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**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE
PROPOSED REHABILITATION AND INSTALLATION OF COMMUNITY
WATER HARVESTING FACILITIES, INTERGRATING SUBSIDENCE
AGRICULTURE, LIVESTOCK, TREE PLANTING AND AQUACULTURE
AT NTOBA AND UTWIGU VILLAGES, NZEGA DISTRICT COUNCIL,
TABORA REGION –TANZANIA.**

Environmental Impact Statement

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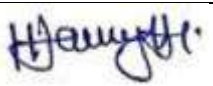
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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
AF	Adaptation Fund
CEO	Chief Executive Officer
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
dBA	Decibel
DED	District Executive Director
EA	Environmental Auditing
EIA	Environmental Impacts Assessments
EMA	Environmental Management Act
EMP	Environmental Management Plan
EIS	Environmental Impact Statement
ESMP	Environmental and Social Management Plan
HIV	Human Immune Virus
KVA	Kilovolt-Amp
NEMC	National Environment Management Council
NEP	National Environmental Policy
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Authority
SWAHAT	Strategic Water Harvesting Technologies
SUA	Sokoine University of Agriculture
STD	Sexual Transmitted Diseases
TANESCO	Tanzania Electric Supply Company
URT	United Republic of Tanzania

ESIA STUDY TEAM

We hereby certify that the particulars given in this report are correct and true to the best of our knowledge

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EXECUTIVE SUMMARY

PROJECT BACKGROUND

It is far and wide established by the global community that the world's climate is changing and will continue to change at unprecedented rates. Climate change is increasingly becoming a global concern as it poses a challenge to sustainable livelihoods, economic development and global security. The impacts of climate change are already being felt across the country and are projected to increase both in frequency and severity leading to severe socioeconomic implications.

Majority of semi-arid rural communities live and derive their economy from a rural agrarian setting. Climate change has come with devastating effects on agriculture in the semi-arid areas leading to drought, floods and water scarcity causing direct consequence on social, economic, gender and environment. As a result, food availability, natural resource utilization and income generation by the vulnerable semi-arid communities is severely affected. The government and donor community is obliged to set aside large sums of budget to support such communities for food as well as financing various socio economic needs such as food aid, education, health and water supply.

The Strategic Water Harvesting Technologies for Enhancing Resilience to Climate Change in Rural Communities in Semi-Arid Areas of Tanzania (SWAHAT) Project is funded by The ADAPTATION FUND (AF), whereas the Implementing Entity is the National Environment Management Council (NEMC) and the Executive Entity being the Sokoine University of Agriculture (SUA).

The project investment cost is estimated to be \$ 125,546 which is equivalent to 340,385,995.71 TZS, the budget covers construction and installation of all facilities. The project costs will include costs for site preparation; excavation activities; re-installation of dykes and construction of spillways; installation of boreholes; health and safety activities. The project timeframe is estimated to be three years.

OBJECTIVES

Project Objectives

The objective of proposed SWAHAT project is enhancing resilience and adaptation of semi- arid rural communities to climate change-induced impacts of drought, floods and water scarcity. The project will be implemented in drought and flood prone semi-arid regions of central and western Tanzania particularly Dodoma, Singida, and Tabora. This will be achieved through strategic water harvesting technologies that will contribute to improved crops, aquaculture and livestock productivity, reforestation as well as combating emerging crops and livestock pests and diseases. The conceptual design of the water harvesting dam has been designed to ensure afforestation of the catchment before the dam thus prevention excessive siltation. The constructed or rehabilitated dams will supply water for all the proposed resilience and adaptation enhancing integrated

innovations to be implemented on the semi-arid landscapes. In addition, synergism between aquaculture and agricultural activities will be done to enhance nutrient recycling and improve resource use efficiency.

Project Rationale

Thereby the SWAHAT project intends to address and create resilience and sustainability through its implementation which will combat the impacts of the climate change discussed above. The proposed dams will therefore supply water for domestic use, irrigation agriculture, and livestock production including aquaculture as well as reforestation of the degraded landscapes²⁰. They will include vegetable production, aquaculture, intensive livestock and poultry keeping, fruit trees and forest nursery production and apiculture for enhanced resilience to impacts of climate change.

NATURE OF THE PROJECT

According to the FIRST SCHEDULE of the Environment Management (Environmental Impact Assessment and Audit) (Amendment) Regulations (2018), those projects with Medium to High impacts are considered to be Type B1, then the Screening process shall be used by NEMC to categorize them either as Type “A” or “B2” project.

The project falls under the B2 in the First Schedule of the Environmental Impact Assessment and Audit Regulations of 2005. The B2 projects do not require full Environmental Impact Assessment (EIA) study. Therefore, the project requires preparation of Project Brief with Terms of Reference and EIA Registration Form No. 4 for submission to NEMC in accordance with Regulation 8(1).

Site Location and Size of the Project Site

Nzega District Council is among eight local authorities of Tabora Region located 116 km north of regional headquarters. Other councils include Nzega Town, Igunga, Uyui, Urambo, Tabora Municipal, Kaliua and Sikonge. The council is located northeast of Tabora region, It is bordered to the north by Shinyanga Region, to the south and southwest by Uyui District and to the east by Igunga District. In terms of international identification, the council lies between Latitude 3°45' - 5°00' South of Equator and 32°30' - 33°30' Longitude East of Greenwich. The figure 1-1 indicates the Google earth view and pictorial presentation of the project components and their locations, whereby the red block indicates Livestock drinking troughs, green structure indicates irrigation farms and the pale blue circle indicates Ntoba and Utwigu dam. The project will be of small scale and involve installations and rehabilitation of the water harvesting dam and bore holes facilities. The area covered by the dam is about 80 Acres, while about 900 Acres are suitable for irrigation. The main source of water for the dams is rain water, dam if not well rehabilitated and maintained will lead to floods to the downstream.

Topography, Soil and Climate

Topography of the council forms part of the Central Plateau of Tanzania which is relatively homogeneous with gently undulating plains intersected by seasonally flooded valley bottoms. In

the extreme gives way to open flat land suitable for cultivation and covered by red lateritic earth grey sand to silt hardpan and iron crust mbuga.

Major Adjacent Development

The adjacent land use is mainly undeveloped land mostly used for agriculture activities and livestock grazing.

LAND OWNERSHIP

The proposed project sites are legally owned by the village governments, i.e. Ntoba and Utwigu villages. However, the village government advised to secure the land ownership documents from the Nzega District Council.

SITE DESCRIPTION

The proposed project will be located in an area where there is an existing utilization of left-over roadside borrow pits, over 50 years old water harvesting dams, small water pits and local ponds that have been proved to accommodate agriculture, livestock and domestic needs although very insufficiently due to inadequate capacity of the infrastructure as well as people's skills and knowledge on management and utilization of the scarce water resources. The Ntoba dam will cover about 10 Acres while Utwigu covers about 70 Acres. The suitable area for irrigation at Ntoba village is 400 Acres while Utwigu has about 500 Acres suitable for irrigation.

Current Situation

Dam

Utwigu and Ntoba Villages are potential for implementation of SWAHAT Project components because they have organized farmers groups in crop production, good land use planning, Livestock keeping and environmental conservation bylaws (such as Protection of water catchments by not allowing animals to directly drink from the dam, and prevention of agricultural activities upstream the catchment area. Utwigu and Ntoba villages have an old dams known as Ibako dam in Utwigu and Ntoba dam, these dams require silt removal, reinstallation and repairs embankments and restoration of spillway to allow for increase in volume of water storage and water holding capacity. Currently the dams are not capable of keeping that much water for more than 5 months of dry season because dams have undergone siltation, forcing farmers to dig local pits to collect capillary surface water for domestic use and animal drinking points. These dams will give water access to animals and domestic use to 5 villages Utwigu, Mwanhala, Iyombo, Isalalo, Ishike and Uhemeli, Kampala, Ntoba, Wita Mabisilo. A population of more than 14,000 livestock animals and over 20,340 villagers.

Livestock Drinking Points

Currently, there are designated areas for watering livestock whose infrastructure has deteriorated due to being unused for a long time, to the extent that grass and trees have grown around the livestock watering area.

Beekeeping

Beekeeping is one of the components of this SWAHAT project. In Utwigu and Ntoba villages, there is a beekeeping group consisting of more than 9 people, including 4 men and 5 women. This group has been provided with several beehives for beekeeping. Additionally, institutions such as Utwigu Primary School were given more than 6 beehives to be part of the school's projects and to serve as a source of income for the school to meet some of its needs.

Tree Planting

Utwigu Village

Tree planting is one of the components of this SWAHAT drought resilience project. Utwigu village has received more than 1,000 tree seedlings, which include various types such as fruit trees, timber trees, and trees for shade. These seedlings have been distributed to several residents as well as institutions such as schools, churches, mosques, clinics, and hospitals. In some areas visited by the ESIA team, the trees are in good condition. Tree planting helps prevent soil erosion. There is still a great need for tree planting, especially in the area around the dam, as no trees have been planted to protect the dam's banks during heavy seasonal rains.

Irrigation Farming

Irrigation farming is one of the priority components of the SWAHAT project, focusing on vegetable farming and other crops. In Ntoba and Utwigu village, so far, few people engaged in small-scale irrigation farming in the dam area. Some of the crops grown include vegetables such as tomatoes, sweet potato leaves, onions, cabbages, pumpkin leaves, etc.

Infrastructure and Utilities

Water Supply

Wetlands are an important resource in arid and semi-arid areas. Although not extensively available, they are in many cases the only water source and contribute in solving water scarcity problems in these areas. Water supply available at the area are from existing village local ponds and seasonal river. Water to be used during project implementation will be sourced from the existing water harvesting dam. Borehole will be constructed as a source of water and there will be one (1) storage tanks (SIMTANK) of 5,000L to be used during project operational phase.

Electricity and Fuel

Electricity from the National Grid (REA) is available but a bit far from the project site. The proposed project will use diesel-powered generator with the capacity of 120kVA will be installed for generation of power to run electrical systems at the project site during project implementation. However Solar system will be the other alternative source.

Waste Water Management System

Liquid Waste Management

The project operations will conform to the National Effluent Standard of Tanzania with regard to wastewater produced by the proposed project. The site shall have latrines with collection points during construction phase. The project shall have sufficient septic tanks and soak away pit to

accommodate excreta and wastewater from washrooms, etc. There is neither public sewerage network nor community waste stabilization ponds in the area.

Solid Waste Management

Various types of solid wastes will be generated (during all phases of the project). A well-established solid waste collection system will be instituted. The system will involve among other things wastes segregation at source, recycling or reuse of some wastes and final disposal to the available village dumping area.

Project Design

The project will be of small scale and involve installations and rehabilitation of the water harvesting dam and bore holes facilities. The proposed project will include reinforcement of the embankment as detailed in the structural design of the dams, Reinforcing the area using concrete mortar and gravel reinforced with iron bars and wire mesh will repair spillways also excavation to remove deposited sand and clay so as to increase the depth. Water gate will be installed on one side of the dam to control water to be channeled to the livestock drinking points and irrigation farms. From the water gate a concrete canal will be constructed direct the water to a distribution point.

