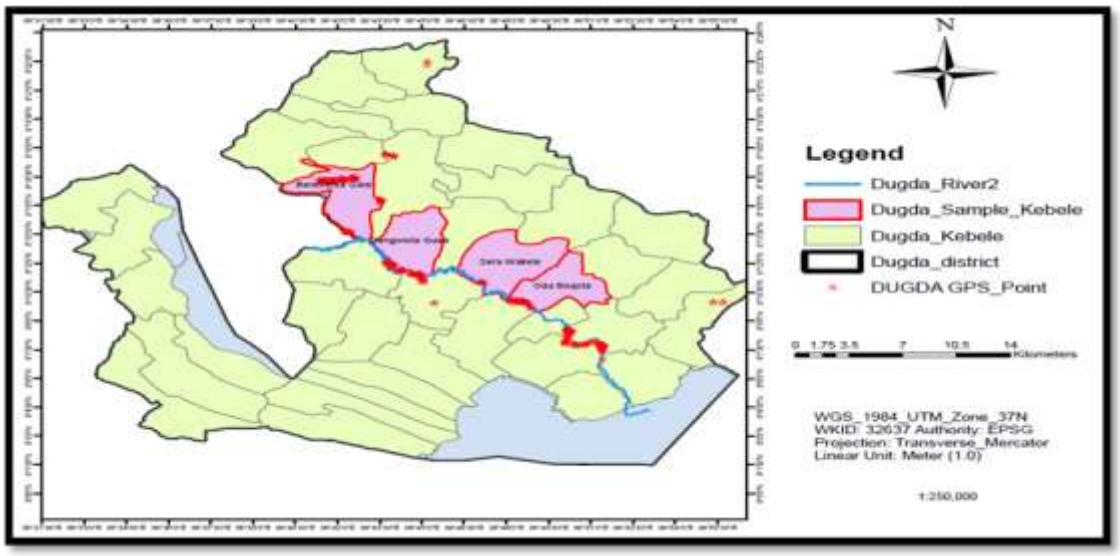


Figure 4.5: Dugda District the studied area selected RKs and sand mining sites

The star symbols are the sand mining sites collected from the GPS from district Land use and administration of the district,Dudga River_2 is Meki River

Sand mining eliminates the top soils that are needed for most farm activities. That results in the destruction of such lands for crop production. As a result, farmlands in villages in the sand mining periphery are still dwindling. Accordingly, despite the wealth creation capabilities of sand mining, the foundation of people's livelihoods, particularly farmers, is also known to erode. The farmers (47%) and sand miners (58%) responded at degree of agreed to the view that, sand mining leads to destruction or reduction of farmlands as shown in Table 4.5.

The reason is that sand mining is mostly done in communities studying the area undertaken. An additional negative effect of sand mining on the environment and livelihoods is the creation of gullies in the wake of farmland sand mining activities. A significant proportion of farmers (97%) and sand miners (96%) agreed to the view that, sand mining leads gully/ditch erosion or destruction on farmlands. These gullies or large holes are made possible through the hollow out of the sand from the ground with simple tools such as mattocks and shovel. Many gullies created by sand miners can be spotted on farmlands and in the river. Some of these gullies are very large and deep. This view confirms the findings of Tariro (2013), whose study into the environmental impact of sand mining on urban development in Gaborone found that, sand mining had shaped deep drain and pot holes on grazing lands and crop fields.

During the fieldwork of the studied, several hector of farmlands in Birbirsa Gale RK had been converted to sand mining sites before eight years. The owner of the land responded as: *water sleeping on surface of farmland before eight years then changed into river gorge. My land divided into three places and sand resource seen in the area. I and my family organized MSSE sand miners on one place of my land. The rest of the land rented to other persons sand to collect on it and for road trucks 100 Birr per sand loaded. The trucks compacted farmland for many years. When I tried to plough faced me difficulty my hand hurt and hard to cultivated plough again by manual-oxen after years resulted unproductive farmland and discouraged engaging in farming as before.The effects of sand mining increased year to year on the environments caused degradations farmlands in both sides here and there on the seasonal Bitsi River, the river bed expanded time to time, the depth or gorge and the length increased. No any forest planted on the river bed to conserve. Until sand loaded on the truck, it collected from the river accumulated on the private farmland by temporary small amount of compensation. This reduced the production of crops and farmlands of the community in the lower river stream covered by sand so that it created problems on farming.*

Source: Field observation 2020 during the study

Figure: 4.6 Baqaqa sand mining sites on the farmland of Birbrsa Gale RK/Bitsi River

At district level, there were many gullies in the villages that have variety in different rural organizations where sand mining operations have been carried out. Most of the sand mining sites

at these areas had fewer or no deeper gullies, owing to the dominant use of simple sand mining tools in that area. The stagnant water in the gullies, however, is now propagating habitat for mosquitoes and other dangerous species. It may contribute to health concerns such as outbreaks of malaria, especially in areas where gullies are closer to human settlement.

Such an outbreak of disease could negatively impact people's productivity. The stagnant water in the gullies, however, is now propagating habitat for mosquitoes and other dangerous species. The explanation for this is that health services are not spread equally across the fields of research.

Therefore, particularly in the remote sections of the district's RKs, these facilities and health staff are insufficient.

Table 4.2: Negative Effects Sand mining on the environment

S. N	Statement	Respond.	Extent of Agreement					Total	N
			Strongly Agree%	Agree %	Undecided%	Disagree %	Strongly Disagree %		
1	Destruction of water bodies (rivers)	Farmer	0.0	77.7	7.9	14.4	0.0	100	229
		Sand Miner	4.6	75.0	5.6	14.8	0.0	100	108
2	Land degradation	Farmer	2	91	2	5	0	100	229
		Sand Miner	6	54	3	24	13	100	108
3	Deforestation by the sand mining	Farmer	0	27	12	62	0	100	229
		Sand Miner	6	48	7	37	1	100	108
4	Destruction habitat of living organisms	Farmer	1	57	14	28	0	100	229
		Sand Miner	23	32	5	39	1	100	108
5	Decrease or loss of biodiversity	Farmer	0	59	16	25	0	100	229
		Sand Miner	0	52	7	40	1	100	108
6	Increased water turbidity/muddy	Farmer	0	55	2	42	0	100	229
		Sand Miner	0	78	3	19	0	100	108
7	Gullies/ditch or channel on farmlands	Farmer	0	97	3	0	0	100	229
		Sand Miner	5	91	0	5	0	100	108

The activities of sand mining are directly accountable for the destruction of water bodies (streams, rivers, ponds), especially when they are done in river valleys. The majority the farmers (78%) and the sand miners (75%) supported the idea that, sand mining leads to the destruction of water bodies as shown in Table 4.5.

Sand miners uncovered in river bed and nearby areas to remove the plant layer.

The sand miners not only dig really river for grain, they often take their grain directly from water bodies ground. All those harmful activities lead to water bodies being dried up or made unsafe for human and livestock consumption.

These activities continued year to year but during rainy season the ladder road degraded by erosion or floods this makes expand the bed of river as well as resulted land slide by both

direction south-north direction since sand mining or extraction with Because sand mining or excavation around the Meki River,with separate rural kebele borders and Meki town kebeles.
Odaa Guddaa MSSE sand miner members in Odaa Boqota PA. He answered about the degradation of Meki River as follows:
I have been working for six years did not stop and transferred to other economic activities. The effects of the sand mining on the Meki River: the road path for human and donkey where sand carrying to outside was damaged. As soon as the rain continued to raining the road is on the way of destroyed as well as the land slide ready to degraded and entered to the river. This resulted expanded the river bed. In future on this side it is difficult to the harvested sand bring up to the land place where the truck stopped and to be loaded. In addition the Mekiriver was filled with soil, water flow stopped in dry time; trucks damaged the road surroundings and on the bed of the river.

Source: Field observation during the study, 2020

Figure: 4.7 Degraded Meki River Bed in OdaBoqota PA OdaaGuddaa MSSE SM sites

Another negative effect of sand mining on the environment is deforestation. This is especially severe when sand miners operate illegally in the forest reserved.

One thing remind that the statement/variables deforestation by the sand mining, the majority of respondents 54 % replied ‘disagree’ and 34 % ‘agree’ the reason is that the majority of sand mining is undertaking in the surroundings of ‘Meki’ river valley areas the respondents expected and assumed that no big forests in the area by ignoring the vegetation located on the river bed and area enclosure or planted by the previous sand miners, recently widely damaged by sand carryings vehicles travelled on road making in many direction here there unplanned and uncontrolled even including the farmlands are degraded in the areas.
The view the respondents had confirmed for the study that sand mining leads to deforestation.
Consequently, in different areas, a number of trees or plant cover has been removed to make room for sand mining operations. The sand mining site on the Meki River with cleared vegetation cover in the Sera Wakale & Oda Boqota RKs area enclosed and preserved by former sand miners but recently It is deforested, degraded by pasture or grazing land and eroded by sand-carried vehicles, destroyed in the forest during field surveys.

The protected trees and vegetation are removed by the sand miners without any plans for replacements consequently bare land in the area.

One of the respondents an elder known the area in detail and living in Oda Boqota RK near Meki Town told about the history of sand mining started in the area said that;

> *About the vegetation he also provided the evidence that in area the forest gradually diminished as well as the wildlife destroyed from the area*. He mentioned that *in the previous time there were many local natural forests on the beds of the river in both sides. Vegetation is used for human and animals consumption for food and medicines already disappeared.*

This data confirmed that regarding to Vegetation Covers based on Dugda district physical and socio-economic profile 2010 E.C, the largest proportion ha or of district area is devoted to cultivation land. The natural vegetation is highly distributed through human intervention therefore insignificant amount hectares of lands occupied by forest in the district. Only (3.56%) ha and (8.32%) ha land respectively occupied by forest land, grazing land/pasture. There is no closed woodland found in the plain area. Dense woodland and trees around the lake were used to support variety of wild life. Now, however they are degraded and converted into different land uses. The areas around the lake have been left with only patches of ruminants' wood and bush land.

The Other respondent in OdaaGuddaa MSSE sand miner members in Odaa Boqota RK at sand mining started here and he had been joined in 1996 E.C as a member that supported the idea of vegetation conditions the area**.** This respondent continued his idea provision on the vegetation conditions.

> *Regarding the area forest enclosure by the previous sand miners done including me and with concerned government bodies at that time, now it brings a challenge on the forests. We asked many times did not get the support from government bodies to enforce legally. To employed guard we have no capacity to pay him. The forest on the way of illegally destroyed by people for cutting or timbering. Strongly he told that we kept it by ourselves there during sand mining but people cutting the forest as soon as we went to our home to eat the lunch time. It is difficult to control.*

Source: Field observation during the study, 2020

Figure: 4.8 deforestation of vegetations in sand mining sites of OdaBoqota and Sera Wakle RKs

Such lands are discarded to go waste when all the needed sand resources are finished as in the case of Figure 5.4. This view corresponds to that of Aromolaran (2012), whose study on the effects of sand mining on land in agrarian communities in the Ogun State of Nigeria discovered that, the activities of sand mining leads to the loss of vegetation and forest cover. Hedge, (2011) also found the number of tress lost to the activities of sand mining to be uncountable.

This is not good to hear because; deforestation contributes to global warming (Philip and William, 2003). Again, when an area is deforested, almost all precipitation is lost as run-off leading to drier climates (Raven and Berg, 2006). Deforestation has also increased communities' soil erosion rate through heavy run-off in deforested areas. It should also be remembered that, in the way that certain rains are promoted by the existence of vegetation cover, deforestation will adversely impact rainfall guides. In fact, deforestation may also impact their health-care services in these areas. Although the destruction of the district's vegetation cover was relatively moderate due to the increased use of human labor to mining the area's sand. That is, it took sand miners there a longer period of time to cause widespread deforestation, owing to their reliance on mainly simple instruments. These devices, such as shovels and mattocks, have struggled to encourage quick and successful digging for the sand.

Damage to the living organisms' habitat has led to biodiversity loss. These damages are caused primarily by removing the trees or scooping the top soils which serve as the animals' home grounds. The devastation of habitats is harmful to all animals, especially those which need a specialized environment to thrive. Therefore, anything which damages the habitat of living organisms has the potential to destroy such animals. The majority farmers (59%) and the sand miners (52%) agreed to the view that, sand mining leads to hammering of biodiversity. The reason is that, when trees are uprooted, all the birds and other animals which live on those trees are either killed or pursue away. Again, when the sand is dug, especially with the aid sand mining instruments/hand tools, many animals such as local name ‘Wakalle’, rats, snakes, crabs and are also killed or forced to abandon their habitat. These displacements and killings of animals lead to the decrease or loss of biodiversity.

The resident elder farmer confirms about the local wildlife by comparing the past condition with the recent one and he responded it.

> *As far as the vegetation become visible on both direction North-South of Meki river: so many Wildlife like monkey, Hyena, tiger, fox, ‘wakkale’ Crocodile like, and like were also there in the area around the Meki river at that time. But as a result of sand mining most of wildlife’s are disappeared here today.*

The views expressed by the respondents is consistent with that of Saviour (2012) and Aromolaran (2012), that the major adverse effects of sand mining on the environment are habitat destruction and damage to biodiversity. It should be noted that, the loss of wildlife has negative repercussions on the livelihoods of several people in the communities.

Sand Impacts of from river extraction consequences pollution and changes in levels of pH, lateral instability, can change the riverbed itself, incision can drain to a lower level resulting in

reduced aquifer storage, may increase flood frequency and intensity by reducing flood regulation and can lower the water table, thus exacerbating drought occurrence (Dr Pascal Peduzzi, 2015)

Hypothesis on Gullies/ditch or channel on farmlands

H0: Gullies/ditch or channel on farmlands is not the Negative Effects of sand mining on the environment

Effects SM on the environment		Gullies/ditch or channel on farmlands				
		Strongly Agree	Agree	Undecided	Disagree	Total
	Total	5	320	6	6	337

Chi-Square Tests

Effects SM on the environment		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	20.976[a]	3	.000
	Likelihood Ratio	23.061	3	.000
	N of Valid Cases	337		

a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is 1.60.

The calculated Chi-square ($\chi 2$) is 20.98 while with degree of freedom 3 the critical value at 0.05 the significance level is 7.81, hence null hypothesis is rejected. That is, there is statistically significant relationship between Gullies/ditch or channel on farmlands and the Negative Effects of sand mining on the environment in the district. We can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables.

Hypothesis Thirteen

H0: Deforestation by the SM is not the Negative Effects of sand mining on the environment

Effects SM on the environment		Deforestation by the sand mining					
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
	Total	7	113	35	181	1	337

Chi-Square Tests

Effects SM on the environment		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	36.673[a]	4	.000
	Likelihood Ratio	37.994	4	.000
	N of Valid Cases	337		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .32.

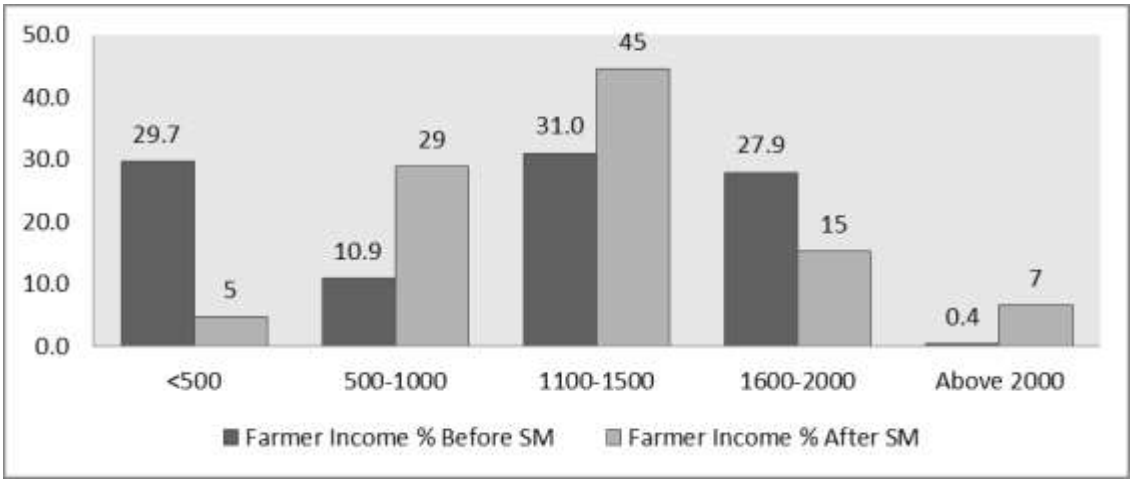
The calculated Chi-square ($\chi 2$) is 36.67 while with degree of freedom 4 the critical value at 0.05 the significance level is 9.49, hence null hypothesis is rejected. That is, there is statistically significant relationship between Deforestation by the SM and the Negative Effects of sand mining on the environment in the district. We can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables.

4.6. LIVELIHOODS EFFECTS OF SAND MINING

4.6.1. Effects of Income

The growing impact of long maturity cycles on agricultural crops, seasonality of agricultural practices and the negative burden of environment unpredictability on natural weaknessesin agriculture, and harassment of crops by pest and disease, low profitability and weak pricing of agricultural commodities, farming is lower income for farmers. Thus, many citizens in rural areas are compelled to participate in sand mining or some other subsistence operation possible in such challenging circumstances.

It was showing that, majority of the farmers earned lower monthly income before sand mining started in their communities as shown in Figure 5.1. That is, 29.7 % of the farmers usual less than Birr 500 a month before sand mining began. Again, almost 10.9 % of the farmers also received a lower monthly income of Birr 500-1000. Generally, over 40.6% of the farmers were in the lower income brackets (Birr 500-1000) before sand mining came to the communities. Just about 31 % of the farmers were in the highest monthly income range of Birr 1100-1150.



Source: Field Survey, 2020

Figure 4.9 Income Levels of Farmers before and after Sand Mining

This means that many farmers did not enjoy higher incomes in the various communities before starting sand mining, reasoned as clarified earlier is that farming in rural communities is mostly associated with lower productivity due to the use of basic farming methods, bad weather conditions and poor pricing of the produce.

For example, some farmers who received less than Birr 500 in a month before sand mining had an improvement in their income after sand mining. Similarly, farmers in the other lower income ranges experienced an increase in their income after sand mining.

This implies that, these farmers obtain additional income after the introduction of sand mining some farmers engaged in sand mining as part time work in addition to the farming. Possibly, this

gave them upward adjustments in their monthly earnings. Conversely, the number of farmers in the last two highest income categories (Birr 1100- 1500; Birr 1600-2000) diminished after sand mining started. These were mostly farmers whose farmlands and crops had been giving up for sand mining.

Many of those farmers were either too old to take advantage of the opportunities sand mining brought or were simply concentrating on the little lands left for them. This means that, in spite of the capacity of sand mining to transform the economic lives of certain people, it also brings income loses to another group of people, especially farmers whose lands are used for the sand mining (Musah, 2009).

It can be accomplished that, as long as the rate and way in which sand mining is done in the society persists, many more farmers would be made poorer.

That is, as more farmlands are being transformed into sand mining sites, many more farmers are getting lower incomes and hence their vulnerability levels are increasing.

The impacted farmers' reduced income has the ability to raise their rate of deprivation and thus push them to abandon farming or to induce them to become sand miners if they can and are drawn. Such a scenario might threaten food protection that would impact not only the sand mining boundary communities but the district as a society. Therefore, some sort of intervention is required to check the increasing activities of the sand mines, especially in the agricultural areas. It was exposed that, before sand mining was initiated into the communities in the area; a lower monthly income group of Birr 500 evidenced the highest numbers of farmers and sand miners which was about 29.7% and 50% respectively as shown in Only a few of the sand miners (17.6%) and farmers (27.9%) made the highest monthly income of Birr 1600-2000.

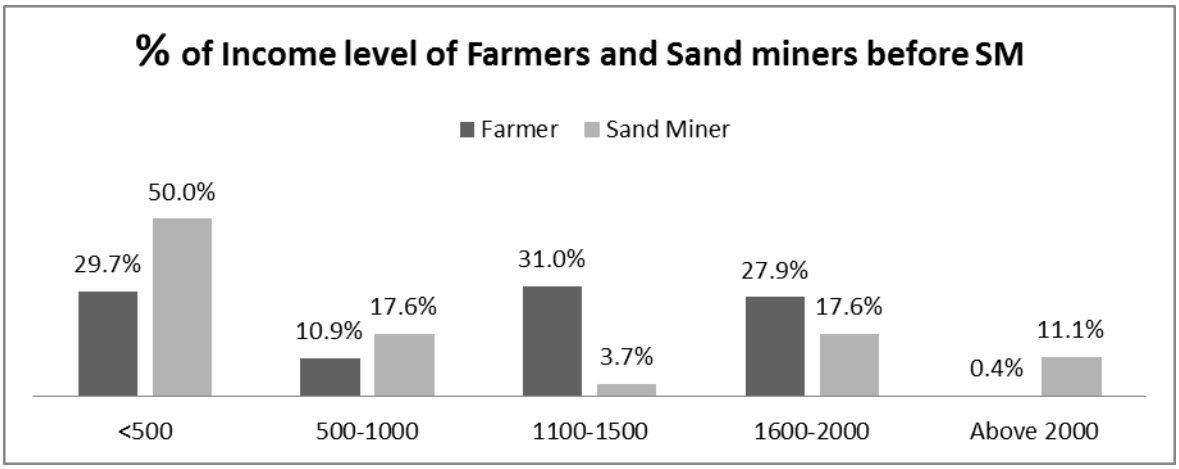
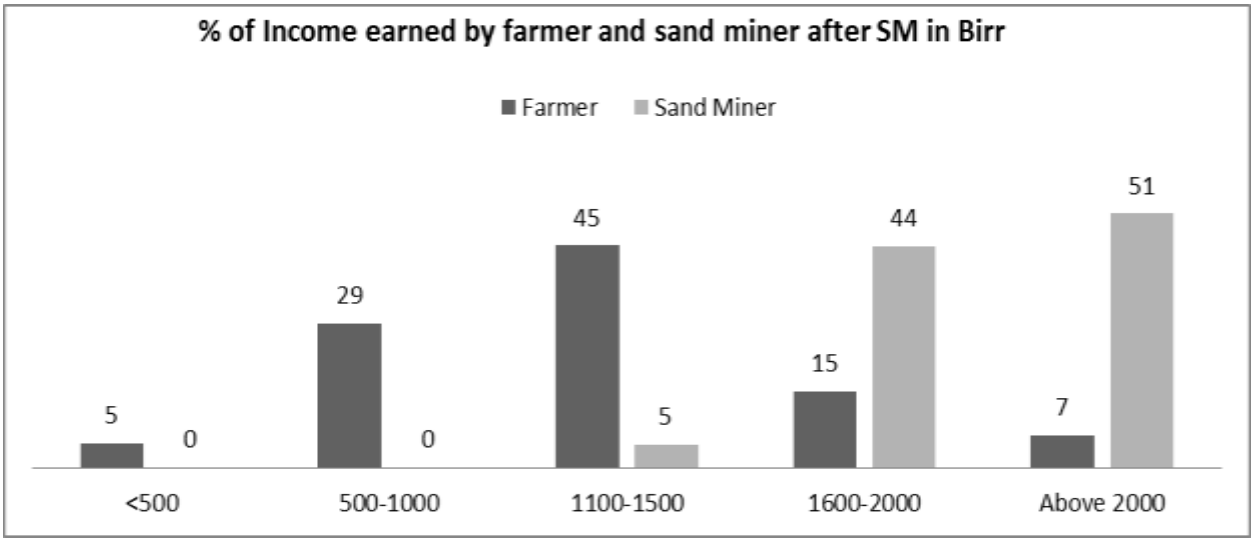


Figure 4.10: Income Levels of Farmers and Sand Miners before Sand Mining

The relatively smaller proportion of sand miners in the highest monthly income group can be explained by the fact that most of the sand miners did not own the land they used for farming before sand mining. However, after sand mining in the communities started; the majority of the people (91%) were raised into the highest monthly income bracket of Birr 1600-2000 and above as shown in Figure 4.10.



Source: Field Survey, 2020

Figure 4.11: Income Levels of Farmers and Sand Miners after Sand Mining

For the sand miners, the reason for this huge shift in income levels is not unbelievable.

That is, along with their costs, the demand for sand has increased. It has rendered the work competitive for all those who receive higher income in the value chain of sand mining operations another situation after beginning of sand mining.

That is, while the number of farmers who enjoyed the highest income before sand mining fell, those in the lower income brackets gained some degree of income appreciation.

The reason is that in the lower income set, many of the farmers combined sand mining with their agriculture.

Consequently, any lack of revenue from sand mining was accounted for by the extra income they earned as sand miners from their part time jobs. Some of the farmers in the lower income group also added other income-earning jobs, such as small-scale trading, shopping, oxen fattening, sheep and poultry into their farming. In the other side, many of the farmers who missed income after sand mining either were too old to take advantage of the possibilities offered by sand mining or were not involved in sand mining. Such farmers always perceived sand mining as a constant source of threat because the higher income the sand miners earned corresponded to a fall in their income The explanation for this is that sand mining operations are primarily carried out on farmlands and on the river bed in.

As more sand is mined, more river beds are destroyed which lead to such farmers being displaced and their income being reduced.

This view confirms the findings of Mensah (1997) in his study of coastal sand mining in Ghana that, and mining activities are much more profitable than food crop production. The possible reason for the confirmation could be attributed to the increasing demand for sand products all over the world and its associated price increases. The change in occupation amongst some

residents in the communities to sand mining, and other livelihood activities also supports the view that, poor people diversify in order to survive in risk prone and uncertain world (Chambers, 1997).

It's important to remember that many people are motivated to leave Growing on the belief that the extraction of sand is more lucrative than farming. In the long run, a deprivation rate among farmers who cannot touch the sand mine value chain is growing.

That would also have a negative effect on food supply and other agricultural commodities.

Such a situation could be dangerous for people in communities on the sand mining fringe and the region as a whole. Therefore, the local authorities must make every effort to make farming attractive to the people. This will mean that subsistence farming and sand extraction coexist peacefully.