Project Component

- Installation and Rehabilitation of Community Water Harvesting Dam
- Installation of bore hole
- Irrigation Scheme
- Livestock dipping point

PROJECT PHASES

During the implementation of the proposed project, there will be some project activities that will be done in mobilization/designing phase, Construction Phase, Operation Phase and Decommissioning Phase.

POLICY, LEGAL AND INSTITUTIONAL ASPECTS

- The Constitution of the United Republic of Tanzania (1977)
- National Environmental Policy (2021)
- The National Climate Change Reduction Strategy (2021-2026)
- The Agriculture and Livestock Policy (1997)
- The National Forest Policy (1998)
- National Gender Policy
- National Water Policy 2002
- National Investment Policy (1996)
- Tanzania Development Vision 2025
- Environmental Management Act of 2004
- The Water Resources Management Act, 11 of 2009.
- Occupational Health and Safety Act, 2003
- Water and Sanitation Act of 2009
- The Village Land Act 1999

BASELINE INFORMATION

Geographical Location

Nzega District Council is among eight local authorities of Tabora Region located 116 km north of regional headquarters. Other councils include Nzega Town, Igunga, Uyui, Urambo, Tabora Municipal, Kaliua and Sikonge. The council is located northeast of Tabora region, bordered by Igunga district in the East and Uyui district council in the South, West and North. In terms of international identification, the council lies between Latitude 3°45' - 5°00' South of Equator and 32°30' - 33°30' Longitude East of Greenwich.

Land Area and Land Use Pattern

The land area covered by the District is 6,788 Sq-km which is 8.9 per cent of the area covered by the region. The altitude varies from 1000m to 1800m above sea level, and annual rainfall ranges between 500mm and 800mm. Vegetation in this area consists of the grassland and acacia species; hence the District is semi-arid in nature.

Existing Land Uses

The existing land use in Nzega District Council is divided to various land uses such as settlements areas, agriculture, grazing, forest reserve areas, mining, water bodies and other uses such as conservation and infrastructure way leave.

Climate

Rainfall

Climate Nzega district Council has one rainfall season starting from early November and ending on June. It receives rainfall between 650mm and 1,200mm annually, falling between the months of October or November and December and a dry period from January to February/March and a second lower peak occurring soon after the dry spell is over in February or March and the rains then tail off in June. Rainfall is critical for agricultural production, which is the mainstay of the Nzega Town Council's economy and livelihood. Thus, human settlement and land use patterns influenced by the distribution of rainfall such that there is a concentration of people on the eastern area. Temperatures range from 28o C to 30o C. The highest temperatures are experienced in October just before the onset of rainfall. Temperatures fall gradually to December and thereafter remain relatively constant up to May. From June to August the district experiences low temperatures. The total annual precipitation ranges from 1,200mm and drops to 650 millimeters or less. The peak is in December followed by a slight dry spell in January. A second lower peak occurs in April and the rains fade off in April/May. However, the rainfall pattern in the region is extremely variable and unpredictable.

Temperature

The temperatures in the District Council vary according to altitude but generally range from about 20oC in July to 30oC during the month of October. Moreover, temperature differences are observed between day and night and may be very high with hot afternoons going up to 32oC and chilly nights going down to 15oC.

Relative humidity

Nzega District Council is within proximity of an overcast and light in saturated relative humidity. It experiences high humidity in month of April and less humid in a month of October. Further, an average annual humidity in Tabora is 58%.

Pan evaporation

The maximum and minimum monthly mean daily pan evaporation are 6.6 mm/day (November) and 5.2mm/day (January) with standard deviations of 1.2 mm/day and 0.8 mm/day respectively.

Soil types

Nzega District in Tanzania exhibits diverse soil types crucial for its agricultural landscape. These include rock and very shallow soils primarily found on steep hillsides, suitable more for grazing and fuel wood production than intensive cultivation. Well-drained sandy soils dominate in areas like Ikindwa and Mwamala, characterized by low fertility and easy leaching. Medium mixture soils with better nutrient retention are prevalent in Puge and Ndala, while black clay soils in Mwakashanhala and Nata offer high fertility, ideal for crops like cotton. Upland soils with impeded drainage in Mogwa and Igusule restrict crop choices due to waterlogging, whereas nutrient-rich Mbuga soils in Lusu and Tongi, prone to seasonal flooding, support a variety of food and cash crops. Understanding these soil characteristics is essential for sustainable agricultural practices and land management in Nzega District.

Topography

The district forms part of the Central Plateau of Tanzania which is relatively homogeneous with gently undulating plains intersected by seasonally flooded valley bottoms. In the extreme Northeast, this pattern gives way to open flat land suitable for cultivation and covered by well or moderately drained soils of sandy loam texture.

Drainage Pattern

Nzega District forms part of the vast central plateau of Tabora region, an area of flat and gently undulating plains broken in places by prominent hills. Most parts of the district lie between 1,100 meters and 1,300 meters above sea level and form the main watershed separating rivers flowing north eastward into the Manonga River and the Wembere Swamps. The district harbours the second largest basin in the region, that of the Manonga river and Wembere Swamp, draining ultimately into Lake Eyasi.

SOCIAL ECONOMIC CHARACTERISTICS

This section presents socio-economic information of the Project site, demographic characteristics, social services and facilities, social dynamics and other cross cutting issues which are relevant to the ESIA Study.

Population and Demographic Trends

According to the NBS (2022), Population and Housing Census, Nzega District Council has a population of **574,498** people (283,140 male, and 291,353 female) with an annual population growth rate of **3.8%** and a population density of **80.28** people per square kilometers. The Council has an average household size of 3.3 and sex ratio of 93. The project site is within Ndala Ward in Ntoba village and Utwigu ward in Utwigu village. Ndala Ward hosts about **25,570** people while Utwigu ward hosts 23,104. The average household size for Ndala Ward is 3.3 While Utwigu 3.5.

Economic Activities

About 85 percent of Nzega district economy comes from farming. The sector is managed by smallholder-farmers and most of them do not use improved farming practices and mostly depend on rain fed farming. As a result, yield per acre is relatively low. The district mainly cultivates maize, sorghum, bulrush millet, groundnuts, sunflower, paddy, Bambara nuts, cassava, sweet potatoes, tomatoes and to a lesser extent finger millet and grapes.

Apart from farming, livestock also have great potential of contributing significantly to the district economy. The common livestock are traditional cattle breed, sheep and goats. However, improved dairy cattle also form a source of income, especially in ward with urban characteristics.

Besides livestock, forestry products are also prominent sources of the district economy. The potential products include timber; honey and wax; charcoal and fuel wood from Chinene forest.

STAKEHOLDERS VIEWS AND CONSULTATION

Introduction

Section 89 of the Environmental Management Act No. 20 of 2004 provides for directives on public participation issues and its importance in the EIA. The EIA and Audit Regulation (2005) provide further details and procedures for public participation in the EIA process. The term “stakeholders” has now become common in the EIA process. The stakeholders include those parties positively and negatively affected by the project. Stakeholder participation involves processes whereby all those with a stake in the outcome of a project actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project.

In this EIA study stakeholder is given a very broad definition and would encompass all different international and regional agencies, government agencies, beneficiaries, institutions and all other formal or informal groups associated with a project.

Objectives of the Public Consultations and Engagement

Objectives of public consultations and engagement are:

- Informing stakeholders
- Gaining their views, concerns, and values
- Taking account of public inputs in decision making
- Influencing project design
- Obtaining local knowledge
- Increasing public confidence
- Improving transparency and accountability in decision-making; and
- Reducing conflict

IDENTIFIED STAKEHOLDERS

These were identified during literature review and interviews. From one stakeholder, the team was connected to another stakeholder, in chain like or network process. The following stakeholders were identified:

- *Nzega District Council*
- *Internal Basin Drainage*
- *Ndala and Mwanhala Wards*
- *Local government (Ntoba and Utwigu Village)*
- *Project beneficiaries*

During consultative Meetings, consultations were done through direct interviews and focus group discussions. Typically, the Agenda for these consultations included:

- Informing stakeholders
- Gaining their views, concerns, and values
- Taking account of public inputs in decision making
- Influencing project design
- Obtaining knowledge local communities
- Increasing public confidence in the proposed project
- Improving transparency and accountability in decision-making; and
- Reducing conflict among the beneficiaries to the implementation of the project

IMPACTS ASSESSMENT AND IDENTIFICATION OF ALTERNATIVES

Introduction

As per the first schedule of Tanzania Environmental Impact Assessment and Audit Regulations, 2005. This project falls under Category B projects that require a comprehensive project brief. The anticipated environmental impacts have been analyzed according to the stages of the project life namely site selection phase, mobilization phase, construction phase, the operational phase and finally the decommissioning phase.

Impact Identification

The impacts are categorized into Pre-Construction phase impacts, Construction phase impacts, Demobilization phase impacts and Operational phase impacts. The main receptors of impacts associated with the anticipated Infrastructure Rehabilitation include physical resources (hydrology, surface water quality, soils, air quality and noise); ecological resources (vegetation); material assets, public health and safety, aesthetics and landscape.

Potential Positive Impacts

Mobilization and Construction Phase

- i. Improved livelihood.
- ii. Employment/Income generation.
- iii. Benefit to local producers and suppliers of goods and services.
- iv. Opportunities for skills acquisition and technology transfer.

Operation Phase

- v. Improved agriculture and irrigation practices.
- vi. Improved water availability.
- vii. Controlled surface runoff and flooding
- viii. Gender equity and Women's empowerment.
- ix. Improved resilience to climate change impacts.

Potential Negative Impacts

Mobilization and Construction phase

- i. Loss of /disturbance of biodiversity (flora, fauna and ecosystem
- ii. Deterioration/impairment of local air quality
- iii. Nuisance and disturbance on/offsite receptors from noise pollution
- iv. Depletion at points of source of construction materials

v. Erosion of the topsoil and reservoir sedimentation

Operation Phase

vi. Disruption of traffic flow during mobilization

vii. Damage to the dam and conveyance system due to effects of natural factors and processes.

viii. Risk to Children

ix. Emergency of Water Conflict

IMPACTS MITIGATION MEASURES

- Clearing of vegetation shall be as minimal as possible so as to avoid much destruction of this natural, unique and small ecosystem.
- The Contractor shall clearly mark out the extent of clearing within the approved worksite and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas.
- The implementing entity shall help to afforest the area when the rehabilitation/construction work is complete.
- The plant species include the endemic ones which will be cut down in the project site and their stock shall be reserved in the upstream and downstream area
- Water sprinkling at the project area to minimize dust emission
- Use of properly maintained equipment, Use of fuels and lubricants of approved quality
- The contractor and project proponent shall ensure all machinery and vehicles are fitted with appropriate mufflers, and that all mufflers and acoustic treatments are in good working order.
- All workers should be provided with protective equipment PPEs

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Introduction

The Environmental and Social Management Plan (ESMP) presents the implementation schedule of the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. For the proposed rehabilitation of Ntoba and Utwigu dam and installation of associated facilities, the ESMP is given in Table 8-1. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. Additional recommendations are provided in ESMP to enable the facilities to be more environmentally friendly. The implementation steps will involve the contractor, project implementing entity, District Councils, Water basin board, users, and the local communities at large.