The sand miners in the value chain of sand mining activities such as the, diggers, carrying on donkey back, loaders and land owners (rented farmland road for vehicles carrying sand per each trip cross to sand mining sites across Meki River and on farmland areas) earn income immediately after executing their assigned tasks. That is, sand miners earn income on daily basis, but agricultural activities are seasonal. The classifications sand miners the majority of them 81% were sand diggers in the sand mining activities. Other factors that boost the income for sand miner the customer of the sand were different sources. The sand miners responded that 28% from the district, 20% from other district, 37% from other region (outside Oromyia) and 13% from different company. The price increased had also its own contributions for sand miner income increments. Accordingly 79 % of sand miners responded the price of sand increased gradually year to year that enforced the amount of sand exploitations and increased the amount of sand sales in the district.

Unlike sand mining, agriculture does not provide immediate earnings, because it takes longer periods to mature crops. Certain outside powers, such as the impact of climate change on crops, may even disrupt farming earnings. The views here further support the conceptual framework for the study that people are either joining sand mining to enjoy some of its benefits or due to climate and physical vulnerabilities affecting agriculture. This finding confirms the view of Robert (2014) that many of Kenya’s poor youngsters were turning to sand mining as a quick way to earn money. It should however be noted that, even though sand mining brings quick income, it could be detrimental to the communities in the long run. This is because; it may influence people to sacrifice the arable lands at their disposal regardless of its intra-generational and inter-generational consequences.

An observation at community events showed that becoming a sand miner was the fastest way to get money. In this context, many community landowners leased most of their land to the sand miners at the expense of agricultural production and food safety.

The implication of this finding is that sand mining activities in the communities will continue to flourish without any intervention and eclipse other livelihood activities. Such a situation could result in all of the sand resources dwindling or exhausted.

Table 4.3: extracted sand sold in m^3, price and amount of sold in Birr in Dugda District

Year In E.C	Total sand mined in meter cube in million	Price	Total sales in Birr in million
1990-1993	2.37	22	52.20
1994-1995	1.19	35	41.52
1996-1999	2.37	44	104.39
2000-2004	4.79	70	335.34
2005-2008	6.21	90	558.45
2009-2010	2.48	100	248.20
2011-2012	2.48	106	263.09

Source: Dugda Mining Development Office

Sand mining in the district has an Income effects with value chain from the sand miner to customers. Such as sand miners involved in different jobs, revenue source for the district, Meki town, middle men/brokers, business men and created payment made for different labor in the customers were included. In terms of sand mined it played a great role mostly used for different construction industry in the region as well as the national level.

Regressions analysis of sand mined sold, price and income earned in Birr

Coefficients[a]

Model		Unstandardized Coefficient	Standardized Coefficients		t	Sig.	95.0% Confidence Interval for B			Collinearity Statistics
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-170.793	31.673		-5.392	.006	-258.731	-82.855		
	Total amount of sand sold in meter cube in Million (X1)	78.997	8.184	.743	9.652	.001	56.274	101.720	.832	1.202
	Price of one meter cube of sand (X2)	2.290	.423	.417	5.408	.006	1.114	3.466	.832	1.202

a. Dependent Variable: Total amount of sold in Birr in Million(Y)

The Regression equation

Y= -170.793+78.997 X1+2.29 X2

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.990[a]	.980	.970	31.67110

a. Predictors: (Constant), Price of one meter cube of sand(X2), Total amount of sand sold in meter cube in Million(X1)

b. Dependent Variable: Total amount of sold in Birr in Million(Y)

Interpretation

The coefficient of 78.997 amount of sand sold in meter cube in Million and tells us that with the influence of price (X2) held constant,78.997 increases by say sand in metric cube, on average, the amount of in Birr in Million increased by about 7899.7. The coefficient 2.29 tells us that holding the influence of sand sold in meter cube (X1) constant, on average, the amount of in Birr in Million increased by about 229 amount.

The intercept value of about -170.793, mechanically interpreted, means that if the values of sand sold in meter cube in Million and price of sand rate were fixed at zero, the mean of amount of income earned decreased would be about 170.79 per Million Birr sand sold. Of course, such an interpretation should be taken with a grain of salt. All one could infer is that if the two repressors were fixed at zero, the income of sand sold in million Birr will be quite low, which makes practical sense. The coefficient of multiple determination (R^2) is 0.98; therefore, about 98% of the variation in the earn income from sand sold in Birr is explained by the sand mined and the price of sand. The regression equation appears to be very useful for making predictions since the value of R^2 is close to 1.

Hypothesis Test receiving higher incomes in the community after sand mining started

H0: A lot of people are not begun receiving higher incomes in the community after sand mining started than before.

		Receiving higher incomes in the community after sand mining started than before				
Positive effects of Sand mining		Strongly Agree	Agree	Undecided	Disagree	Total
	Total	1	297	10	29	337

Chi-Square Tests				
Positive effects of Sand mining		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	55.910[a]	3	.000
	Likelihood Ratio	55.617	3	.000
	N of Valid Cases	337		

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .32.

The calculated Chi-square ($\chi 2$) is 55.91 while with degree of freedom 3 the critical value at 0.05 the significance level is 7.81, hence null hypothesis is rejected. That is, there is statistically

significant relationship between receiving higher incomes in the community after sand mining started than before than before sand mining began in the district. We can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables. One variable of category that receiving higher incomes in the community after sand mining started than before so that there is a positive effect relationship.

4.6.2. Positive Effects of Sand Mining on Livelihoods

With reference to the adapted conceptual framework (Figure 2.2), the activities of sand mining have effects on the environment and livelihoods of people. These effects could be positive, negative or a combination of both (Akabzaa, 2009). The section that follows presented the results the studied and the fieldwork on the positive and negative effects of sand mining on the livelihoods of the study communities. Sand mining activities are becoming increasingly an alternative path of job creation for many people in the developing world. This is particularly so as policies in developed countries have been very difficult to establish job prospects for the population. The value chain of sand mining activities provides employment for people in communities and beyond the sand mining fringe.

All the farmers and Majority of sand miners (96%) sampled for the study the degree of agreed to the view that, sand mining creates more employment opportunities as shown in Table 5.1. The reason is that, sand mining offers both direct and indirect jobs to people living in the sand mining fringe communities.

Table 4.4: Positive Effects of Sand Mining on Livelihoods

S.N	Statement	Respond.	Extent of Agreement				Total	N
			Strongly Agree%	Agree %	Undecided%	Disagree%		
	Sand miner created more Emp't now than before sand mining began	Farmer	6	94	0	0	100	229
1		Sand Miner	0	96	1	3	100	108
	Permanent Emp't security now than before sand mining started	Farmer	1	83	1	15	100	229
2		Sand Miner	0	78	9	13	100	108
	Receiving higher incomes in your community after sand mining started than before	Farmer	0	95	4	1	100	229
3		Sand Miner	0	74	1	25	100	108
	An increase in the sales of goods and services after SM began than before introduction of SM	Farmer	0	74	25	1	100	229
4		Sand Miner	6	81	7	6	100	108

S.N	Statement	Respond.	Extent of Agreement				Total	N
			Strongly Agree%	Agree %	Undecided%	Disagree%		
5	Alternative means of livelihood; economically more rewarding than food crop production	Farmer	1	76	2	21	100	229
		Sand Miner	0	63	3	34	100	108

Emp't=Employment SM=Sand mining

Source: Field Survey, 2020

For instance, sand loaders, diggers, and carrying on the back of donkey are among the people who are directly employed by sand mining in the communities in the studied area that can benefited from sand mining activities. Beside that the middle men or broker has also the one has gotten income from the both from the supplied side (sand miner) and demand side (customers from different areas) of the sand mining value chain activities. Other people whose services are needed by sand miners include tally clerks, food vendors, water sellers, truck mechanics, fuel operators, and vulcanizes.

This concluded that the sand mining income generation as income spillover plays a major role in the economy of the district, another district, province, and other area of the world, particularly in the construction sector.

Consequently, the study found majority of the farmers (95%) and of the sand miners 74% agreeing to the assertion that, sand mining brings higher income to the communities as shown in Table 4.6. This supports the views of Thomas and Donovan (2013), that sand mining activities for most part pays high wages relative to other local employment opportunities. It is also consistent with the findings of Stewart (2013), Musah (2009) and Mensah (1997) that sand mining results in high income accruing to the land owners, truck drivers and other people engaged in the sand mining work.

Furthermore, the above result supports the proposition that "the higher sand mining profits is a big beneficial impact of sand mining on livelihoods." The higher profit the sand miners had earned would allow them to introduce their friends and loved ones to sand mining.

Also, some of the local residents who see changes in the sand miners' economic status may be drawn to join. This helps to drive all competent individuals into sand mining trade irrespective of their social and environmental implications.

Another positive effect of sand mining on livelihoods is the increase in commercial activities in the sand mining fringe communities. Sand mining is closely associated with the arrival of people to mining fringe communities in the district included capital Meki town. The demand for goods and services in such communities by the sand miners open up opportunities for more people to engage in various forms of commercial activities. This contributes to an increase in the sales of items in the area. The study found majority of the sand miners (95%) and that of the farmers (74%) supporting the above position as shown in Table 5.1. The reason is that, sand miners purchase several items in the communities to facilitate their work. Some of these items include

foodstuffs, cigarettes, sachet water, shop, and local grocery, 'Dubee or Iqub', assurance lending for goods or service and general provisions. They also employed the services of truck mechanics, vulcanizes and other artisans in the communities. All these series of demands for goods and services eventually boost the sales of items in the communities. This view confirms the findings of Asante et al., (2014), whose study into stone quarry and livelihoods in Kumasi showed that individuals sold water, foodstuff and even operated taxi cabs near quarrying sites.
Without sand mining, this bar operator's customers will decline, and those in similar businesses. That will obviously lead to a decrease in their income levels. The perception that sand miners offer the local economy favorably means that they should be received well by the residents. It aims to potentially broaden their projects without giving any heed to environmental concerns and other problems that result from their practices.

However, it is important to note that sand mining has not equally boosted all study communities' local economies. In those communities studied, many residents of sand miners were able to trade effectively with the members.
From the above presentations, it can be assumed that sand mining activities support the creation of wealth; however, there are greater tendencies to undermine the ability of farmers whose main livelihood assets are land. The job creation associated with sand mining organized the MSSE sand miners in turn creates new tax revenues, especially on a local level generates more revenues for local governments, and county governments.

Another one of the major economic benefits of sand mining in Wisconsin has been the positive impact it has had on the state's rail and trucking industries. These industries play a central role in sand mining operations, and the increase in mining in the state has given the rail and trucking industries a significant boost. Other related positive effects of sand mining regarding to support livelihood communities: In general there are so many other related research findings views that supported overviews Positive Effects of Sand Mining on Livelihoods by different authors' directly or indirectly provided broad evidence conveyed significance at micro and macro level, regional, national and global level connection with this objective. Some of these are listed in the next idea manipulations.

Sand has been used in the construction of roads, dams, schools, health facilities and houses for thousands of years. The increasing population and economic developments impose an ever increasing rise in the demand for sand throughout the world (Kondolf, 2000 as cited in Padmalal & Maya, 2014). Major constituents of any structures by volume or weight are aggregates of sand and there are few or no structures in their permanent forms that exist without sand (Ashraf et al 2011; Lawal, 2011); (Asabonga et al., 2017).

Hypothesis Test on created more employment
H0: The activities sand miners in the community has not created more employment now than before sand mining began
.

Positive effects of Sand mining		Sand miner created more Employment now than before sand mining began				
		Strongly Agree	Agree	Undecided	Disagree	Total
	Total	14	319	1	3	337

Chi-Square Tests

Positive effects of Sand mining		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	15.129[a]	3	.002
	Likelihood Ratio	19.967	3	.000
	N of Valid Cases	337		

a. 5 cells (62.5%) have expected count less than 5. The minimum expected count is .32.

The calculated Chi-square ($\chi 2$) is 15.13 while with degree of freedom 3 the critical value at 0.05 the significance level is 7.81, hence null hypothesis is rejected. That is, there is statistically significant relationship between the activities sand miners in the community has created more employment now than before sand mining began in the district. As the *p*-value (labeled Asymp. Sig. (2-sided) or 0.002 is less than 0.05 if so; we can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables. One variable of category that sand miners in the community has created more employment now than before sand mining began so that there is appositive relationship.

4.6.3. Negative Effects of sand mining on the Livelihoods

The majority the farmers (86%) and the sand miners (58%) sampled for the study supported the idea that, sand mining leads to the major negative effects of sand mining in the livelihood in the community that damage to public and private properties such as roads, pipes, and farmland &etc. this is because trucks travelled with unplanned path destroyed the road, farmland, vegetations and others caused dust during winter/dry season, muddy during rainy season.

Table 4.5: Negative effects of Sand Mining on Livelihoods

S. N	Statement	Respond.	Extent of Agreement					Total	N
			Strongly Agree%	Agree%	Undecided %	Disagree %	Strongly Disagree%		
1	Low crop yields	Farmer	0	88	6	6	0	100	229
		Sand Miner	1	44	4	52	0	100	108
2	High school drop-out	Farmer	0	83	0	17	0	100	229
		Sand Miner	7	50	1	42	0	100	108
3	Child's labor	Farmer	0	81	0	18	0	100	229
		Sand Miner	6	52	1	41	0	100	108
4	Damaged public and private properties	Farmer	1	86	7	6	0	100	229
		Sand Miner	0	58	1	39	2	100	108
5	High cost of	Farmer	4	70	21	5	0	100	229

S. N	Statement	Respond.	Extent of Agreement					Total	N
			Strongly Agree%	Agree%	Undecided %	Disagree %	Strongly Disagree%		
	living	Sand Miner	6	35	3	56	0	100	108
		Sand Miner	0	58	6	35	0	100	108

Source: Field Survey, 2020

One of the main challenges was the fact that many access roads had to pass through their lands thereby destroying their crops and degrading their land. Soil erosion along the river as a result of scooping sand from the walls of the river banks, increase in the rate of river flow and dander of flooding, deep valleys left by sand harvesting and overexploitation of sand at the expense of crop farming were also enlisted as challenges specific to land owners.

During dry time dust covered large area, people on "Gaari" horse travelled had been accidental reported in last year in Oda Boqota PA because of heavy dark dust created foggy on the land and also by wind movement into the sky so that both parties of vehicles and Horse by 'Gaari horse' drivers unable to seen each other due to road vehicles trafficking in the area caused and accidents happened as a result of an adverse effects and mining. This view confirmed as 'The Soil class of the district is Clay Loam 33% & Sandy Loam is 67 %'. It has a light texture, which is vulnerable to both wind and soil erosion (Dugda PLEDO, 2010)

Another negative effect of sand mining on livelihoods social problem by sand mining, the activities of sand mining are directly responsible for high school drop-out especially when they are done across 'Meki' river valleys and other places. The majority the farmers (83%) and the sand miners (57%) sampled for the study supported the degree of agreed the idea as shown in Table 4.7. The reason is that, school drop-out expose to sand mining activities are the students looked their as a peer group or attracted to earn income by the sand miners would encourage students to invite their friends and influenced to sand mining the one that not attended school and participated as sand miner and more income generate purpose phenomenon. These resulted students forced to stop from higher education goals such as become skilled or semi skilled labor.

Beside that negative effect of sand mining on livelihoods social problem by sand mining statements explained the adverse effects of sand mining on child's labor in the community the study done as indicated majority the farmers (81%) and the sand miners (58%) sampled for the study supported the degree of agreed in the district. The reason is that, child labor not attended school and exposed to sand mining activities are to support their family, and because of their family are aged and unable to work on an energetic force labor and earn income generate purpose phenomenon. Children labor enforced to sand mining as unable to attend school due to lack of supported by their families.

Other problems of sand mining in the district were manual mechanism of mining system. Not only manual work but also it is difficult extraction of sand from the deep river bring to the top of land where on vehicles loaded. The processes of manual sand mining step by step from the river caused tiredness to the sand miners. Sand gathered in one place in the river by sand miners; filled into sacks or tearing water jercan, carrying sand sacks/jerycan and then put on the back of donkey by energy labor force, the path for donkey may difficult on the ladder road steps prepared or easy to travel the upper river and then took to the land outside of the river where it comfortable land road area to the sand to be load on that vehicles.

Farmers 61% and 69% were aware of any sand mining laws or regulations in the area, where as farmers 81% accessed to information from the sand miners with regard to their operations that affect the well-being.

Hypothesis on Damage to public and private properties

H0: Damage to public and private properties such as roads, pipes, farm land, etcis not Negative Effects of sand mining on the livelihood

Negative effects of SM		Damage to public and private properties					
		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
	Total	2	260	17	56	2	337

Chi-Square Tests

Negative effects of SM		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	65.266[a]	4	.000
	Likelihood Ratio	64.226	4	.000
	N of Valid Cases	337		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .64.

The calculated Chi-square ($\chi 2$) is 65.27 while with degree of freedom 4 the critical value at 0.05 the significance level is 9.49, hence null hypothesis is rejected. That is, there is statistically significant relationship between Damage to public and private properties such as roads, pipes, farm land and negative Effects of sand mining on the livelihood in the district. We can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables.

Hypothesis on High school drop-out

H0: High school drop-out is not the Negative Effects of sand mining on the livelihood

Negative effects of SM		High school drop-out				
		Strongly Agree	Agree	Undecided	Disagree	Total
	Total	8	243	2	84	337

Chi-Square Tests

Negative effects of SM		Value	df	Asymp. Sig. (2-sided)
Total	Pearson Chi-Square	45.901[a]	3	.000
	Likelihood Ratio	46.521	3	.000
	N of Valid Cases	337		

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .64.

The calculated Chi-square ($\chi 2$) is 45.9 while with degree of freedom 3 the critical value at 0.05 the significance level is 7.81, hence null hypothesis is rejected. That is, there is statistically significant relationship between High school students' drop-out and negative Effects of sand mining on the livelihood in the district. We can conclude that the variables are not independent of each other and that there is a statistical relationship between the categorical variables.

4.4. Ensuring Environmental Sustainability and Livelihood Security

This section gives the impression of being in the roles of government stakeholder authorities in different hierarchy of government policy organizations, proclamations, rules and regulations
Andeven laws ensuring environmental sustainability and providing security of livelihood to communities, especially farmers and others who have been adversely affected by sand mining. Coordination, alignment and inter-linkage research needed for sustainable environmental growth in the mining industry, like sand extraction, would typically be the consequences of environmental policy, mining policy and land use policy.

In this study, only farmers 54% were responded that proper monitoring and enforcement often done on sand mining activities to ensure compliance /act according to the standard by government stakeholders. Totally 22 Key Informant Interviews (KII) were included from District mining councils and Regional level: such as Environmental Protection, Forestry and Climate Change Authority, Mining Development Authority, Land use and Administration Bureau and the Chiefs/Opinion leaders in the sand mining border communities as indicated in the table 3.3.

The importance of these stakeholders in providing secured livelihoods for people in the face of vulnerabilities cannot be underestimated (DFID, 2000; Carney, 1998). The adapted conceptual framework for the study (Figure 2.2) indicates that, local authorities influence the use of livelihood assets, livelihood activities and their outcomes. They do this by enacting laws and creating livelihood strategies for people in need. The strategies or influences by these local authorities usually produce positive or negative livelihood outcomes.
But an effort to determine the roles of these local authorities in sand mining activities exposed lack of success in protecting the environment and securing farmers' livelihoods. It was revealed that most of these institutions had their own gap in contributing to the environmental impact issues in the sand miners' operations.
They also had limited knowledge of the actual effects on the communities and the environment of sand mining activities. Consequently, most of these local authorities either lack sand mining regulations or did not enforce the regulations even when they did exist.

Environmental Protection Head/a member of Dugda District mining council she had responded that about sand mining activities in the area the Key informal interview as follows:

The awareness level of the activities sand mining in the district is high. The owner of land is common land where most of the mining activities are undertaking in the river areas. Most of people engaged on sand mining because of there are sand resource present in the district. It is an opportunity job for unemployment and to get income. Sand mining has both a benefit and an adverse effect. The laws or regulations prescribe do not applied and enforced. The proclamation was put the general mining system not separate to each minerals mining. Because proclamations it is not customized from federal and regional level direction for working to enforce as rules and regulations so that a big challenges faced at the grass root of district and PA level where the realistic sand mining request undergone.

Figure: 4.12 the Steps of sand mining practices in the Dugda District in Meki River and on farmland

Descriptions of the figures (Chart)

1. Harvesting sand from river by washing; **2**. Collected on river near to river; **3**. Fill the sand in the tear water jenkan/sacks then put on the donkey back;**4**. The road or like ladder steps prepared travelled up and down to human and donkey; **5**. Sand accumulated on the above land ready to loaded on trucks; **6**. The sand collected on the land were loaded on the trucks by sand miners or other employed; **7**. Trucks sand loaded destructed the feeding road; **8**. The vehicles loaded moved to the main asphalt Meki to Finfinne-Addis Ababa

These idea similar views were shared by the district Environmental Protection Monitoring & Evaluation Expert who was contacted as key informal interview responded as:

> *In the district if the projects required full EIA it accomplished at regional level, partial EIA at zonal level and Environmental management planning (EMP) at district level.*
>
> *The acquired licensed permit provided to sand miners to operate mechanism were by participation and discussions using local community centered around project area or based on people affected people (PAP) methods of minute document agreement signed with development committee at the PA level and prepared screening checklist at the district level the owner of the project is the government so that signed by representative and the private sector signed by himself. The types of EIA undertake for sand mining activities were identified by screening checklist methods no EIA was forced to undertake (EMP) at district level.*

Dugda District Forestry Team Leader as Key Informal Interviewed (KII) reacted on the regarding vegetation or forest situations in the district as:

> *Sand miners were encroaching upon the forest reserves. I aware of the negative effects of sand mining on the environment as deforestation of land degradation, ecosystem disturbance phenomenon, loss of biodiversity due to human interferences, destruction of habitat of living organisms like their eggs and siltation or muddy in sand mining sites. There is high severity rate of degradations caused by sand mining to the vegetation coverage. The top soil where sand mining undertaken was collected separately in one place and after sand mined completed it returned to filled in the digging dumps area. But most of the sand miners did not do this work to conserve on the degraded sand mining sites. The soil gathered in dry season the river bed caused flooding in the rainy season and distracted the river. The soil filling the digging holes was filled by flooding not by sand miners. For example of vehicles that loaded the sand travelled in the road path in area enclosure in different place illegally. Deforestation for coal production and fire wood to earn income caused created valley, on the river bed the root of vegetation damaged by flooding and fall down. The farmland surrounding the river bed had been caused soil erosion and land degradation. In general about 95% of sand miners did not involve in the conservation and protection according to the agreement bylaw made to take any measure to rehabilitate their sand mining sites.*

Dugda District Mining Development Desk as Council Member representative reacted about the operations MSSE sand miners in the district especially on the mechanisms the sand loaded flow between the supplier and demand in the district as:

The coordination and integrations of the district Stakeholders like administrations, police, and revenues offices were weak on working together. The rules and regulations have its own gap to take legal measurement and law enforcement. In the district, due to the weakness of rules and regulations and lack of accountability in laws gap sand miners were operated both legally and illegally. Illegally operation by MSSE sand miners and truck drivers made agreement not provided the dispatch as well as change the date on the dispatch these caused harm the government's 5% taxation and members' capital benefit. This illegally done was opened the local name 'Chabata' (embezzlement) through chain in the Meki town where the truck sand loaded stopped and assessed take place the trucks allowed easy to pass. Beside that the illegal operations, as far as the sand mined completed in one place they sold the dispatch or receipts to other MSSE sand miners.

A team leader worked in town municipality KII acted in response on an opportunity and a threat of sand mining in the district mentioned as follow:

I described sand mining as one of the major sources of taxes for the district council for the Meki town because sand loaded truckers paid money to the town revenue as road travelled for the development especially road maintenance during passed the road. 200 birr paid per truckers of sand loader that travelled in Meki town. The estimation taxes are generated from the activities of sand mining was up to 200 sand loaded vehicles passed per day in the town was considered as an opportunity.

However, I have seen sand mining as a major threat to livelihoods and the environment it reason out that increased spreading different disease as far as overcrowding of trucks in the town. Social conflict made if sand miners become jobless or if they lose the job. The activities Destroyed all weather and dry weather of sand mining sites as well as the main asphalt road that traveled from Finfinne -Addis Ababa to Meki.

Trucks moved on the beyond capacity of the roads are some illegally operated due to the sand mining effects both on the environment and livelihoods. Beside that sand accumulated or stored on the private and green land areas that not allowed in the town so that residents exposed to sand heavy dust, added sand into human eyes that on travelled on the road on foot, sand loaded trucks travelled on not permitted road pathway and caused road trafficking as well as house cracking, destroyed residents house, properties and even life lost has provided

Similar views were shared by the officers who were contacted with that of environment monitoring and evaluations expert of the district.

About land used to sand mining purpose allowed to the sand miners the digging depth and up in the District Land Use and administration planning Expert when interviewed he replied as:

The laws or regulations prescribed how sand mining should be done in this area in case in relation to land uses have no problem. The problem where there is a potential of minerals land the private land ownership can be possible to organize as MSSE and worked on with his family. The area land allowed for sand miners by the GPS for an individual in the river inside was 100m^2 for sand extractions purposes. But there was no standard set on the digging depth and to the upper done in sand mining sites that enforced the sand miners so that easily opened to path environmental damaged mechanisms.

What the malfunction of most of governmental stakeholders' local authorities either with lack of regulations governing sand mining or were not enforcing the regulations even when with the existed one; sand mining activities will be continued as a livelihoods of the community. Dugda District

Medium and Small Scale Enterprise and industry office Team Leader replied on the sand mining situation as:

> *Banning or stopping of sand mining is impossible with regarding to its benefits because sand is a mineral resource of the district; sand mining is the livelihood of the society, it is an opportunity for unemployment and source of income. If sand mining tried to banned, a large number of unemployment will increased and other problems or jobless consequences like thief and criminals works expanded.*

To Ensure Environmental Sustainability and Livelihood Security, in general all the above-mentioned circumstances related to the environmental and livelihood implications of sand mining affected the holistic approach to integration and cooperation of many stakeholders in government. Such us environmental issues, mining development, medium-sized and small-scale enterprises and land use and administration policies, proclamations, rules and regulations as well as national , regional and grassroots considerations of district level.