ENVIRONMENTAL MONITORING PLAN

Introduction

The correct and successful implementation of impact mitigation measures to reduce adverse impacts on environmental conditions needs to be ensured by a proper monitoring Programme. This chapter presents the Environmental and social monitoring plan (EMP) that will be carried out throughout the project implementation to mitigate the impacts and enhance the benefits of the project. The EMP outlines the specific actions that shall be undertaken to ensure that the Project complies with all applicable laws and regulations related to environmental impacts and impact mitigation. The EMP deals with all mitigation required for the physical, biological and socio-economic impacts and focuses on the impacts of higher significance as provided in table 8.1 above.

Objectives of EMP

The EMP applies to, and will be implemented throughout, all phases of the project: mobilization, operation, and decommissioning. The objective of the EMP is to set out clearly the key components of environmental and socio-economic management for the proposed project and thereby ensure that the following concepts are realized throughout the mobilization, construction, operation, and decommissioning.

- Negative impacts on the physical, biological and socio-economic environments are mitigated.
- Benefits that will arise from the development of the proposed project are enhanced;
- Support smooth implementation of project with minimum losses to environmental and social infrastructure;
- Compliance which is guided by national, international laws, standards and guidelines e.g. Effluents standards, noise level standards, occupational and safety standards etc and best practice is achieved; and
- Good will and good relations with communities, and governments at local and national levels are maintained.

COST BENEFITS ANALYSIS

Introduction

The cost-benefit analysis presents a brief comparison of environmental and social costs of implementing the proposed project versus benefits accrued from the project implementation. It is a clear fact that it is not possible to account for all the impacts accrued from the implementation of the project. This is because some of the impacts are direct while others are indirect; others are short-term while others are long-term, some of the impacts are site specific while others cross the boundaries of the project area to affect a much larger population, though it may not be necessarily a significant impact. Similarly, valuation of these impacts is more or less dictated by the social group biases tied to the environment to which the project has been

subjected. Therefore, the methodology used in this cost benefit analysis, will be based on comparing between the following:

Financial Cost Benefit Analysis

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost benefit analysis is to inform the project developer to make a decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is a cost-effective alternative; and
- The estimate of the size of a project. Generically the costs include:
 - Capital expenditures
 - Operating and maintenance costs;
 - Staff costs;
 - Materials and;
 - Environment, health and other social costs. Benefits may include:
 - Better understanding of the target business;
 - Accurate targeting of the resource;
 - Potential for additional revenues generated from new resources;
 - Protection of environment and health; and
 - Provision of other social benefits.

SWAHAT has undertaken a feasibility study and has confirmed that the project is economically viable.

DECOMMISSIONING CONCEPTUAL PLAN

Introduction

The project implementation which entails the Installation and rehabilitation of community water harvesting facilities integrating agriculture, livestock, tree planting and aquaculture is considered as a sustainable long-term investment which emphasizes adaptation and resilience.

Thereby the design life of the project cannot be ascertained. However, in cases of unforeseen events such as disasters caused by extreme weather conditions that might lead to destruction of the project infrastructures the following scenarios might be deployed:

- Major rehabilitation or upgrading of project structures.
- Development of a completely new project at the project site.

Therefore, the post-design life is expected to involve rehabilitation, upgrading, and modernization of the facilities, with a possible expansion (retrofitting and addition of new technology). As a result, impacts from decommissioning are not expected to arise in the near future unless retrofitting and upgrading of the facilities were not feasible.

SUMMARY AND CONCLUSION

Summary

SWAHAT has ensured that the project is located at an appropriate site and is environmentally sound. The project shall have several positive impacts emanating from both the construction and operational phases. These positive impacts include improved livelihoods and resilience of the rural communities to climate change; improved nutrition of local communities as a result of access to fruits and vegetables; increased food security among community members; Vegetation restoration; Reduced land degradation; Habitat restoration; improved welfare of girl child and women at large through reduced drudgery from collection of fuel wood among others as it has been outlined within the report.

The proposed project will also provide some negative impacts, which in turn need to be minimized and mitigated during the construction and the operational phases. Several of these negative impacts are rated low and short-term, thus have minimal impacts. The negative environmental impacts that will result from the establishment of the project include increased health and safety risks during construction and rehabilitation phase, biological disturbance, visual impacts and generation waste, among others.

Conclusion

It is, therefore, concluded that the implementation of the SWAHAT project which entails the Installation and rehabilitation of community water harvesting facilities integrating agriculture, livestock, tree planting and aquaculture would entail no significant adverse impacts to the environment and surrounding communities rather provide resilience and coping mechanisms to challenges caused by the climate change impacts. This project will create resilient communities in the semi-arid areas of Tanzania which will subsequently improve the livelihoods and socio-economic welfare of the communities provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation system laid down in this ESIA.

1 CHAPTER ONE: INTRODUCTION

1.1 PROJECT BACKGROUND

It is far and widely established by the global community that the world's climate is changing and will continue to change at unprecedented rates. Climate change is increasingly becoming a global concern as it poses a challenge to sustainable livelihoods, economic development and global security. The impacts of climate change are already being felt across the country and are projected to increase both in frequency and severity, leading to severe socioeconomic implications.

Majority of semi-arid rural communities live and derive their economy from a rural agrarian setting. Climate change has come with devastating effects on agriculture in the semi-arid areas leading to drought, floods and water scarcity causing direct consequences on social, economic, gender and environment. As a result, food availability, natural resource utilization and income generation by the vulnerable semi-arid communities are severely affected. The government and donor community are obliged to set aside large sums of budget to support such communities for food as well as financing various socio-economic needs such as food aid, education, health and water supply.

The Strategic Water Harvesting Technologies for Enhancing Resilience to Climate Change in Rural Communities in Semi-Arid Areas of Tanzania (SWAHAT) Project is funded by The ADAPTATION FUND (AF), whereas the Implementing Entity is the National Environment Management Council (NEMC) and the Executive Entity being the Sokoine University of Agriculture (SUA).

The project have been designed to have four objectives which when accomplished they will translate into improvement of adaptation and resilience capacity of the vulnerable communities of semi- arid areas of central-western Tanzania. Below the objectives are outlined alongside the AF outcomes they respectively align with:

1. Installation and rehabilitation of community water harvesting dams and facilities that will integrate agriculture, livestock, tree planting and aquaculture:

This objective is in line with:

- i. Adaptation Fund Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors
 - ii. Adaptation Fund Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress
2. Develop and implement participatory afforestation program for locally adapted fruit and forest trees this objective is in line with:
 - Adaptation Fund Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level

- Adaptation Fund Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced and
3. Develop integrated climate resilient livelihoods diversification through improved technologies in agriculture

This objective is in line with:

- Adaptation Fund Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
 - Adaptation Fund Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas
4. Formulate and implement interventions for integrated management of climate change related emerging pests and diseases that affect crops and livestock productivity.

This objective is in line with:

- Adaptation Fund Outcome 3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
5. Enhancing Learning and Knowledge Management: Increase capacity of vulnerable semi-arid rural communities in adaptation to impacts of climate change through adoption of various technologies from SWAHAT project

The Objective is in line with:

- AF outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level.

12 OBJECTIVES

• Project Objectives

The objective of the proposed SWAHAT project is to enhance resilience and adaptation of semi-arid rural communities to climate change-induced impacts of drought, floods and water scarcity. The project will be implemented in drought and flood prone semi-arid regions of central and western Tanzania particularly Dodoma, Singida, and Tabora. This will be achieved through strategic water harvesting technologies that will contribute to improved crops, aquaculture and livestock productivity, reforestation as well as combating emerging crops and livestock pests and diseases. The conceptual design of the water harvesting dam has been designed to ensure afforestation of catchment before the dam thus preventing excessive siltation. The constructed or rehabilitated dams will supply water for all the proposed resilience and adaptation enhancing integrated innovations to be implemented on the semi-arid landscapes. In addition, synergism between aquaculture and agricultural activities will be done to enhance nutrient recycling and improve resource use efficiency. Nursery for fruits and forest trees as well as vegetable gardens will be established and supply seedlings for afforestation and horticulture. Pastureland and animal husbandry infrastructure will be established downstream of the dam for improved productivity and supply of manure for soil fertility improvement. The afforested landscape will integrate apiary

units, provide fuel wood and restore habitats for biodiversity conservation. All these integrated approaches will contribute to livelihoods diversification to improve adaptation and resilience capacity to climate change of the semi-arid communities and the surrounding ecosystem.

13 Objective of the Study

The Environmental Management Act, Cap 191 and the Environmental Management (EIA and Audit) (Amendment) Regulations, 2018, Regulations require that all projects, undertakings and activities that may have potential adverse impacts to the environment to be subjected to the EIA study before their commencement.

The purpose of this assignment is to conduct detailed Environmental and Social Impact Assessment (ESIA), development of the Environmental and Social Management Plan (ESMP) for construction and rehabilitation of water harvesting infrastructures specifically dams and installation of boreholes in Nzega Tabora region. The ESIA will address environmental and social impacts which may arise from mobilization, rehabilitation/construction, operation and decommissioning activities and provide mitigation measures to prevent or minimize adverse impacts.

14 PROJECT RATIONALE

This project is justified by the impacts attributed to climate change impacts and are further stressed as below:

- **Livelihood through Agriculture and Livestock:** The agriculture sector is the mainstay of Tanzania's economy, as well as having a key role in sustaining livelihoods. Agriculture in semi-arid regions of Tanzania is predominantly rain-fed, hence the frequency and intensity of droughts and water scarcity are seriously affecting the sector's productivity. Drought leads to crop failure while excessive rainfall and run off leads to crop loss in most semi-arid regions of Tanzania.
- **Water resources and Wetlands:** Decline in rainfall due to climate change has decreased water availability and as a result patches of wetlands have dried which has impacted water supply and resident biodiversity. Moreover, wetlands are sources of water points for livestock and provide local ponds for fish and other aquatic habitats. Most of these have dried and or diminished as a result of climate change.
- **Emerging pests and diseases:** Under climate change, pressures from pests, weeds, and diseases have been reported to increase, with detrimental effects on crops and livestock. In the semi-arid areas of Tanzania, climate change has lead to emergence of new crop and livestock pests and diseases.
- **Social Context:** Climate change is causing exacerbated poverty, food insecurity, emigration and loss of employment. The Semi-arid habitat occupies 18% of the total land surface area in Sub-saharan Africa, and covers 80% of the land surface in Tanzania. The people living in these regions are characterized by high levels of poverty food insecurity, malnutrition and pastoral lifestyle.

- **Gender:** Climate change is causing water scarcity, shortage of fuel energy, crop failure, drudgery and household labour disparity. Scarcity of clean and safe water for domestic use in these semi-arid areas is a serious climate change induced impact. As a result, women and children are burdened with responsibilities of walking long distances in search of water from unreliable water sources. Consequently, women lose time and energy, which could have been invested in other more productive activities. In addition, young boys and girls are forced into child labour, which is against national and international laws and agreements. They spend less time for schooling so that they can help families fetch water from these distant sources affecting their performance in school and in extreme cases being forced to drop completely from their education career.
- **Environmentally:** Climate change is causing severe land degradation, deforestation and loss of biodiversity leading to poor delivery of ecosystem services. Semi-arid communities are therefore deprived of these important natural resources, which would have provided resilient and sufficient ecosystem products and services necessary adaptation to climate change.

Thereby the SWAHAT project intends to address and create resilience and sustainability through its implementation which will combat the impacts of the climate change discussed above. The proposed dams will therefore supply water for domestic use, irrigation agriculture, and livestock production including aquaculture as well as reforestation of the degraded landscapes²⁰. They will include vegetable production, aquaculture, intensive livestock and poultry keeping, fruit trees and forest nursery production and apiculture for enhanced resilience to impacts of climate change.

15 NATURE OF THE PROJECT

According to the FIRST SCHEDULE of the Environment Management (Environmental Impact Assessment and Audit) (Amendment) Regulations (2018), those projects with Medium to High impacts are Type B1, then the Screening process shall be used by NEMC to categorize them either as Type “A” or “B2” project.

The project falls under type “A” in the First Schedule of the Environmental Impact Assessment and Audit Regulations of 2005. Type A projects require full Environmental Impact Assessment (EIA) study. A Scoping Report with Terms of Reference and EIA Registration Form No. 4 was submitted to NEMC through the Online Registration System in accordance with Regulation 8(1). The project was registered and given Registration No. EC/EIA/2024/5029.

16 STUDY METHODOLOGY

Different approaches were applied to obtain an overview of the project and study the baseline conditions where altogether we will guide on the process of impact identification and analysis and propose for environmental management and monitoring plans.

Literature Review

The EIA team has reviewed the following documents below which apply to the proposed project.

Project baseline report.

- Regional and District profiles.
- National policies and institutional, legal framework relevant to the project; and

- Visual aids such as photographs and maps of the project area and its area.
- Field Visit and Baseline Data Collection

The EIA team will conduct site visits to collect biophysical information and conduct stakeholder consultation to verify the information collected from the field observation.

The baseline data will involve conducting biophysical and socio-economic baseline surveys by Environmental Expert and Sociologist, respectively. The baseline surveys will include collection of both primary data through field work and secondary data through reviews of relevant documents from various sources. Biophysical surveys involved recording of any significant features and land use along the project area with a width of about 60 m. Socio-economic survey involved interviews with relevant stakeholders. Whenever necessary, during the survey some photographs were also taken for illustrations.

Stakeholders Consultation

Stakeholders to be consulted include: Nzega District Council (DED, District Agricultural Officer, District Water Engineer, Irrigation Engineer, District Livestock and Fishery Development Officer) OSHA, Local Government ie wards and Villages level (Utwigu and Ntoba Villages Offices), Vulnerable Groups and neighbors. Views and concerns from each stakeholder consulted will be noted and discussed in the detailed EIA Report.

23 LAND OWNERSHIP

The proposed project sites are legally owned by the village governments, i.e. Ntoba and Utwigu villages. However, the village government advised to secure the land ownership documents from the Nzega District Council.

24 SITE DESCRIPTION

The proposed project will be located in an area where there is an existing utilization of left-over roadside borrow pits, over 50 years old water harvesting dams, small water pits and local ponds that have been proved to accommodate agriculture, livestock and domestic needs although very insufficiently due to inadequate capacity of the infrastructure as well as people's skills and knowledge on management and utilization of the scarce water resources. The Ntoba dam will cover about 10 Acres while Utwigu covers about 70 Acres. The suitable area for irrigation at Ntoba village is 400 Acres while Utwigu has about 500 Acres suitable for irrigation.

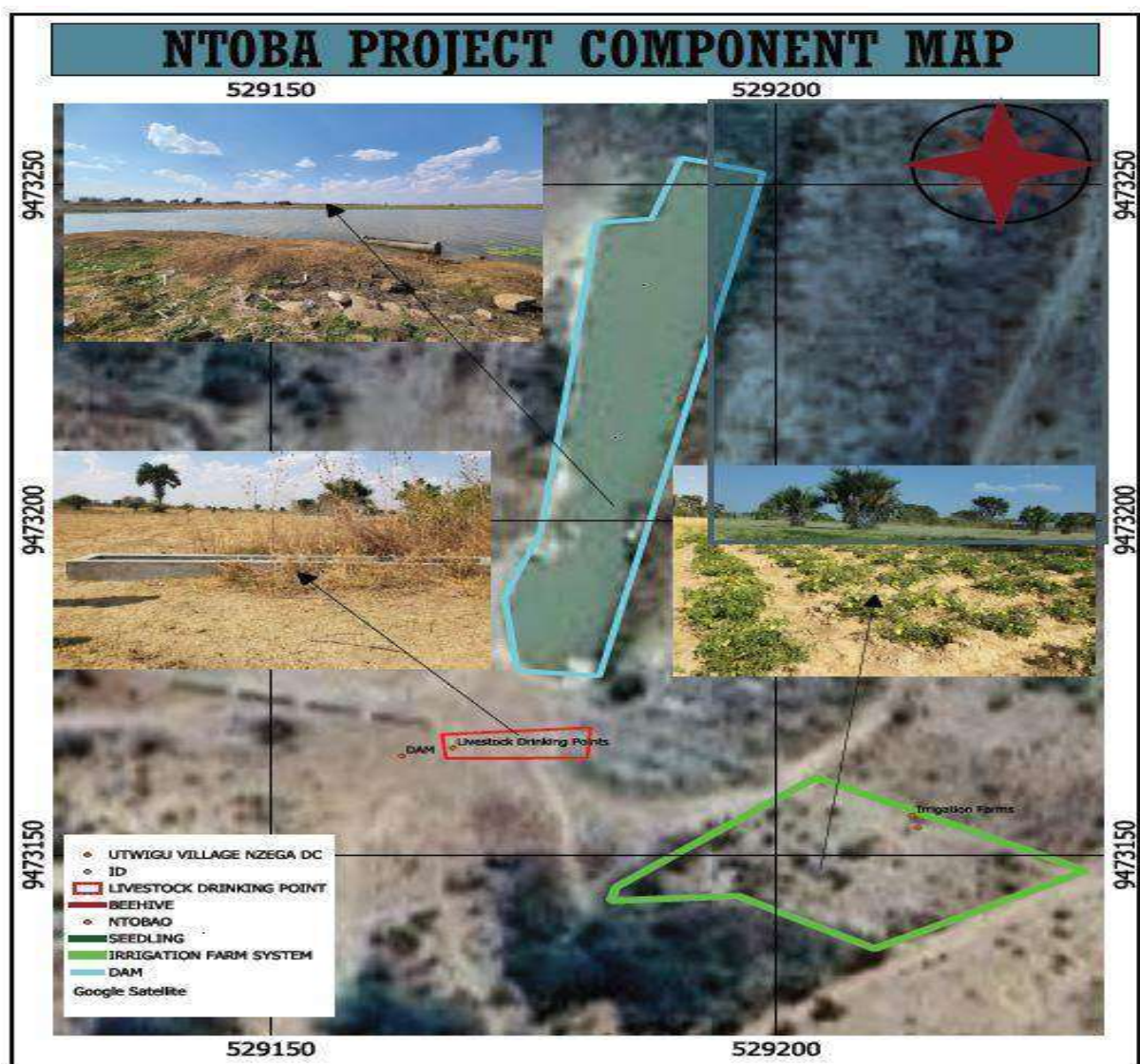


Plate 2-2: Project components at Ntoba village (Source: Consultant 2024)

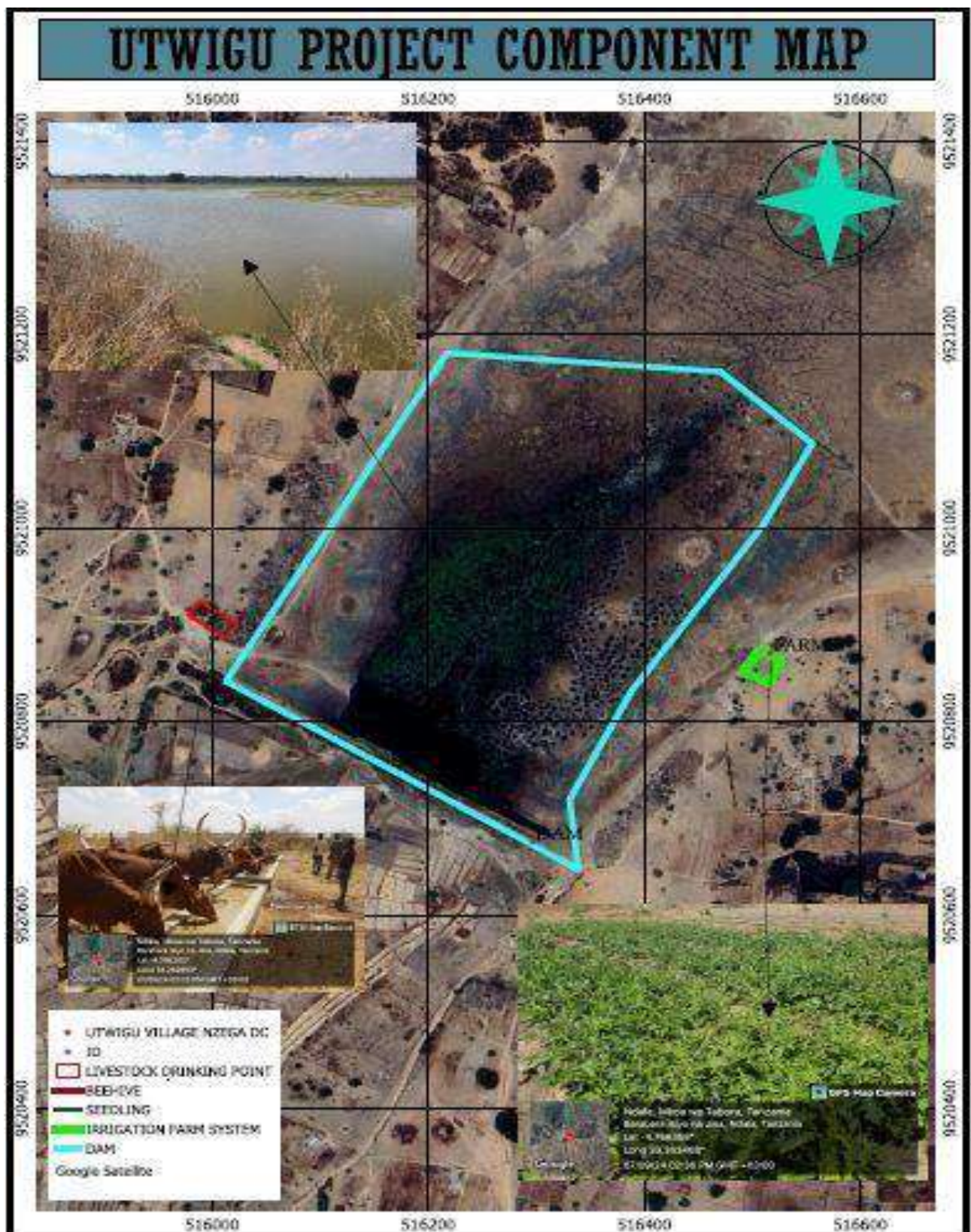


Plate 2-3: Project components (Dam, Drinking point and Irrigation farms at Utwigu village (Source: Consultant 2024)