With the context of environmental issues the environmental policy and proclamations, environmental pollutions, environmental impact assessment (EIA) 299/ 2002: Directive No. 2/ 2008 of EIA: Project Types Subject to Environmental Impact Assessment: Mine Exploration that is subject to Federal Government Permit. And the customized by Oromiya regional sate of environmental impact assessment (EIA) Proclamation 176/2012;has a gap on EIA type undertook only EMP at the district level is not sufficient and not leads to accountability.

Environmental Pollution Control Proclamation 300/2002: Standards for noise providing for the maximum allowable noise level taking into account the Settlement patterns and the availability of scientific and technological capacity in the county the adapted by Oromiya regional State: Environmental Pollution Control Proclamation 177/2012: Sand mining effects on the livelihoods as a result of Truck Sand loaded noise and heavy dust during dry season in the district to be not considered.

Regarding to the Mining operations Proclamations of No 816/2013:Regarding to mining development sector sand mining is categorized under showed that the definition of "Artisanal mining" means operations carried out by individuals or micro enterprises which is mostly manual in a nature and does not involve the engagement the employed workers. Sand is categorized as the construction minerals defined as any mineral directly or indirectly used as an input for construction materials purposes any other non-metallic minerals designated as such by directive of the ministry.

Small scale mining means any mining operations of which the annual run-off mine ore does not exceed regarding construction materials 80,000m^3 for sand and like. Except artisanal mining, any applicants submit EIA to approval competent authority required by the relevant environmental laws of the country; allocate funds for costs of rehabilitations of environmental impacts. Artisanal Mining licenses are prescribed with relevant laws with environment, health and safety standard and Valid for not exceed three years and renewed twice for in three years each. There is no rules and regulation to enforce into law. Without undertake EIA difficult to identify the health and safety.

In case of Oromiya regional state mining development proclamation 223/2012 the unpublished document approved by regional state council Artisanal Mining licenses mining. Where there is a potential of minerals land the private land ownership can be possible to organize as MSSE with his

family on his land. Artisanal Mining licenses are prescribed with relevant laws with environment, health and safety standard and Valid for not exceed two years and impossible to renewed. No rules and regulations to enforce the laws as far as the land degraded, health and safety rules guaranteed and only EMP was undertaken at the district level.

In general less attention provided to Artisanal Mining regarding to the rules and regulations, there was a gap of rules and regulations to enforce the law on the negative effects of sand mining activities on the environment, livelihoods and illegally operations in the district to bring the accountability and sustainable environment development regarding to the sand mined there. This finding is, consistent with the next ideas .The Artisanal mining license holders are not entitled to submit Environmental Impact Assessment document or related environmental management plans as a prerequisite for license issuance. The Artisanal mining situation at the grassroots level does not consider the proclamations or any regulation of environmental issues. Therefore, damage to the environment is evident and significant(Ethiopian Ministry of Mines and Petroleum, 2019).

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The research has made considerable methodological contributions with regard to the study of sand mining and its effects on livelihoods and environment in Meki river valley and on the farmlands in four rural kebeles. It has provided a framework for further studies into issues relating to sand mining effects on environment and livelihood activities in fringe communities. The study has again made available a framework for future researches into the roles and challenges of stakeholders at the district and regional even in the national as an initial in the sand mining production. The results of the study have adequately confirmed it does define objectives. The conclusions of the study, based on the analysis of the approval derived from the field investigations are presented below:

i. The research had to examine the drivers in the selected community who had driven people into sand mining. It was assumed, based on the review of the data gathered, that these drivers fall into two major categories; namely, the influences pull and push features. The pull factors were the presence source of sand advantages of sand mining which attracted people into it. The push factors were derived mainly from agricultural vulnerabilities, such as seasonal unemployment, and pest and disease attacks on crops.

ii. There are many negative effects of sand mining on the environment, such as the destruction of water bodies; now Meki river bed has expanded in both directions north-south, with sand mining on both sides of the kebeles, many holes dug in different places and distracting the river as well as the river bed degrading to sand miners (Prepared path ladder steps to go down and up to river for donkey and human the land was eroded) both in the north-south direction, deforestation (vegetation surrounding the river), and loss of biodiversity and the formation of deep gullies on farmland Birbirsa Gale kebele of Minko / Bitsi river gorge. Sand loaded trucks moving on the unplanned roads' beyond capacity are some illegally operated. Reduction of farmland by deciding the top soils was hold back farmers' ability to produce crops at their maximum levels. These damages have negative effects on farmers' environment, health and productivity, and on the entire community as a whole.

iii. Sand mining had many positive effects on livelihoods. These included job creations and regular access to higher income. Sand mining became one of the main tax outlets for district and Meki town government revenues. Sand mined has developed a business linking gap beyond the district and other area customers. it also created social interaction for the people.

Iv. The negative effect of sand mining on livelihoods like private and public properties damaged, a social problem with child labor and drop-out of high school especially when it is done across the valleys of the river 'Meki' and elsewhere. Aside from that sand collected or deposited in

private and green areas that did not enable in Meki town such that people subjected to heavy sand dust applied sand to human eyes that walked on the road on foot, sand filled trucks moved on unregulated roads and triggered overcrowded traffic as well as house crumbling, damaged residents' houses, property and even loss of life.

Iv. Another conclusion stressed from the study's analysis was the fact that on sustainability discourse, issues related to sand mining and agricultural activities were difficult, and not trade-off issues. This is because; for the overall growth and development of the study kebeles communities, as well as the district, region and country as a whole, both economic activities are needed; Based on an evaluation of the results of stakeholders positions in the district's sand mining operations have neglected to implement laws to regulate sand mining activities. There is a gap on the rules and regulations at the regional, national level that enforced into the laws of environmental issues and mining development. For examples, not the standard set that how much digging in depth and the length in the river or on the land or the farmland was not indicated.

For example under environment policy there are different proclamations such as environmental control pollutions and EIA proclamations and Mining development and operations proclamations. On the other side Power to Issue Regulations on all these proclamations are open and a gap of it said that provided mandate to the Council of Ministers. In general less attention provided to Artisanal Mining regarding to the rules and regulations, there was a gap of rules and regulations to enforce the law on the negative effects of sand mining activities on the environment, livelihoods and illegally operations in the district to bring the accountability and sustainable environment development regarding to the sand mined there.

Recommendations

Provision of option Livelihood Activities

The drivers influencing people into sand mining can be minimized when members of the sand mining-fringe initiate the public to other livelihood activities. This is because; unemployment and other agricultural vulnerabilities compelled many to become sand miners. Shift to another economic activity is important by encouraging loans by training farmers in entrepreneurship such as apiculture, fattening, irrigation of vegetables and fruits, artisans and trading practices and others in compliance with MSSE bylaws. Since the district located in the area of the rift valley and on the main Finfinne / Addis Ababa-Hawasa road, it has an opportunity in both the region and SNNP for market. Such a step would provide many people with jobs, which would also draw their focus from sand mining. Therefore less harm can occur to farmers' livelihoods.

Rehabilitation /Treatment of Degraded Sand Mining Sites

Sand mining communities are synonymous with plant cover degradation, the formation of gullies on farmland and other physical damage on the Meki river areas. Unfortunately, these degraded sites become unproductive because there are no measures in place to reclaim the lands lost. As a result, several hectares of land are lost annually to sand mining operations in different parts of the district consequently. Therefore, all hard work must be put in place by the district mining

councils, in collaboration with the agricultural sector; to bring back the farmlands and surrounding riverbeds that are damaged by the sand mining activities that come around. These reclaimed lands could be reused by the farmers, or used for afforestation with the district's governments and NGO projects.

Converting Gullies into Ponds and Irrigation Dams

Sand mining operations produce several deep gaps in the areas of water sources and farmland. Although gullies have vast economic potential, they are great sources of harm cause to the people. The holes usually collect water which trap animals, people, and also serve as breeding grounds for mosquitoes. The regional GOV and NGO should assist the district mining councils in order to redesign gullies and convert them into ponds and irrigation damlike structural work of water and soil conservation along the rivers and gorges created. Such a move will make employment for many people in addition to improving food security needs of the people.

Provision of sufficient Compensation

Issues of compensations are not properly addressed in areas where sand mining actions occur. A lot of people have suffered because their assets were taken without any form of compensation given to them. To alleviate the livelihood challenges that happen from the activities of sand mining andinvolve the active participation of the affected people and their peculiar circumstancesadequate compensation must be paid by the sand miners to the farmers and land users who have lost their assets. The compensation farmlands and crop packages should be enough and rewarded before the lands or farms are taken over by the sand miners and it facilitated by the local chiefs and the assembly members in the different communities

Proper Demarcation of Sand Mining Sites

Throughout the sand mining industry, municipal councils have not demarcated clear areas for the sand mining operations. In cooperation with certain nearby chieftains, the sand miners determine when and when to extend their activities. Then it is recommended that the mining councils of the district and Meki Town in coordination with the chiefs will designate those areas for sand extraction in the villages.

After that, they should also furnish the communities with the boundaries specifying which areas were granted to the sand miners as concessions. It would allow mining councils such as the Environmental Protection Agency, the Mines Development Office, land use and administrations to carry out EIA on this landuntil the sand miners are provided the opportunity to furnish the communities with the boundaries specifying which areas were granted to the sand miners as compromise. This enable societies (farmers) to have assurance in recognizing their livelihood activities as well as being suitable for managing illegal sand miners' land extensions and unauthorized land for such purposes.

Active partaking and cooperation among Institutions

Most of institutions had little or no information on where the sand miners work, or underestimate sand miners' operations the dangers posed by stakeholders and communities as sand mining in the river and farmland has no negative effect on the environment and the livelihoods, how they work and the degree of damage they caused to people and the environment. As a result, no assistance to reduce the burden of those affected by the externalities of sand mining is provided by established organizations. Therefore it is suggested that the environmental policy-based and proclamation mandate given to the Regional Environmental Protection and Forestry and Climate Authority (EPFCCA) conducts intensive education to attract other institutions' such as traditional authorities, opinion leaders and community members affected by the sand miners' operations should be made to join forces in combating the threat of negative effects of sand mining and ways of solving these problems. Rules and regulations which implemented the rehabilitation law to delegate liability and accountability to sand miners by allocating the cost budget for rehabilitation of the deteriorated land returned to the land used again for various purposes, such as farming or forestry, expected from EPFCC. Council of Ministers will issue convert the proclamations into rules and regulations by tailoring them at national and regional level to enforce the laws in the grass root the ground where the practical work done in the community of sand mining areas specifically treated for each mining mineral.

Mandatory Sand Mining By-laws

The district mining councils have no specific rules or regulations governing how sand mining should be carried out in the different communities, especially after sand mining has been completed: Clearly not stated mitigating and rehabilitating and the rehabilitated costs were not decided on by-laws by sand miners. This led to the establishment of indiscriminate sand mining activities in different communities. Therefore endorse the cost of rehabilitation depending on the rules and regulations, specific by-laws or rules for managing the sand miners' operations, and the way the degraded sand mining sites are rehabilitated.

Areas for Further Research

This study centered on the effects of sand mining on livelihoods and the environment in some communities in the Dugda District mostly regarding to Meki River. Further studies can be undertaken to assess the detailed impact of sand mining on farmland of ‘HalayaBitisi’ of Menko River in Birbirsa Gale kebele in the district. Such a study will help reveal how the activities of sand mining are impacting on the farmland and urgent expanded river bed degradations of the affected communities and its possible consequences.

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APPENDICES

APPENDIX 'A'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

QUESTIONNAIRES FOR FARMERS

Name of Peasant Association/PA/kebele ……
Questionnaire No……..
The main objective of the study is to assess the effects of sand mining on the environment and peoples' livelihoods. The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will measured by some factors such as the reduction/increase in people's income, reduction/increase in job avenues, and the reduction/increase in crop yields. This questionnaire will design to obtain information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.
Please make a tick [] in the box against your response. Thanks for your cooperation.

Section A: Socio-demographic characteristics of respondents.

1. Sex:

(a) Male [ ] (b) Female [ ]

2. In which of the following age range do you belong?

(a) < 20 years (b) 20-29 years [ ] (b) 30-39 years [ ] (c) 40-49 years [ ] (d) 50-59 [ ] (e) ≥ 60 years [ ]

3. Marital Status:

(a) Married [ ] (b) Single [ ] (c) Divorced [ ] (d) Separated [ ] (e) Widowed/female [ ]

4. Your origin:

(a) From the Kebele [ ] (b) From another kebele [ ] (c) From the District [ ] (d) From another Region [ ] (e) Others, specify ……

5. Level of education……

(a) Illiterate [ ] (b) Read [ ] (c) Read and write [ ] (d) 1-8 [ ] (e) 9-12 [ ] (f) Diploma [ ] (g)Degree [] (h) Masters &above [ ] (i) others, specify ……

6. In your Peasant Association common type of minerals mining that undertaking is/are

(a) Sand [ ] (b) Pumice [ ] (c) both Sand and Pumice [ ] (d) others, specify ……

7. When did you start sand mining in your farm/community? (a) Before 20 yrs (b) 16-20 yrs [ ] (b) 11-15 yrs [ ] (c) 6-10 yrs [ ] (d) 1-5 yrs [ ] (e) others, specify ……

8. Are you involved in sand mineral mining in addition to Farming Occupation?

(a) Yes [ ] (b) No [ ] (c) others, specify ……

Section B: Factors that push people into sand mining

9. Mention and explain some drivers that influence people into sand mining in your kebele.....

9b. The following statements describes some additional reasons why people engage in sand mining in your community. Indicate the extent to which you agree or disagree with the statements. Kindly state the reason(s) for your choices.**SA: Strongly Agree: A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	Statement	SA	A	U	D	SD	Reasons for *CHOICES* made
1	Sand mining is economically more rewarding than farming.						
2	Sand mining provides quick access to income.						
3	Sand mining offers a better job security than farming.						
4	Sand mining does not require any specialized skills to engage in.						
5	Sand mining offers job opportunities to people without lands.						
6	Unemployment/Underemployment compel people to engage in sand mining						
7	It is easy to get access to sand.						
8	People engage in sand mining to be able to build their houses.						
9	People engage in sand mining to raise funds to be able to undertake development projects in the community						
10	People engage in sand mining because they do not care about the environment.						