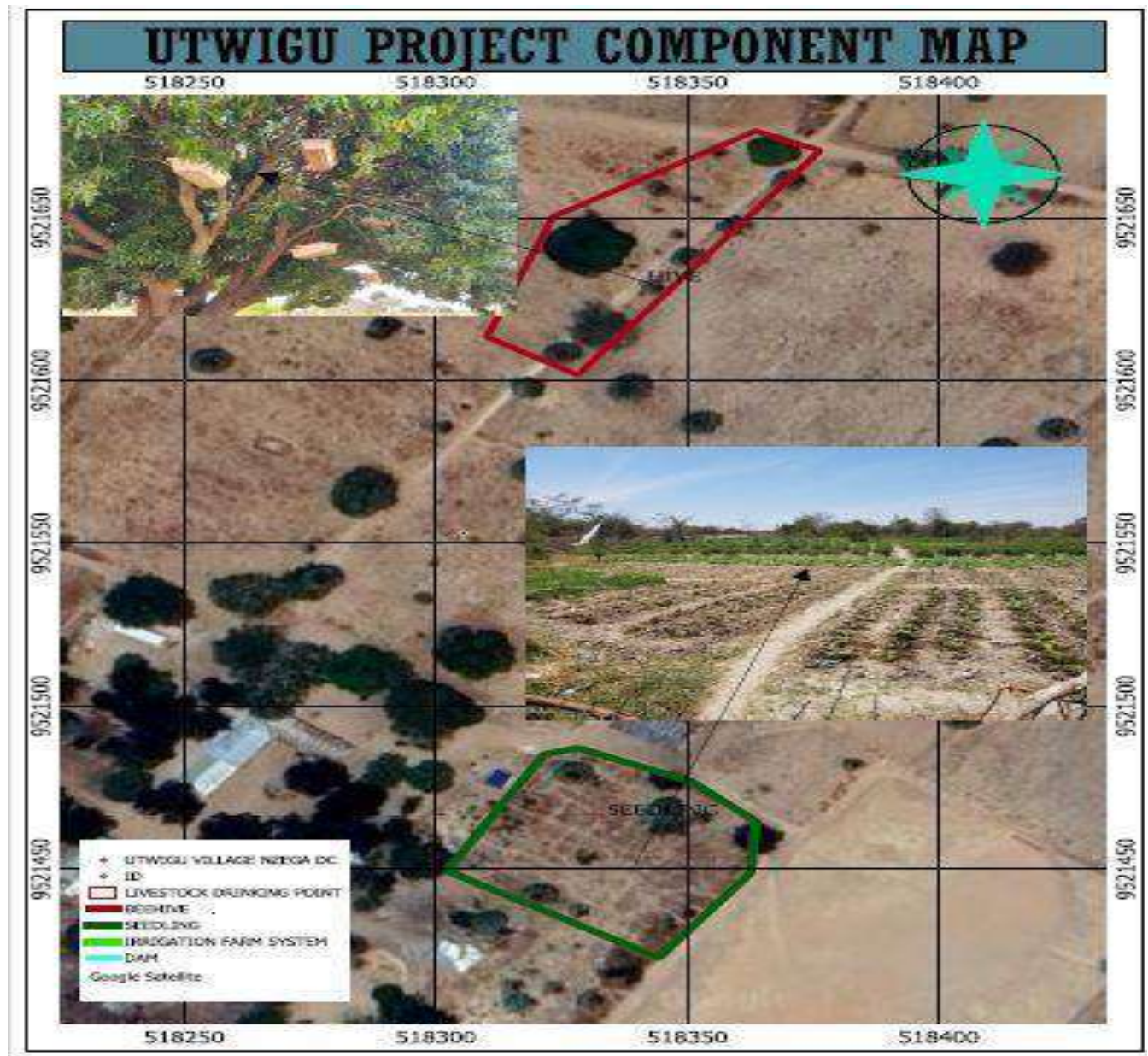


Plate 2-4: Project components (Beekeeping and Tree nursery farms at Utwigu village (Source: Consultant 2024)

- **Existing Situation**

2.4..1 Current Situation

Dam

Utwigu and Ntoba Villages are potential for implementation of SWAHAT Project components because they have organized farmers groups in crop production, good land use planning, Livestock keeping and environmental conservation bylaws (such as Protection of water catchments by not allowing animals to directly drink from the dam, and prevention of agricultural activities upstream the catchment area.

Utwigu and Ntoba villages have an old dams known as Ibako dam in Utwigu and Ntoba dam, these dams require silt removal, reinstallation and repairs embankments and restoration of spillway to allow for increase in volume of water storage and water holding capacity. Currently the dams are not capable of keeping that much water for more than 5 months of dry season because dams have undergone siltation, forcing farmers to dig local pits to collect capillary surface water for domestic use and animal drinking points. These dams will give water access to animals and domestic use to 5 villages Utwigu, Mwanhala, Iyombo, Isalalo, Ishike and Uhemeli, Kampala, Ntoba, Wita Mabisilo. A population of more than 14,000 livestock animals and over 20,340 villagers.



Plate 2-5: Part of Iboko dam at Utwigu Village, (2024)

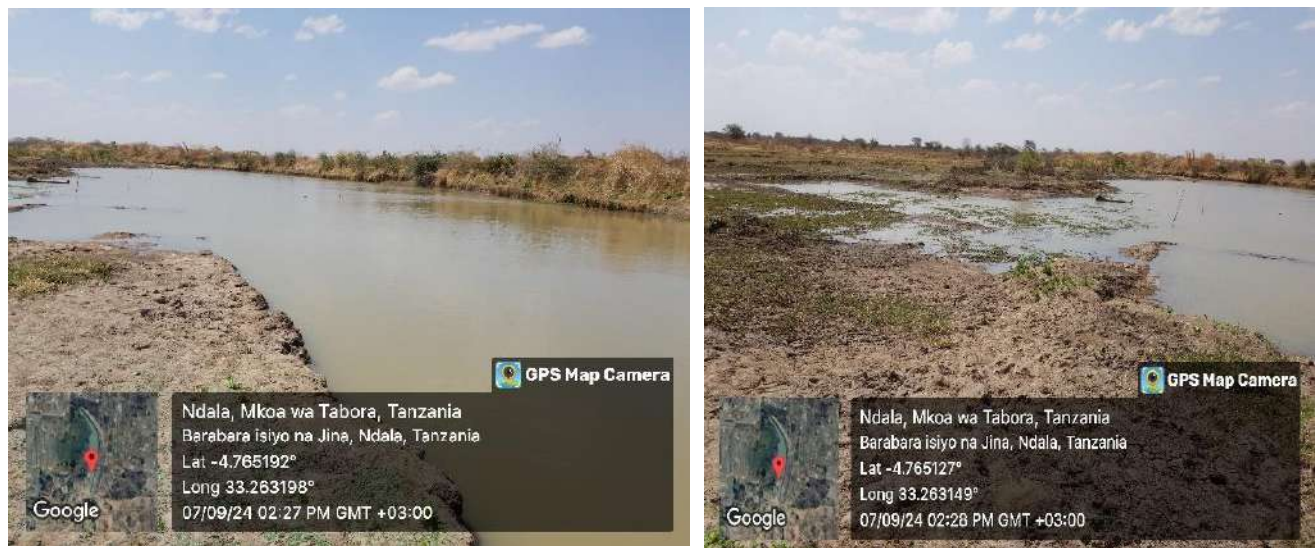


Plate 2-6: Part of Ntoba dam in Ntoba Village, (2024)

During rainy season, the water from dams overflows downstream since the depth of the dam is too shallow and hence low water holding capacity.

2.4..2 Livestock Drinking Points

Currently, there are designated areas for watering livestock whose infrastructure has deteriorated due to being unused for a long time, to the extent that grass and trees have grown around the livestock watering area. Therefore, urgent efforts are needed to rescue this vital infrastructure for watering livestock. Utwigu village has many livestock, so the availability of watering areas is important and a great help to the pastoralist community.



Plate 2-7: Abandoned Livestock watering points at Iboko dam (2024).

The Ntoba village has livestock watering infrastructure, which has been highly beneficial for the community, as it helps to protect the dam and prevent contamination of the dam water. Whereby about 20 cattle can access water at once. These infrastructures are part of SWAHAT project in Ntoba village, the community become the caretaker of the facility because of its benefits.



Plate 2-8: Livestock watering points at Ntoba dam (2024).

2.4..3 Beekeeping

Beekeeping is one of the components of this SWAHAT project. In Utwigu and Ntoba villages, there is a beekeeping group consisting of more than 9 people, including 4 men and 5 women.

This group has been provided with several beehives for beekeeping. Additionally, institutions such as Utwigu Primary School were given more than 6 beehives to be part of the school's projects and to serve as a source of income for the school to meet some of its needs.



Plate 2-9: Beehives at Utwigu Primary School



Plate 2-10: Beehives at Ntoba village

2.4..4 Tree Planting

Utwigu Village

Tree planting is one of the components of this SWAHAT drought resilience project. Utwigu village has received more than 1,000 tree seedlings, which include various types such as fruit trees, timber trees, and trees for shade. These seedlings have been distributed to several residents as

well as institutions such as schools, churches, mosques, clinics, and hospitals. In some areas visited by the ESIA team, the trees are in good condition. Tree planting helps prevent soil erosion. There is still a great need for tree planting, especially in the area around the dam, as no trees have been planted to protect the dam's banks during heavy seasonal rains.



Plate 2-11: Mangoes trees at Utwigu Primary School

Ntoba Village

Ntoba village received various types of tree seedlings, with over 500 seedlings distributed to residents and institutions such as the health clinic and the village office. Additionally, there is a demonstration farm where one resident has planted over 100 mango seedlings on their land, and the seedlings are in good condition. In some areas visited by the ESIA team, the trees are in good condition. Tree planting helps prevent soil erosion. There is still a great need for tree planting, especially in the area around the dam, as no trees have been planted to protect the dam's banks during heavy seasonal rains.



Plate 2-12: Mangoes trees at Ntoba Office

2.4..5 Irrigation Farming

Irrigation farming is one of the priority components of the SWAHAT project, focusing on vegetable farming and other crops. In Utwigu village, so far, only one person is engaged in small-scale irrigation farming in the dam area. Some of the crops grown include vegetables such as tomatoes, sweet potato leaves, pumpkin leaves, etc. However, there is still low awareness, especially regarding vegetable farming through irrigation. Therefore, there is a great need to conduct training seminars on the importance of this type of farming and the best ways to manage vegetable farming and gardens for profit.



Plate 2-13:Some of Vegetables grown at Iboko Dam in Utwigu Village



Plate 2-14:Some of Vegetables grown at Ntoba dam Village

2.4..6 Livestock Dipping Point

Currently, there is no livestock dip (Josho) in Utwigu and Ntoba villages, although there is only one dip serving the entire Mwanhala Ward, which is located at a considerable distance—approximately 6 kilometers from Utwigu as well as in Ntoba no any existing and operating dipping points. Additionally, the existing ward dip has not been renovated for a long time, and the demand exceeds the capacity of the available dip. Therefore, the project should explore the possibility of

securing funds for the construction of a dip to serve the people of Utwigu and neighboring villages because the demand is high.

2.5 Infrastructure and Utilities

2.5.1 Water Supply

Wetlands are an important resource in arid and semi-arid areas. Although not extensively available, they are in many cases the only water source and contribute to solving water scarcity problems in these areas. Water available in the area are from existing village local ponds and seasonal river. Water to be used during project implementation will be sourced from the existing water harvesting dams. Borehole will be constructed as a source of water and there will be one (1) storage tanks (SIMTANK) of 5,000L to be used during project operational phase.

2.5.2 Electricity and Fuel

Electricity from the National Grid (REA) is available but a bit far from the project site. The proposed project will use diesel-powered generator with a capacity of 120kVA will be installed for generation of power to run electrical systems at the project site during project implementation.

2.5.3 Waste Water Management System

2.5.3.1 Liquid Waste Management

The project operations will conform to the National Effluent Standard of Tanzania regarding wastewater produced by the proposed project. The site shall have latrines with collection points during construction phase. The project will have sufficient septic tanks and soak away pits to accommodate excreta and wastewater from washrooms, etc. There is neither public sewerage network nor community waste stabilization ponds in the area.

2.5.3.2 Solid Waste Management

Various types of solid waste will be generated (during all phases of the project). A well-established solid waste collection point will be instituted. Most of the solid waste generated will includes, papers, garbage, used bottles, fertilizer bags e.tc .The system will involve among other things wastes segregation at source, recycling or reuse of some wastes and final disposal to the available village dumping area.

2.6 Design Of the Project

2.6.1 Project Design

The project will be of small scale and involve installations and rehabilitation of the water harvesting dam and bore holes facilities. The proposed project will include reinforcement of the embankment as detailed in the structural design of the dams, Reinforcing the area using concrete mortar and gravel reinforced with iron bars and wire mesh will repair spillways also excavation to remove deposited sand and clay to increase the depth. A water gate will be installed on one side of the dam to control water to be channeled to the livestock drinking points and irrigation farms. From the water gate a concrete canal will be constructed direct the water to a distribution point.

This work will involve important resources such as excavators, bulldozers, trucks, engineers and laborers. The installations and rehabilitation activities will be through a contractor. The construction work will involve civil and building works. Depending on the contractor's implementation plan, a maximum of 12 people will be employed at peak time during the construction phase. The construction activities are expected to last for 4 to 6 months.

The design of the water harvesting dam is guided by relevant standards for such facilities considering relevant technical, safety and environmental aspects.

In general, the design and implementation of the proposed project shall be guided by policies and legislation relevant to environmental management, petroleum sub-sector regulations and respective technical design manuals and standards.

2.6.2 Materials to be used

The materials that will be used for the construction of the water harvesting dam include cement, aggregates, steel reinforcement bars, timber, bricks, water and sanitary ware; some materials like stone aggregates, sand, water, bricks, cement, roofing sheets and sanitary ware will be locally obtained. Other components will be brought in from outside the area (pumps and metering devices).

2.7 Project Component

The proposed project will consist of the following facilities.

The project have been designed to have four objectives which when accomplished they will translate into improvement of adaptation and resilience capacity of the vulnerable communities of semi- arid areas of central-western Tanzania. Below the objectives are outlined alongside the AF outcomes they respectively align with:

1. Installation and rehabilitation of community water harvesting dams and facilities that will integrate agriculture, livestock, tree planting and aquaculture:
 - iii. This objective is in line with:
 - iv. Adaptation Fund Outcome 4: Increased adaptive capacity within relevant development and natural resource sectors
 - v. Adaptation Fund Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress
2. Develop and implement participatory afforestation program for locally adapted fruit and forest trees this objective is in line with:
 - Adaptation Fund Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
 - Adaptation Fund Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced and
3. Develop integrated climate resilient livelihoods diversification through improved technologies in agriculture

This objective is in line with:

- Adaptation Fund Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level
- Adaptation Fund Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas

4. Formulate and implement interventions for integrated management of climate change related emerging pests and diseases that affect crops and livestock productivity.

This objective is in line with:

- Adaptation Fund Outcome 3. Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level

5. Enhancing Learning and Knowledge Management: Increase capacity of vulnerable semi-arid rural communities in adaptation to impacts of climate change through adoption of various technologies from SWAHAT project

The Objective is in line with:

- AF outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level

2.7.1.1 Installation and Rehabilitation of Community Water Harvesting Dam

The project will involve installations and rehabilitation of the water harvesting dam and bore holes facilities. The proposed project will include reinforcement of the embankment as detailed in the structural design of the dams, Reinforcing the area using concrete mortar and gravel reinforced with iron bars and wire mesh will repair spillways also excavation to remove deposited sand and clay so as to increase the depth. The proposed schematic design (Figure 2-11) for water harvesting technologies that incorporate integrated interventions will enhance sustainable adaptation and resilience to climate change.

Project Design

The proposed schematic water harvesting and integrated innovations design (Figure 2-3) is based on the existing utilization of left over roadside borrow pits, over 60 years old water harvesting dams, small water pits and local ponds that have proved to accommodate agriculture, livestock and domestic needs although very insufficiently due to inadequate capacity of the infrastructure as well as people's skills and knowledge on management and utilization of the scarce water resources.

Wetlands are an important resource in arid and semi-arid areas. Although not extensively available, they are in many cases the only water source and contribute in solving water scarcity problems in these areas. Decline in rainfall due to climate change has decreased water availability and as a result patches of wetlands have dried, as witnessed during the survey. This has declined

the areas under wetlands with consequences on water supply and resident biodiversity. Wetlands are sources of water points for livestock and provide local ponds for fish and other aquatic habitats. Most of these have dried and or diminished as a result of climate change.

Rise in temperature, drought and floods contributes in reduction of water quantity and quality increasing water scarcity, leading to potential water use conflicts. Increasingly erratic rainfall regimes and higher mean temperatures in upper catchment areas will ultimately lead to less river water discharge and flow, while high evaporation losses downstream will mean less water available for domestic, irrigation and, hydro-power generation. The impact of climate change on domestic water supplies, both in terms of decreasing quantity and quality is overarching. For instance, the second Vulnerability Assessment Report 12 showed that most of the households in Tanzania use more than one source of water supply, and 62% depend on traditional water supply sources. The majority of the population has no access to potable water and relies on surface water supply, which is mostly lost by floods and drought frequently occurring in the semi arid regions.

This project concept has proved successful in Vietnam, China, India and a few countries in sub-Saharan Africa. In addition, the project design is tailored to validate and upscale the success of the left over roadside dams/ borrow pits in order to implement integrated innovative interventions for adaptation and resilience to climate change of the vulnerable rural communities of semi-arid regions. The conceptual design of the water harvesting dams has been designed to ensure afforestation of the catchment before the dam thus prevention excessive siltation. The installed dams will supply water for all the proposed resilience and adaptation-integrated innovations to be implemented on the semi-arid landscapes. In addition, synergism between aquaculture and agricultural activities will enhance nutrient recycling and improve resource use efficiency. Nursery for fruits and forest trees as well as vegetable gardens will be established and supply seedlings for afforestation and horticulture. Pastureland and animal husbandry facilities will be established downstream of the dams and will, in addition to improve livestock productivity; supply manure for soil fertility improvement. The afforested landscape will integrate apiary units, provide fuel wood and restore habitats for biodiversity conservation. All these integrated approaches will contribute to livelihoods diversification to ensure adaptation and resilience to climate change. Main goal of the proposed SWAHAT project is focused on enhancing resilience of rural community to climate change-induced challenges of drought, floods and high temperatures in semi-arid regions of Tanzania for improved agricultural, aquaculture and livestock productivity, forest restoration and combating emergence of climate change related pests and diseases.

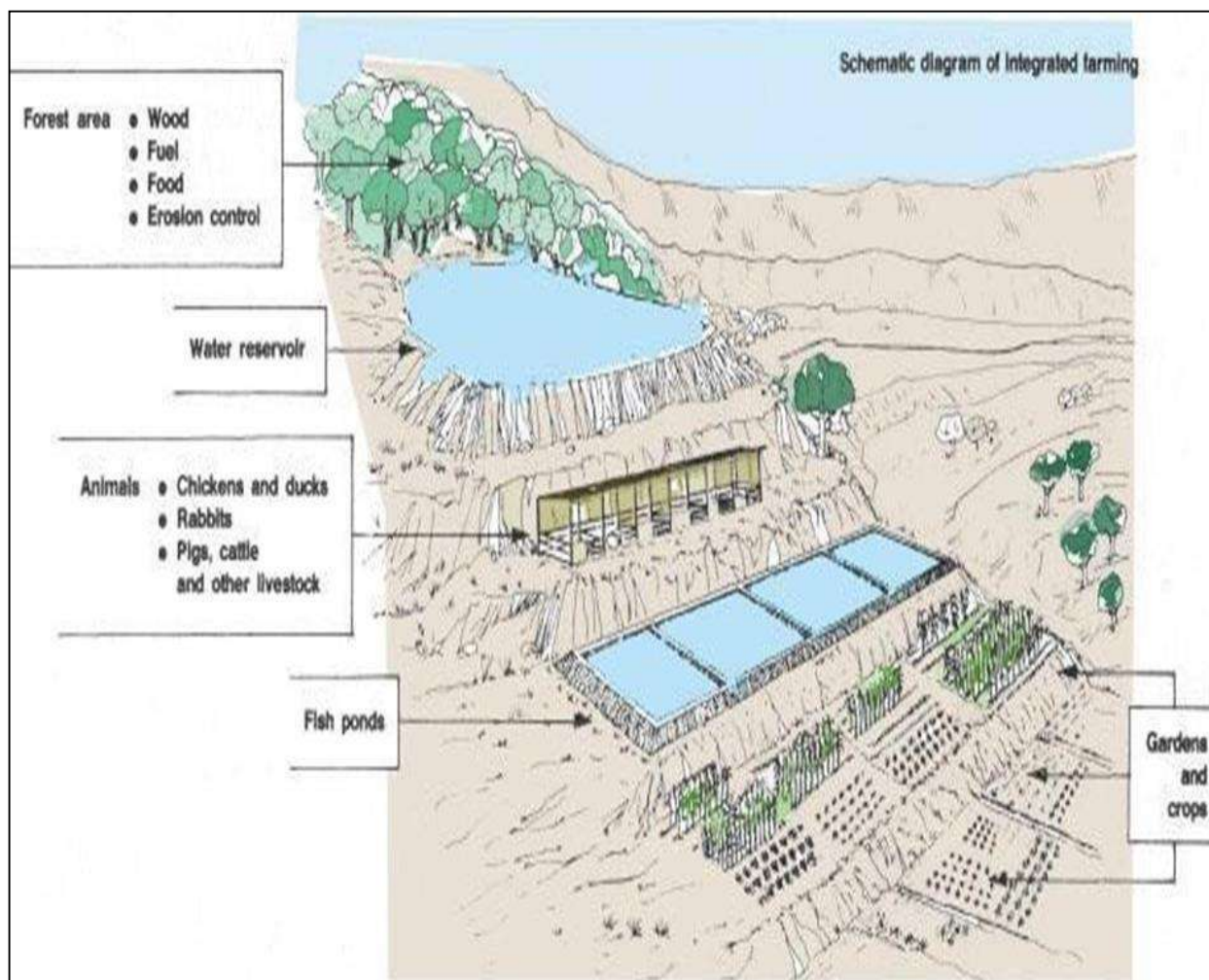


Figure 2-3: Schematic representation of the project concept (Source FAO)

The conceptual design of the water harvesting dams has been designed to ensure afforestation of the catchment before the dam thus prevention excessive siltation. The installed dam will supply water for all the proposed resilience and adaptation-integrated innovations to be implemented on the semi-arid landscapes. In addition, synergism between aquaculture and agricultural activities will enhance nutrient recycling and improve resource use efficiency. Nursery for fruits and forest trees as well as vegetable gardens will be established and supply seedlings for afforestation and horticulture. Pastureland and animal husbandry facilities will be established downstream of the dam and will, in addition to improve livestock productivity; supply manure for soil fertility improvement.