Section C: Effects of sand mining on Livelihoods

10. Which of the following natural assets did you depend on for your livelihood before sand mining began in your community? (Tick as many as possible)

(a) Land [ ] (b) Forest [ ] (c) Rivers/Streams [ ] (d) Others, specify …….

11. How did you use the asset(s) selected in the Q.7 above? .....

12. What livelihood asset(s) have you lost as a result of sand mining? .....

12b. How did you lose the above mentioned asset(s) to sand mining? ……..

13. Indicate the type of compensation you received from the sand miners below: (a) Cash [ ] (b) New Building [ ] (c) Farm inputs [ ] (d) New farm land [ ] (e) None [ ] (f) Others, specify……

14. How would you describe the compensation given to you by the sand miners? (a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Very Low [ ] (e) No compensation [ ]

15. What are the effects of the loss of livelihood assets on your general well-being? ……

16. How much income did you earn monthly before the introduction of sand mining in your community? In Eth. Birr

(a) < 500 [ ] (b) 500-1000 [ ] (c) 1100- 1500 Birr [ ] (d) 1600- 2000 Birr [ ] (e) above Birr 2000

17. How would you describe the income earned in Q.13 above?

(a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] Very Low [ ]

18. What is your main economic activity presently?

(a)Farming [ ] (b) Fishing [ ] (c) Trading [ ] (d) Artisan/handicraft [ ] (e) Civil/Public servant [ ] (f) Casual labor /wage [ ] (g) others, specify…….

19. How much income do you earn from your present/current economic activity monthly?
(a) < 500 [ ] (b) 500-1000 [ ] (c) 1100- 1500 Birr [ ] (d) 1600- 2000 Birr [ ] (e) above Birr 2000

20. How would you classify the income earned?
(a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] (e) Very Low [ ]

21. Is the above stated economic activity in Q.18 different from the one you engaged in prior/previous to the sand mining? (a)Yes [ ] (b) No [ ]

22. If the answer to Q.21 above is "Yes", what specific reasons would you give for the change in your economic or livelihood activity? ……

23. What alternative source(s) of income do you have to support your household budget? .....

24. Have you changed your location over the past ten years?
(a)Yes [ ] (b) No [ ]

25. If yes, what reason(s) accounted/reasoned for the change? .....

26. Positive Effects of sand mining

The following statements describe the benefits of sand mining to your community. Indicate the extent to which you agree or disagree with the statements. Kindly state the reason(s) for your choices. **SA: Strongly Agree A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	The activities of sand miners in your community have created more employment now than before sand mining began.						
2	There is permanent employment security in your community now than before sand mining started.						
3	A lot of people began receiving higher incomes in your community after sand mining started than before the coming of sand mining there.						
4	There has been an increase in the sales of goods and services in your community after sand mining began than before the introduction of sand mining.						
5	Before sand mining began the community had fewer roads most of which were not motorable, however after the introduction of sand mining there has been many roads repairs and constructions.						
6	Before sand mining activities began the community had no or fewer social infrastructural assets, however after the start of sand mining there has been an increase in the provision of social infrastructure assets such as classroom blocks, and police stations through the revenues generated from it.						
7	Before sand mining started farmers used crude/basic farming instruments and methods, however after sand mining began the farmers have been provided with proper farming inputs and trainings in employable skills						

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
	for additional income.						
8	Before sand mining the people used water from streams and ponds however after sand mining potable water have been given to the communities.						
9	Sand miners have provided alternative means of livelihood such as fish farming and bee keeping which are economically more rewarding than food crop production.						
10	Sand miners provide adequate compensation for taken farms and houses						
11	There has been an increase in sale of goods and services after sand mining activities began in your communities.						

26b. Mention and explain some additional benefits sand mining brings to livelihoods in your community apart from the ones stated above: .....

27. To what extent are you satisfied with the benefits derived from the sand mining?

(a) Very Satisfied [ ] (b) Satisfied [ ] (c) Undecided [ ] (d) Not satisfied [ ] **(e)** Not satisfied at all [ ]

28. What additional benefits do you expect from the sand mining activities? ……

29. Negative Effects of sand mining

The following statements describe the adverse effects of sand mining on your community. Indicate the extent to which you agree or disagree with the statement and kindly state the reasons for the choices made. **SA: Strongly Agree A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	Farmlands taken away by sand mining activities						
2	Lands for farming reduced						
3	High cost of living						
4	No proper crop compensation						
5	Burden of carrying water to farms						
6	Low crop yields						
7	High school drop-out						
8	Child's labor						
9	Damage to public and private properties such as roads, pipes, farmland, etc						

29b. Mention and explain any additional adverse effects of sand mining activities on livelihoods in your community apart from the ones mentioned above: ……
30. What suggestion(s) would you give to combat the negative/adverse effects of sand mining on livelihoods in your community ……

Section D: Effects of sand mining on the environment
31. How would you describe the relationship between sand mining and the degradation of the environment? .....
32. Has there been any new health problem or condition (e.g. malaria outbreak, transporting Lorries and dust at the mining sites)in the community since sand mining started there? .....
33. How is the community dealing with such health conditions and problems if any (are there facilities)? .....
34. Do you think the health problems and conditions are related in one way or the other to the sand mining activities? Kindly give reason(s) to support your answer.....
35. The following statements describe the adverse effects of sand mining on the environment in your community. Indicate the extent to which you agree or disagree with the statements and kindly provide reason(s) for the choices made.

SA:Strongly Agree A: Agree U: Undecided **D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	Destruction of water bodies(streams, rivers, ponds)						
2	Land degradation						
3	Deforestation by the sand mining						
4	Destruction of habitat of living organisms						
5	Decrease or loss of biodiversity						
6	Loss of sand reserve/ maintain or store						
7	Increased water turbidity/muddy						
8	Increasing depth of the water table making irrigation costly and difficult						
9	Reduction in soil nutrients						
10	Gullies/ditch or channel on farmlands						
11	Ground water depletion/reduction						

35b. Mention and explain any additional adverse effects of sand mining activities on the environment in your community: **……**
36. What suggestion(s) would you give to combat the negative/adverse effects of sand mining on the environment? **.....**

Section E: Role of stakeholders in ensuring livelihood security

37. Who are the usual owners of the sand/pumice mining sites in this community? (Tick as many as possible)**(a)**Individuals [ ] (**b**) Government/Common land [ ] **(c)** Companies [ ] (d) Micro & Small Scale Enterprise group (e) Others, specify…….

38. Are you aware of any sand mining laws or regulations in this area?

(a) Yes [ ] (b) No [ ]

39. Are sand mining activities in this community regulated by rules/laws?

(a)Yes [ ] (b) No [ ]

40. If yes, which of the following institutions control the activities of sand mining in this area?

(a) EPFCCA [ ] (b) Mineral Development Authority [ ] (c) MSSE Bureau/office (d) Land use & Administration Bureau (e) Chiefs [ ] (f) NGO's [ ] (g) District Assembly [ ] (h) Youth groups [ ] (i) Others, specify ……

41. Is proper monitoring and enforcement often done to ensure compliance/standardize? (a)Yes [ ] (b) No [ ]

42. If No, why in your opinion is it so? **.....**

43. What kind of help have you received from any level of government to mitigate/alleviate the adverse effects of the sand mining in your community ……

44. Indicate level of government that provided the assistance

(a) District Assembly [ ] (b) Regional Government [ ] (c) Federal Government [ ] (d) Others, specify ……

45. Have you received support from any NGO?

(a) Yes [ ] (b) No [ ] (Skip to 43)

46. If yes, indicate name of NGO ……..

47. Indicate type of help you obtained from the NGO mentioned above.

(a) Cash [ ] (b) Legal Service [ ] (c) Farm input [ ] (d) Training in employable skills(e) Others, specify ……

48. Do you have access to information from the sand miners with regard to their operations that affect your well-being?

(a)Yes [ ] (b) No [ ]

49. What established mechanism(s) are there for you to channel your complaints/criticism/regarding the operations of the sand miners? **.....**

50. How would you rate the extent to which the mechanism(s) are reliable and accessible? (a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] (e) Very Low [ ]

51. How would you describe the relationship between the sand miners and residents of the sand mining-fringe/boarder communities ……

52. How would you describe the relationship between sand mining activities and the population growth in your community? **.....**

53. What are your expectations from the sand miners, the District Assembly, NGO's and other institutions in respect of livelihood enhancement and opportunities?

.....

54. What is your general impression/idea about the activities of the sand miners in your community? ……

Thanks for your cooperation.

APPENDIX 'B'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

QUESTIONNAIRES FOR SAND MINERS.

Name of Peasant Association/PA/kebele ……
Questionnaire No……..
The main objective of the study is to assess the effects of sand mining on the environment and peoples' livelihoods. The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will measured by some factors such as the reduction/increase in people's income, reduction/increase in job avenues, and the reduction/increase in crop yields. This questionnaire will design to obtain information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.
Please make a tick [ ] in the box against your response. ***Thanks for your cooperation***.

Section A: Socio-demographic characteristics of respondents.
1. Sex:
(b) Male [ ] (b) Female [ ]
2. In which of the following age range do you belong?

(a) < 20 years (b) 20-29 years [ ] (b) 30-39 years [ ] (c) 40-49 years [ ] (d) 50-59 [ ] (e) ≥ 60 years [ ]
3. Marital Status:
(b) Married [ ] (b) Single [ ] (c) Divorced [ ] (d) Separated [ ] (e) Widowed/female [ ]
4. Your origin:

(a) From the District [ ] (b) From another District [ ] (c) From another Region [ ] (e) Others, specify ……
5. Level of education……
(a) Illiterate [ ] (b) Read [ ] (c) Read and write [ ] (d) 1-8 [ ] (e) 9-12 [ ] (f) Diploma [ ] (g) Degree [ ] (h) Masters& above [ ] (i) others, specify ……

6. The common Type of minerals mining you are engaged in the community is
(a) Sand [ ] (b) pumice [ ] (c) sand and pumice [ ] (d) others, specify ……

7. Are you involved in sand mineral mining in addition to Farming Occupation?

(a) Yes [ ] (b) No [ ] (c) others, specify ……

Section B: Factors that push people into sand mining

8. Mention and explain some drivers that influence people into sand mining in your community.....

8b.The following statements describes the reasons why you and other people engage in the activities of sand mining in your community. Indicate the extent to which you agree or disagree with the statements. **SA: Strongly Agree A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	Sand mining is economically more rewarding than farming						
2	Sand mining provides quick access to income						
3	Sand mining offers a better job security than farming						
4	Sand mining does not require any specialized skills to engage in						
5	Sand mining offers job opportunities to people without lands						
6	Unemployment/Underemployment compel people to engage in sand mining						
7	People engage in sand mining to be able to build their houses						
8	People engage in sand mining to raise funds to be able to undertake development projects in the community						
9	People engage in sand mining because they do not care about the environment						

Section C: Effects of sand mining on Livelihoods

9. What was your main economic activity prior/previous to the introduction of sand mining in your community?

(a) Farming [ ] (b) Fishing [ ] (c) Trading [ ] (d) Artisan/handicraft [ ] (d) Civil/Public servant [ ] (e) Casual labor /wage [ ] (f) Timber/wood work [ ] (g) others, specify …….

10. How much income did you earn monthly before the introduction of sand mining in your community?

(a) < 500 [ ] (b) 500-1000 [ ] (c) 1100- 1500 Birr [ ] (d) 1600- 2000 Birr [ ] (e) above Birr 2000

11. How would you describe the income earned in Q.8 above?

(a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] Very Low [ ]

12. When did you start sand mining work involvement? (a) Before 20 yrs (b) 16-20 yrs [ ] (b) 11-15 yrs [ ] (c) 6-10 yrs [ ] (d) 1-5 yrs [ ] (e) others, specify ……

13. What is your main job in relation to sand mining?

(a) Driving/Carriers [ ] (b) Loading [ ] (c) Digging [ ] (d) Others, specify……

14. Methods of you used to driving/carrying, loading and digging during sand mining/extraction

(a) Manual [ ] (b) Machinery [ ] (c) Manual and machinery [ ] (d) Others, specify……

15. The amount of sand mined sold in a month in m^3/Trucks/vehicles……..
16. The recent price of one Trucks /vehicles in m^3 sand mined /……..
16b. what happened the sand condition in terms of the price?
(a) Constant [ ] (b) Decreased [ ] (c) Increased year to year in gradual [ ] (d) Others, specify……

17. Source of sand mining customers
(a) From the District [ ] (b) From another District in the region [ ] (c) From another Region [ ] (d) Company [ ] (e) Others, specify ……

18. How much income do you currently earn from the sand mining activity monthly?
(a) < 500 [ ] (b) 500-1000 [ ] (c) 1100- 1500 Birr [ ] (d) 1600- 2000 Birr [ ] (e) above Birr 2000

19. How would you classify the income earned?
(a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] (e) Very Low [ ]

20. How does the money earned in the sand mining business compare to the money from other jobs?
.....
.....
21. What other jobs have you been doing if you do not engage in the sand mining activities?
.....
.....
22. How would you classify the sand mining activity? Kindly give reasons for any answer you select.
(a) Permanent [ ] (b) Temporary [ ]
23. If sand mining were to cease /stop, because for example, it would be prohibited or all suitable sand would be gone, what would there be to do?
.....