Rehabilitation of the dam will involve reinforcement of the embankment as detailed in the structural design of the dams excavation to remove deposited sand and clay so as to increase the depth. This work will involve important resources such as excavators, bulldozers, trucks, engineers and laborers. Reinforcing the area using concrete mortar and gravel reinforced with iron bars and wire mesh will repair spillways

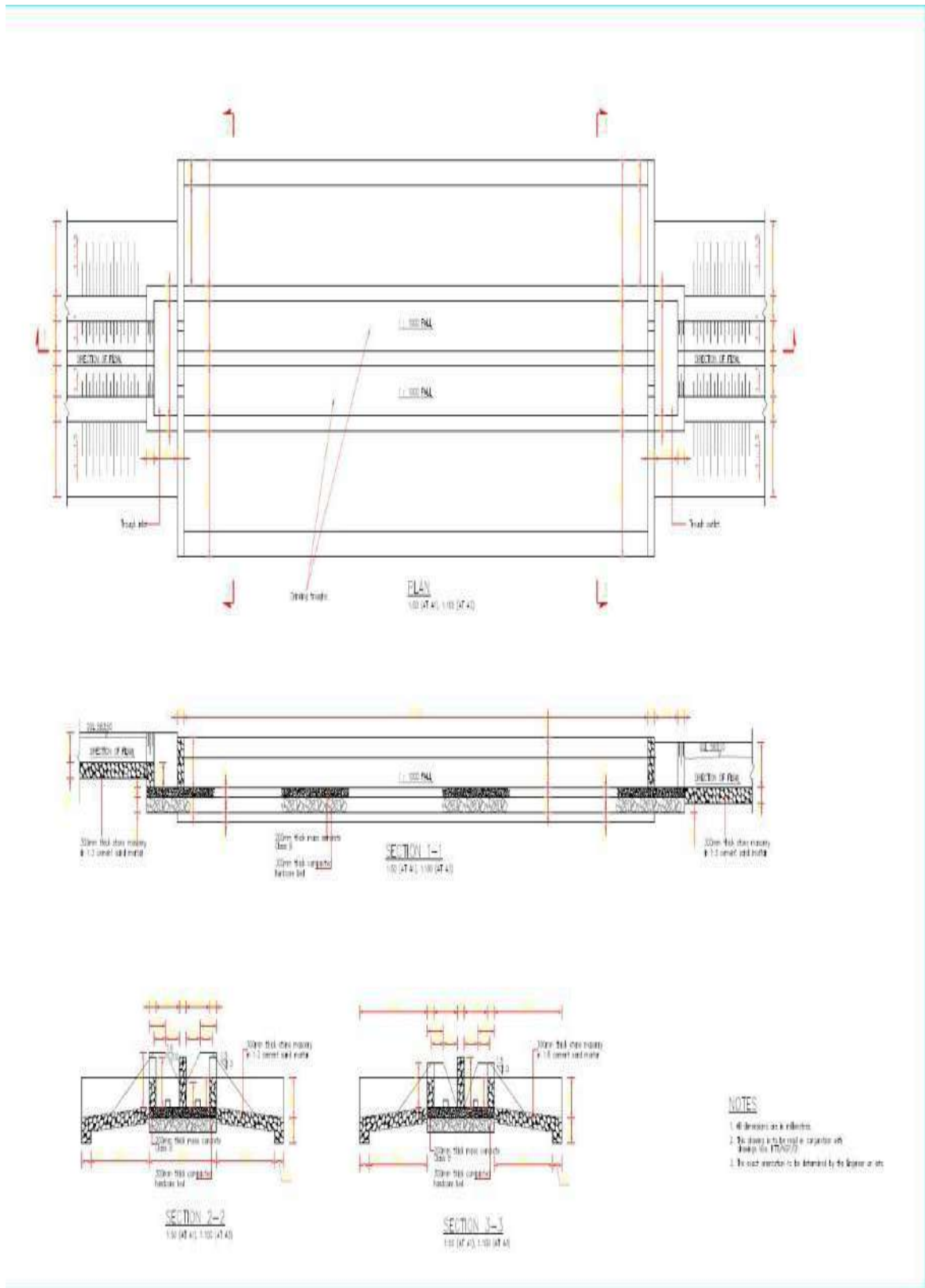


Figure 2-5 Project Design of livestock drinking troughs

2.7.1.3 Installation of bore hole

To ensure availability and access of clean and safe water for domestic use in the selected and most climate change affected areas, deep bore hole will be installed in this area. One bore hole will be installed to serve for clean domestic water supply where local communities will be able to access. Other Support facilities:

- Water drinking Points
- Dip Tanks
- Aquaculture Ponds
- Tree Nursery /Vegetable model farms

2.7.1.4 Irrigation Scheme

Irrigation scheme will be operated by the community. The infrastructures for irrigation scheme will be properly established, such infrastructures includes

- **Water Distribution System:** Canals, pipelines, and drip irrigation will be introduced to optimize water use.
- **Storage & Pumping Facilities:** Solar-powered pumps and reservoirs for continuous supply.
- **Soil & Water Conservation Measures:** Terracing and mulching to reduce erosion and improve soil moisture retention.

There will be the Community Training & Capacity Building where by Farmers will receive training on climate-smart agriculture, irrigation management, and sustainable water use. Demonstrations on drip irrigation, channel irrigation, and sprinkler systems will be conducted. Also workshops on organic farming, pest control, and soil fertility management will be held. In order to have a proper management the committee that will be responsible for overseeing the project will be introduced and later on the community will form small groups for irrigation activities under SWAHAT Project. The beneficiaries of Ntoba and Utwigu dam project under SWAHAT project is about 6341 people

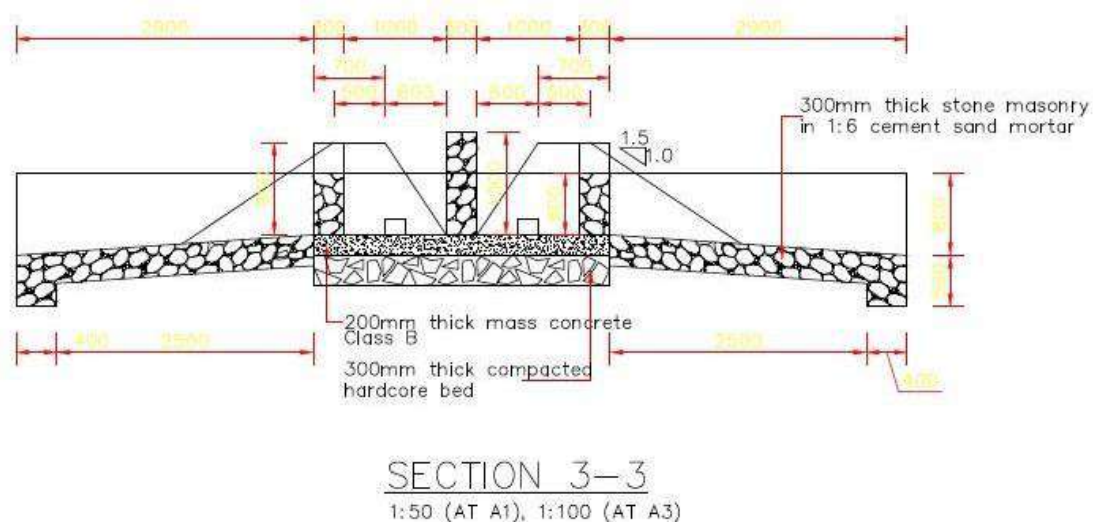
2.7.1.5 Livestock

Pastoralists have had resilience to the historical risk of climate variability in arid and semi-arid lands. However, it is reported that climate change present new risks that will decrease resilience and system stability causing significantly high impacts on livestock keeping. The major challenge to cattle, goat, sheep and other livestock mamals is associated with water scarcity, inadequate pasture and diseases and pests. This will aggravate conflicts between pastoral and agricultural communities, which continue destabilize peace and harmony among communities in various parts of the country. Poultry production is an important livelihood activity in the semi-arid areas where 100% of households are engaged. Poultry diseases stand out to be the major challenge affecting the industry. The toll on poultry production caused by diseases such as Newcastle disease impacts livelihood income and food security aggravating their vulnerability to the consequences of climate change impacts.

The major outcomes from this component will include:

- (i) Improved and sustainable farming systems that are in line with conservation of semi-arid landscapes,
- (ii) Improved livestock production that will translate into improved nutrition and food security and hence more adaptation capacity by a healthy society, and
- (iii) Improved household livelihoods and income generation of local communities from sale of livestock products, and reduced rural to urban migration in search for better life.

Figure 2-6: Cross-section layout of livestock drinking troughs



2.7.1.6 Safety and Health Issues

The entire project area will be guarded accordingly. Health and Safety awareness programs will be conducted, first aid kit will be placed at the campsite, likewise appropriate Personal Protective Equipment (PPE) will be provided to workers during all project phases, the project developer will adapt its own Health, Safety, Security, Environmental, and Quality policy statement during project life cycle will be made available.

28 Project Phases

During the implementation of the proposed project, there will be some project activities that will be done in mobilization/designing phase, Construction Phase, Operation Phase and Decommissioning Phase. The project activities in both phases are summarized in the sections below.

2.8.1 Mobilization & Designing Phase

This initial phase of project implementation will commence when all necessary permits and preparatory processes have been successfully completed. Furthermore, activities that will be included in this phase are as follows:

- Land Survey, dam site mapping and land clearing of dam sites
- Transportation of materials, equipment and machinery to the site
- Stockpiling of materials
- Soil and other investigations
- Recruitment and deployment of construction workforce
- Securing the project site
- Identification of sources of local materials i.e. water. Sand and Aggregates
- Preparation of site construction materials

- Security and safety
- Acquisition of various permits/certificates (i.e. Environmental Permit, Building Permit)

2.8.2 Construction Phase

The construction phase will be accomplished through the following stages:

2.8.2.1 Site Preparation

Site preparation will include the establishment of a temporary office and store at a convenient place close to the site as well as necessary demolishing works. It is anticipated to use grading and compaction machines for site preparation before dam excavation. Manual labor will be used for site clearing, leveling and building works. Up to 12 people will be involved at peak time during the construction phase and 10 people during the operation phase.