24. Positive Effects
The following statements describe the benefits of sand mining to your community. Indicate the extent to which you agree or disagree with the statements. Kindly state the reason(s) for your choices. **SA: Strongly Agree A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	The activities of sand miners in your community have created more employment now than before sand mining began.						
2	There is permanent employment security in your community now than before sand mining started.						
3	A lot of people began receiving higher incomes in your community after sand mining started than before the coming of sand mining there.						
4	There has been an increase in the sales of goods and services in your community after sand mining began than before the introduction of sand mining.						
5	Before sand mining began the community had fewer roads most of which were not motor able, however after the introduction of sand mining there has been many roads repairs and constructions.						
6	Before sand mining activities began the community had						

SN	Statement	SA	A	U	D	SD	Reasons for *CHOICES* made
	no or fewer social infrastructural assets, however after the start of sand mining there has been an increase in the provision of social infrastructure assets such as classroom blocks, and police stations through the revenues generated from it.						
7	Before sand mining started farmers used crude/basic farming instruments and methods, however after sand mining began the farmers have been provided with proper farming inputs and trainings in employable skills for additional income.						
8	Before sand mining the people used water from streams and ponds however after sand mining potable water have been given to the communities.						
9	Sand miners have provided alternative means of livelihood such as fish farming and bee keeping which are economically more rewarding than food crop production.						
10	Sand miners provide adequate compensation for taken farms and houses						
11	There has been an increase in sale of goods and services after sand mining activities began in your communities.						

24b. Mention and explain any additional benefits sand mining brings to livelihoods in your community?
.....

25. To what extent are you satisfied with the benefits derived from the sand mining?
(a) Very Satisfied [ ] (b) Satisfied [ ] (c) Undecided [ ] (d) Not satisfied [ ] **(e)** Not satisfied at all [ ]

26. Negative Impacts

The following statements describe the adverse effects of sand mining on your community. Indicate the extent to which you agree or disagree with the statement and kindly state the reasons for the choices made. **SA: Strongly Agree A: Agree**
U: Undecided D: Disagree SD: Strongly Disagree

SN	Statement	SA	A	U	D	SD	Reasons for *CHOICES* made
1	Farmlands taken away by sand mining activities						
2	Lands for farming reduced						
3	High cost of living						
4	No proper crop compensation						
5	Burden of carrying water to farms						
6	Low crop yields						
7	High school drop-out						
8	Child's labour						

9	Damage to public and private properties such as roads, pipes, farmland, etc						

26b. Mention and explain any additional adverse effects of sand mining activities on livelihoods in your community: ……

27. What suggestion(s) would you give to combat/struggle the negative/adverse effects of sand mining on livelihoods in your community ……

Section D: Effects of sand mining on the environment

28. How would you describe the relationship between sand mining and the degradation of the environment? .....

29. Has there been any new health problem or condition (e.g. malaria outbreak, transporting Lorries and dust at the mining sites) in the community since sand mining started there? .....

30. How is the community dealing with such health conditions and problems if any (are there facilities)? .....

31. Do you think the health problems and conditions are related in one way or the other to the sand mining activities? .....

32. Negative Effects. The following statements describe the adverse effects of sand mining on the environment in your community. Indicate the extent to which you agree or disagree with the statements and kindly provide reason(s) for the choices made. **SA: Strongly Agree A: Agree U: Undecided D: Disagree SD: Strongly Disagree**

SN	**Statement**	**SA**	**A**	**U**	**D**	**SD**	**Reasons for *CHOICES* made**
1	Destruction of water bodies (streams, rivers, ponds)						
2	Land degradation						
3	Deforestation by the sand mining						
4	Destruction of habitat of living organisms						
5	Decrease or loss of biodiversity						
6	Loss of sand reserve/ maintain or store						
7	Increased water turbidity/muddy						
8	Increasing depth of the water table making irrigation costly and difficult						
9	Reduction in soil nutrients						
10	Gullies/ditch or channel on farmlands						
11	Ground water depletion/reduction						

32a. Mention and explain any additional adverse effects of sand mining activities on the environment in your community: ……**……**

32b. What suggestion(s) would you give to combat the negative/adverse effects of sand mining on the environment? **.....**

Section E: Role of stakeholders in ensuring livelihood security

33. Who are the usual owners of the sand mining sites in this community? (Tick as many as possible)

(a) Individuals [ ] (b) Government/Common land [ ] **(c)** Companies [ ] (**d**) Micro & Small Scale Enterprise [ ] (**e**) others, specify ……

34 If the owner of sand mining site is cement industry/**Company**, *(Question 34-38)*

34a. The name of company is…… year of agreement made in ……

34b. Total land area agreement made in ha…….

34c. Started operational sand mining year……

35. Company's sand agreement level made with government at

(a) Federal [ ] (b) Regional [ ] **(c)** Zonal [ ] (**d**) District [ ] (**e**) others, specify ……

36. The amount of sand mining in m^3 /Trucks/Vehicle / monthly……..

37. Methods of sand/ pumice mining by the company is

(a) Manual [ ] (b) Machinery [ ] (c) Manual and machinery [ ] (d) Others, specify……

38. Employed Workers of sand mining by the **company** are from

(a) PA [ ] (b) Other PA [ ] **(c)** District [ ] (**d**) other District [ ] (**e**) other Region [ ] (f) others, specify ……

39. Are you aware of any sand mining laws or regulations in this area?

(a) Yes [ ] (b) No [ ]

40. Are sand mining activities in this community regulated by rules/laws?

(a)Yes [ ] (b) No [ ]

41. If yes, which of the following institutions control the activities of sand mining in this area?

(a) EPFCCA [ ] (b) Mineral Development Authority [ ] (c) MSSE Bureau/office (d) Chiefs [ ] (e) NGO's [ ] (f) District Assembly [ ] (g) Youth groups [ ] (h) Others, specify ……

42. Is proper monitoring and enforcement often done to ensure compliance/standardize/fulfillment?

(a)Yes [ ] (b) No [ ]

43. If No, why in your opinion is it so? .....

44. Which governmental institution do you pay taxes to for the sand mining operations?

45. Type of activities agreement promised made with the government to rehabilitate /construct in your sand/ pumice mining site

.....

46. What mechanisms are there for the rehabilitation of the degraded sites by your activities? .....

Thanks for your cooperation.

APPENDIX 'C'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

INDEPTH INTERVIEW GUIDE FOR THE DISTRICT MINING DEVELOPMENT COUNCIL.

Date of interview:……
Place of interview:…….
Interviewers' name:……..
Interviewees' Gender:……..
Organization /Institution:……
Position/Title:……

The main objective of the study is to assess the effects of sand mining on the environment and people's livelihoods. . The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will be measured by some factors such as the reduction/increase in people's income, reduction/increase in job avenues, and the reduction/increase in crop yields. This questionnaire is designed to elicit information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.

SECTION A: Factors that push people into sand mining

1. What is your level of awareness of the activities of sand mining in this district?
(a) High [ ] (b) Low [ ] (c) Very Low [ ]

2. Who are the owners of the sand mining lands in this area?
(a) Government [ ] (b) Individuals [ ] (c) District Assembly [ ] (d) Companies [ ] (e) MSSE [ ] (f) Don't know [ ] (g) Others, specify ……

3. Why do many people in this area engage in the activities of sand mining? **.....**

Section B: **Effects of sand mining on Livelihoods**

4. What positive effects of sand mining on livelihoods are you aware of? .....

5. What negative effects of sand mining on livelihoods are you aware of? .....

6. Do you see sand mining as a major threat to livelihoods? Kindly give reasons to support your answer ……

Section C: Effects of sand mining on the environment

7. What positive effects of sand mining on the environment are you aware of? **.....**

8. What negative effects of sand mining on the environment are you aware of? **.....**

9. How would you rate the severity of the degradation caused by sand mining compared with mining for other minerals such as pumice/Stone mining?
(a) High severity [ ] (b) Severity of equal status [ ] (c) Moderate severity [ ] (d) Low severity [ ] (e) None [ ]

Section D: Role of stakeholders in ensuring livelihood security

10. What kind of support does the assembly provide to those whose livelihoods are endangered by sand mining? .....

11. How does the assembly deal with the environmental problems associated with sand mining? .....

12. What laws or regulations prescribe how sand mining should be done in this area? .....

13. What would you say about the enforcement of these rules regarding sand mining in this area? .....

14. If these rules are not properly enforced what in your opinion could be responsible for that? .....

15. Would you say that sand miners here are operating legally or not?. Give reasons for your answer: ……

16. Do you conduct environmental impact assessment before sand miners begin their operations?
(a) Yes [ ] (b) No [ ]

17. If "Yes", what considerations do you make? (Tick as many as possible)
(a) Impact on water bodies [ ] (b) Impact on aquatic organisms [ ] (c) Impact on vegetation [ ] (d) Impact on terrestrial organisms [ ] (e) Impact on human activities [ ] (e) Others, specify ……

18. If "No", do you make any attempt of stopping the sand miners from working?
(a) Yes [ ] (b) No [ ]

19. How many sand mining sites are available in this area? .....

20. Do you give permit license to these sand miners to operate? (a) Yes [ ] (b) No [ ]

21. If "Yes", how is license acquired? .....

22. If "No", which agency or institution issue permit or license to these sand miners?
(a) EPFCCA [ ] (b) Mineral Development Authority [ ] (c) Land use & Management Bureau [ ] (d) MSSE Bureau/office [ ] (e) Local chiefs [ ] (f) Others, specify ……

23. Do you pursue/follow any measure in rehabilitating the degraded sand mining sites?
(a) Yes [ ] (How do you rehabilitate the degraded sites? (b) No [ ] (Why don't you rehabilitate the degraded sites?) ……

24. Do the sand miners pay any reclamation/recovery bond/tie before starting to operate?
(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

25. If "Yes", is it adequate to cater/supply for the cost of rehabilitation? (a) Yes [ ] (b) No [ ]

26. What oversight/mistake role do you have in the sand mining activities? .....

27. How does the assembly ensure compliance/standardize in the monitoring of the activities of sand mining here? .....

28. How many hectares of lands are disturbed/ troubled by the sand miners in this area annually? .....

29. Would you describe sand mining as one of the major sources of taxes for the assembly? Kindly give reason(s) for your response. ……

30. How much in your estimation is generated by the assembly through taxes from the activities of sand/pumice mining? ……

31. Does the assembly set aside part of the revenue obtained from sand mining to develop the communities affected by the negative effects of sand mining? (a) Yes [ ] (b) No [ ]

32. If the answer to the question 31 above is "Yes", what are some of the amenities/facilities you provide to these communities? .....

33. How would you rate the amount of revenues the assembly generates through the activities of sand mining?
(a) Very high [ ] (b) High [ ] (c) Low [ ] (d) None [ ]

34. Would you suggest that sand mining activities be banned/stopped /barred? Kindly give reasons to support your answer ……

35. What in your opinion should be the way forward as far as sand mining activities in this area are concerned? .....

Thanks for your cooperation.

APPENDIX 'D'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

NDEPTH INTERVIEW GUIDE FOR THE ENVIRONMENTAL PROTECTION EXPERT

NDEPTH INTERVIEW GUIDE FOR MINING DEVELOPMENT EXPERT

NDEPTH INTERVIEW GUIDE FOR LAND USE AND ADMINSTRATION EXPERT

NDEPTH INTERVIEW GUIDE FOR THE MEDIUM AND SMALL SCALE ENTERPRISE EXPERT

Date of interview:……
Place of interview:……
"Interviewers" name:……
"Interviewees" Gender:……

Organization /Institution:……
Position/Title: ……
The main objective of the study is to assess the effects of sand mining on the environment and people's livelihoods. . The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will be measured by some factors such as the reduction/increase in people's income, reduction/increase in Job avenue/opportunity, and the reduction/increase in crop yields. This questionnaire is designed to elicit information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.
Please make a tick [ ] in the box against your response where applicable.

SECTION A: Factors that push people into sand mining

1. What is your level of awareness of the activities of sand mining in this district?
(a) High [ ] (b) Low [ ] (c) Very Low [ ]

2. Who are the owners of the sand mining lands in this area?
(a) Government [ ] (b) Individuals [ ] (c) District Assembly [ ] (d) Companies [ ] (e) MSSE [ ] (f) Don't know [ ] (g) Others, specify ……

3. Why do many people in this area engage in the activities of sand mining? .....

Section B: **Effects of sand mining on Livelihoods**

4. What positive effects of sand mining on livelihoods are you aware of? .....

5. What negative effects of sand mining on livelihoods are you aware of? .....

6. Do you see sand mining as a major threat to livelihoods? Kindly give reasons to support your answer ……

Section C: Effects of sand mining on the environment

7. What positive effects of sand mining on the environment are you aware of? .....

8. What negative effects of sand mining on the environment are you aware of? .....

9. How would you rate the severity of the degradation caused by sand mining compared with mining for other minerals pumice/Stone mining?
(a) High severity [ ] (b) Severity of equal status [ ] (c) Moderate severity [ ] (d) Low severity [ ] (e) None [ ]

Section D: Role of stakeholders in ensuring livelihood security

10. What kind of support does the agency provide to those whose livelihoods are endangered by sand mining? .....

11. How does the agency deal with the environmental problems associated with sand mining? .....

12. What laws or regulations prescribe how sand mining should be done in this area? .....

13. What would you say about the enforcement of these rules regarding sand mining in this area? .....

14. If these rules are not properly enforced what in your opinion could be responsible for that? .....

15. Would you say that sand miners here are operating legally or not?. Give reasons for your answer: ……

16. Do you conduct environmental impact assessment before sand miners begin their operations?
(a) Yes [ ] (b) No [ ]

17. If "Yes" what considerations do you make? (Tick as many as possible)
(a) Impact on water bodies [ ] (b) Impact on aquatic organisms [ ] (c) Impact on vegetation [ ] (d) Impact on terrestrial organisms [ ] (e) Impact on human activities [ ]
(e) Others, specify ……

18. If "No", do you make any attempt of stopping the sand miners from working?
(a) Yes [ ] (b) No [ ]

19. How many sand mining sites are available in this area? .....

20. Do you give permit license to these sand miners to operate? (a) Yes [ ] (b) No [ ]

21. If "Yes," how is license acquired? .....

22. If "No", which agency or institution issue permit or license to these sand miners?
(a) EPFCCA [ ] (b) Mineral Development Authority [ ] (c) Land use & Management Bureau [ ] (d) MSSE Bureau/office [ ] (e) Local chiefs [ ] (f) Others, specify ……

23. Do you pursue/follow any measure in rehabilitating the degraded sand mining sites?
(a) Yes [ ] (How do you rehabilitate the degraded sites?,
(b) No [ ] (Why don't you rehabilitate the degraded sites?) ……

24. Do the sand miners pay any reclamation bond/share before starting to operate?
(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

25. If "Yes", is it adequate to cater/provide for the cost of rehabilitation? (a) Yes [ ] (b) No [ ]

26. What oversight/mistake/ failure to notice role do you have in the sand mining activities? .....

27. How does the agency ensure compliance/standardize in the monitoring of the activities of sand mining here? .....

28. How many hectares of lands are disturbed by the sand miners in this area annually? .....

30. Would you suggest that sand mining activities be banned/stopped? Kindly give reasons to support your answer ……

31. What in your opinion should be the way forward as far as sand mining activities in this area are concerned? .....

Thanks for your cooperation.

APPENDIX 'E'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

INDEPTH INTERVIEW GUIDE FOR THE FORESTRY EXPERT

Date of interview:……
Place of interview:……
"Interviewers" name:……
"Interviewees" Gender:……
Organization/Institution:……
Position/Title: ……

The main objective of the study is to assess the effects of sand mining on the environment and people's livelihoods. . The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will be measured by some factors such as the reduction/increase in people's income, reduction/increase in job avenues, and the reduction/increase in crop yields. This questionnaire is designed to elicit information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.
Please make a tick [ ] in the box against your response where applicable.

SECTION A: Factors that push people into sand mining

1. What is your level of awareness of the activities of sand mining in this district?
(a) High [ ] (b) Low [ ] (c) Very Low [ ]
2. Who are the owners of the sand mining lands in this area?
(a) Government [ ] (b) Individuals [ ] (c) District Assembly [ ] (d) Companies [ ] (e) MSSE [ ] (f) Don't know [ ] (g) Others, specify ……
3. Why do many people in this area engage in the activities of sand mining? **.....**
4. How would you rate your level of interest in the activities of sand mining in this area? Kindly give reason(s) in support of your answer.
(a) Very High [ ] (b) High [ ] (c) Low [ ] (d) Very Low [ ]
……

Section B: **Effects of sand mining on Livelihoods**

5. What positive effects of sand mining on livelihoods are you aware of? **.....**
6. What negative effects of sand mining on livelihoods are you aware of? **.....**
7. Do you see sand mining as a major threat to livelihoods? Kindly give reasons to support your answer ……

Section C: Effects of sand mining on the environment

8. Are the sand miners encroaching upon the forest reserves? Yes [ ] No [ ]
9. What negative effects of sand mining on the environment are you aware of? .....
10. How would you rate the severity of the degradation caused by sand mining to vegetation cover?

(a) High severity [ ] (c) Moderate severity [ ] (d) Low severity [ ]

Section D: Role of stakeholders in ensuring livelihood security

11. What kind of support does the authority provide to those whose livelihoods are endangered by sand mining? .....

12. How does the authority deal with the environmental problems associated with sand mining? .....

13. What laws or regulations prescribe how sand mining should be done in this area? .....

14. What would you say about the enforcement of these rules regarding sand mining in this area? .....

15. If these rules are not properly enforced what in your opinion could be responsible for that? .....

16. Would you say that sand miners here are operating legally or not?. Give reasons for your answer: ……

17. Do you conduct environmental impact assessment before sand miners begin their operations?

(a) Yes [ ] (b) No [ ]

18. If "Yes" what considerations do you make? (Tick as many as possible)

(a) Impact on water bodies [ ] (b) Impact on aquatic organisms [ ] (c) Impact on vegetation [ ] (d) Impact on terrestrial/earthly organisms [ ] (e) Impact on human activities [ ] (e) Others, specify ……

19. If "No" do you make any attempt of stopping the sand miners from working?

(a) Yes [ ] (b) No [ ]

20. How many sand mining sites are available in this area? .....

21. Do you give permit license to these sand miners to operate? (a) Yes [ ] (b) No [ ]

22. If "Yes" how is license acquired? .....

23. If "No", which agency or institution issue permit or license to these sand miners?

(a) EPFCCA [ ] (b) Mineral Development Authority [ ] (c) Land use & Management Bureau [ ] (d) MSSE Bureau/office [ ] (e) Local chiefs [ ] (f) Others, specify ……

24. Do you pursue any measure in rehabilitating the degraded sand mining sites? (a) Yes [ ] (How do you rehabilitate the degraded sites?, (b) No [ ] (Why don‟t you rehabilitate the degraded sites?) ……
……

25. Do the sand miners pay any reclamation bond/share before starting to operate?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

26. If "Yes", is it adequate to cater/provide for the cost of rehabilitation? (a) Yes [ ] (b) No [ ]

27. What oversight role do you have in the sand mining activities? .....

28. How does the authority ensure compliance/standardize in the monitoring of the activities of sand mining here? .....

29. How many hectares of lands are disturbed by the sand miners in this area annually? .....

30. Would you suggest that sand mining activities be banned/stopped/ stopped? Kindly give reasons to support your answer ……

31. What in your opinion should be the way forward as far as sand mining activities in this area are concerned? .....

Thanks for your cooperation.

APPENDIX 'F'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

INDEPTH INTERVIEW GUIDE FOR CHIEFS/ ASSEMBLY MEMBERS IN SELECTED COMMUNITIES

Date of interview:……
Place of interview:……
Interviewers name:……
Position/Status:……

The main objective of the study is to assess the effects of sand mining on the environment and people's livelihoods. The effects on the environment will be measured based on the extent to which the environment in the affected areas have been degraded using indicators such as deforestation, destruction of water bodies, and the loss or reduction of wildlife. Also the effects of sand mining on livelihoods will be measured by some factors such as the reduction/increase in people's income, reduction/increase in job avenues, and the reduction/increase in crop yields. This questionnaire is designed to elicit information regarding this research work. There are no "correct" or wrong answers. Information given will solely be used for this research. You are also assured of full confidentiality, privacy and anonymity of any information that you provide. You are kindly requested to answer the questions as frankly and openly as you can.

Section A: Socio-demographic characteristics of respondents.

1. Sex:

(a) Male [ ] (b) Female [ ]

2. In which of the following age range do you belong?

(a) < 20 years (b) 20-29 years [ ] (b) 30-39 years [ ] (c) 40-49 years [ ] (d) 50-59 [ ] (e) ≥ 60 years [ ]

3. Marital Status:

(a) Married [ ] (b) Single [ ] (c) Divorced [ ] (d) Separated [ ] (e) Widowed [ ]

4. Level of education……

(a) Illiterate [ ] (b) Read [ ] (c) Read and write [ ] (d) 1-8 [ ] (e) 9-12 [ ] (f) Diploma [ ] (g) Degree [ ] (h) Masters & above [ ] (i) others, specify ……

5. Occupation……

6. How long have you been living in this community?

(a) 0-4 [ ] (b) 5-9 [ ] (c) 10 -14 [ ] (d) 15 -19 [ ] (e) 20 and above [ ]

Section B: Factors that push people into sand mining

7. What reason(s) would you give to explain why some people in your community engage in the activities of sand mining? .....

8. How do the sand miners acquire lands for the sand mining activities?.....

9. Do the sand miners pay royalty/fee to the community?. (a) Yes [ ] (b) No [ ]

10. If "Yes", are you satisfied with the amount given? **.....**

Section C: Effects of sand mining on Livelihoods

11. What are the positive effects of sand mining on livelihoods that you are aware of? .....

12. What are the negative effects of sand mining on livelihoods that you are aware of? **.....**

Section D: Effects of sand mining on the environment

13. Mention and explain any adverse effects of sand mining activities on the environment in your community:**……**

14. What suggestion(s) would you give to combat the negative/adverse effects of sand mining on the environment? **.....**

Section E: Role of stakeholders in ensuring livelihood security

15. Who are the usual owners of the sand mining sites in this community? (Tick as many as possible)

(a) Individuals [ ] (b) Government/Common land [ ] **(c)** Companies [ ] (e) MSSE [ ] (f) Don't know [ ] (g)Others, specify ……

16. What institution regulates the activities of sand mining in this area? **.....**

17. Is proper monitoring and enforcement often done to ensure compliance/standardize? (a)Yes [ ] (b) No [ ]

18. If No, why in your opinion is it so?**.....**

19. What kind of help have you received from any level of government to mitigate the adverse effects of the sand mining in your community ……

20. Indicate level of government that provided the assistance

(a) District Assembly [ ] (b) Regional Administration [ ] (c) Federal Government [ ] (d) Others, specify ……

21. Have you received support from any NGO?

(a) Yes [ ] (b) No [ ]

22. If yes, indicate name of NGO ……

23. Indicate type of help you obtained from the NGO mentioned above.

(a) Cash [ ] (b) Legal Service [ ] (c) Farm input [ ] (d) Training in employable skills

(e) Others, specify ……

24. Do you have access to information from the sand miners with regard to their operations that affect your well-being?

(a)Yes [ ] (b) No [ ]

25. What established mechanism(s) are there for you to channel your complaints/criticism regarding the operations of the sand miners? **.....**

26. How would you rate the extent to which the mechanism(s) are reliable and accessible? (a)Very High [ ] (b) High [ ] (c) Normal [ ] (d) Low [ ] (e) Very Low [ ]

27. How would you describe the relationship between the sand miners and residents of the sand mining-fringe communities ……

28. Would you say that the activities of sand mining have attracted a lot of people into this area? Kindly explain your answer**.....**

29. What are your expectations from the sand miners, the District Assembly, NGO's and other institutions in respect of livelihood enhancement and opportunities?

.....

30. What is your general impression about the activities of the sand miners in your community?

31. Do you see the activities of sand mining as a major problem in this area? Kindly explain your answer. ……

Thanks for your co operation

APPENDIX 'G'

ADDIS ABABA UNIVERSITY CENTER FOR ENVIRONMENT AND DEVELOPMENT STUDIES: MASTER OF ARTS IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

RESEARCH TITLE: IMPLICATIONS OF SAND MINING ON THE ENVIRONMENT AND LIVELIHOODS IN DUGDA DISTRICT

Researcher Name: **Feyissa Defar**, 0911981343/ 0922095960, email. gurmuu936@gmail.com

OBSERVATION SCHEDULE

This observation schedule was made up of documentaries on the following sub themes in the study communities.

1. Livelihood assets of the people.
2. Livelihood activities in the communities.
3. Land degradation as a result of the activities of sand mining.
4. Destruction of vegetation due to sand mining
5. Destruction of water bodies due to sand mining
6. Destruction of farmlands with crops that have not been harvested by the farmers.
7. Social life of the people in the community.
8. Development projects and infrastructure undertaken and provided by the sand miners for the communities
9. Health conditions of the people in the community and identify its linkage to the sand mining operations in the community.
10. Reclamation/recovery sites (if any) and how those lands are been used.
11. Environmental management practices employed by the communities and the sand mining operators.
12. The presence of officials from governmental agencies and other stakeholders interested in the activities of sand mining in the communities