2.8.2.2 Excavation of dam to water storage depth/capacity, re-installation of dykes and construction of spillway

The project will involve installations and rehabilitation of the water harvesting dam and borehole facilities. The proposed project will include reinforcement of the embankment as detailed in the structural design of the dam, Reinforcing the area using concrete mortar and gravel reinforced with iron bars and wire mesh will repair spillways also excavation to remove deposited sand and clay to increase the depth.

2.8.2.3 Installation of bore holes and water supply canals for strategic interventions

This will be carried out using both manual labor and equipment such as water drilling machines, and pumps.

2.8.2.4 Health and Safety

During construction, use and operation of heavy machinery may pose a safety risk should there be any accidents. All necessary measures and precautions will be taken to address safety and health issues.

2.8.3 Operation Phase

Operation phase will involve:

- Supplying water to the community and enabled them to sustainably manage and use water resources and their infrastructure
- Occupation, health and safety activities
- Environmental cleaning activities
- Periodic servicing of the equipment/machines
- Monitoring of the requirements of Environmental Monitoring plan

2.8.4 Decommissioning Phase

Two scenarios may happen in the future:

- i. Major rehabilitation or upgrading of project structures.
- ii. Development of a completely new project at the project site.

A preliminary decommissioning plan shall be developed to enable the project Developer inventories all components that need to be removed and disposed. This information will assist in the preparation of the final decommissioning plan, for approval by NEMC.

2.9 Waste Generation

The waste to be generated by the proposed project during different project phases and the methods of their disposal are as discussed below.

2.9.1 Construction Phase

Major wastes generation associated with project construction and their treatment/ disposal methods are described in Table 2-1.

Table 2-1: Waste Generation and Treatment during Construction Phase

Type of waste	Sources	Disposal / Management procedure
Debris and Rubble (overburden)	Demolition of existing structures and site clearance	- Sale or free give away to whomever is in need. - Fill material for road potholes, gullies
Biodegradable materials are mainly domestic waste (food, paper, wood etc.)	- Construction crew	Proponent will adopt use of pit, for waste disposal
Non- biodegradable materials (plastic, glass)	- Construction crew - Renters	Recycling/ reuse
- Excreta (domestic) human - Grey water /cleaners	- Toilets and floor cleaning	Disposed to the septic tank. /Pit latrines

2.9.1.1 Liquid Waste

Expected liquid wastes on site are liquid wastes from sanitation facilities (ablution building) which will be used by workers at the site to minimize environmental pollution that could occur. The proper treatment methods will be established to control improper disposal of liquid waste.

2.9.1.2 Solid Waste

During construction the core project waste will include solid waste, namely food remains, packaging materials, plastic, and glass bottles, papers waste and domestic wastewater (grey water and sewage). Waste such as office papers, plastic waste, tins, glass, food wastes, oil filters, top soil, cement bags, plastic sheeting, straps, concrete debris are expected from the project site. Bottles of all kinds will be recycled or re-used, biodegradable waste will be dumped in the dust bins located at the site and paper waste will be burned on site. Hazardous or non- biodegradable waste such as batteries, glass, tins, cans, metals, even though minimum will be collected in separate bins and sent to the available dumpsite where they will be handed over for recycling or disposal. During construction, minimal equipment and vehicles shall be used.

The project developer will put waste bins, which will be located at different points in the project area and the collection, and disposal at the local pit available at the project village area.

The Solid wastes such as papers, tins, glass, food wastes are expected during operational phase. Assuming that debris,

- Average number of workers will be 12
- Generation rate is 0.35kg/person. day
- Total waste to generated per day= $12 \times 0.35 = 4.2\text{Kg/day}$

2.9.2 Operational Phase

2.9.2.1 Solid Wastes

Waste such as office papers, plastic waste, tins, glass, food wastes, oil filters, et care expected from the project site. The project developer will put waste bins, which will be located at different points in the project area and the collection, and disposal at the local pit available at the project village area.

Solid waste such as papers, tins, glass, food wastes are expected during operational phase. Assuming that

- The average number of workers will be 12
- Generation rate is 0.35kg/person. day
- Total waste generated per day= $12 \times 0.35 = 4.2\text{Kg/day}$

2.9.2.2 Liquid Waste

Expected liquid waste on site is liquid waste from sanitary facilities. Sanitation facilities of ventilated pit latrines will be constructed to store liquid waste during the operation phase.

All the liquid waste from toilets will be collected and directed to the Septic tank system

- There will be 12 people at a time
- Water consumption will be 40l/capita/day
- 80% of the water consumed becomes wastewater generation per day = $12 \times 40 \times 0.8$
- A maximum of 0.384 m³ per day of liquid waste will be produced from the project when it is run at full capacity.

3 CHAPTER THREE: POLICY, LEGAL AND INSTITUTIONAL ASPECTS

3.1 INTRODUCTION

In Tanzania, there are several policies and legislations, which set out the legal and regulatory requirements which are relevant to the SWAHAT project. Additionally, there are pertinent standards governing environmental management and protection, health and safety. The project should be conducted in compliance with the following policies, legislation and standards identified during the scoping study. The following sections list the relevant policies and legislation:

3.2 NATIONAL POLICIES

The following national policies address environmental management for the proposed project:

3.2.1 The Constitution of the United Republic of Tanzania (1977)

The Constitution of the United Republic of Tanzania (1977) contains a provision on the protection of natural resources, which covers the environment. Natural resources include forests, vegetation, landscape and geographical layout of the country, lakes, rivers and other water bodies, land and minerals beneath and flora and fauna. Article 27(1) of the Constitution of Tanzania stipulates that: “Every person is obliged to safeguard and protect the natural resources of the United Republic, State property and all property jointly owned by the people, as well as to respect another person’s property.”

The Directive Principles of State Policy in the Constitution obliges the state and all its organs to ensure that the natural resources and heritage are harnessed, preserved and applied to the common good of Tanzanians. This shows that the Constitution, which is above, all laws lay a firm constitutional foundation for the sustainable management of the environment in Tanzania. This proposed SWAHAT project would serve for conservation, sustainability and resilience of the resources namely: forests, vegetation, landscape and enhance sustainable use of water resources through water harvesting technologies.

3.2.2 National Environmental Policy (2021)

The policy defines environmental issues as both natural and social concerns and adopts the key principle of sustainable development. The policy has proposed the framework of environmental legislation to be considered by the numerous agencies of the government involved in regulating the various sectors. The policy defines strategic plans for environmental management at all levels and provides an approach for mainstreaming environmental issues for decision-making. The policy also proposes measures as a means of minimizing the pollution likely to be originated. The implementation of the SWAHAT project adheres to this policy.

3.2.3 The National Climate Change Strategy (2012)

This Strategy has been developed in response to the growing concern of the negative impacts of climate change and climate variability on the country’s social, economic and physical environment. Its overall aim is to enhance the technical, institutional and individual capacity of the country to address the impacts of climate change. The Strategy

covers adaptation, mitigation and cross-cutting interventions that will enable Tanzania benefit from the opportunities available to developing countries in their efforts to tackle climate change. The goal of the Strategy is to enable Tanzania to effectively adapt to climate change by among other strategies:

- To build the capacity of Tanzania to adapt to climate change impacts.
- To enhance resilience of ecosystems to the challenges posed by climate change.
- To enhance public awareness on climate change;
- To enhance information management on climate change.
- To put in place a better institutional arrangement to adequately address climate change; and
- To mobilize resources including finance to adequately address climate change.

The national climate strategy recognizes that agriculture is the most vulnerable and severely affected sector of the country's economy to climate change (URT, 2013). The strategy notes that the effects of climate change on agriculture include crop failure, increased incidents and severity of pests and diseases as well as shifting agro-ecological zones (AEZs). Agriculture employs more than 80% of people in semi-arid areas of Tanzania. Through SWAHAT interventions, which will address agriculture and land use, a significant amount of semi-arid population will be empowered to adapt to climate change. The surrounding environment and ecosystem resilience to climate change will also be increased through concerted afforestation and catchment conservation activities.

3.2.4 The National Land Policy (1997)

The United Republic of Tanzania has promulgated several national policies on different aspects including environmental and natural resources management in the 1990s. There are number of existing policies that relate to environmental management in Tanzania. These are policies that provide guidance or impact the implementation of management at different levels of governance in the country. Environmental management is complex, multi-sectorial and cross-sectoral; it requires a holistic approach and multi-level operation. Effective environmental management involves many actors and incorporates many different and sometimes overlapping institutional and legal mandates, which require cooperation and coordination.

The overarching policy framework for the Country is the National Environmental Policy (NEP) of 1997. One of the major thrusts of NEP is that it provides for the need to develop ways for encouraging a holistic multi-sectorial approach to environmental management by integrating environmental concerns in sectorial policies, strategies and decisions. In that way it creates the context for cross-sectorial planning and coordination. NEP articulates the concept of shared responsibility and distinct accountability for environmental management so as to inculcate collective responsibility in environmental management. Therefore, every other sector in the country needs to integrate environmental aspects in their policies and strategies. SWAHAT project activities are multispectral by nature and will comply with NEP and other relevant cross-sectoral policy

provisions as directed by the National Environment Management Council (NEMC), which in this project is the implementing entity.

3.2.5 The Agriculture and Livestock Policy (1997)

In Tanzania, the agricultural sector is reckoned as the major economic development pillar employing more than 80% of the country population of 56 million people. Agriculture sector in the country unfortunately suffers from dependency on climate sensitive rain-fed agriculture. Adverse effects of climate change have been recorded within different government reports as cited from CIAT and World Bank. The dependence of agriculture on rainfall increases risks of droughts and floods. Therefore, reducing vulnerability of the sector to climate change will significantly contribute to socio-economic development and ensure food security. Cognizant of the situation, Tanzanian government through Agriculture policy and plans has set and implemented several priorities, of which the SWAHAT project will also thrive to make its contribution to enhance the resilience of the more vulnerable farming communities of semi-arid areas to climate change induced impacts, through:

Assessing crop vulnerability and suitability (cropping pattern) for different micro-site agro-ecological zones;

Improve appropriate irrigation schemes tailored to semi-arid areas which typically receive less rainfall in addition to negative impacts of climate change;

- Promoting early maturing and drought tolerant crops;
- Enhancing agro-infrastructural (input, output, marketing, storage) systems;
- Promoting appropriate indigenous knowledge practices;
- Strengthening post-harvest processes and promoting value addition;
- Addressing soil and land degradation by promoting improved soil and land management practices/techniques.
- Strengthen integrated pest management techniques.
- Promote use of pest/disease tolerant varieties; and
- Strengthen early warning systems for pest surveillance.

Livestock sector adaptation initiatives

The livestock sector adaptation initiative of Tanzania aims to enhance the resilience of the livestock industry to the impacts of climate change. This is especially important in rural semi-arid areas where the livestock industry is quite dominant. The proposed project will therefore contribute to the following national strategic interventions for improving livestock adaptation capacities to with stand negative impacts of climate change:

- Promoting climate change resilient traditional and modern knowledge on sustainable pasture and range management systems;
- Promoting development and implementation of land use plans in the semi-arid areas;
- Promoting livelihood diversification of livestock keepers; and

- Improving the traditional livestock keeping system.

Fisheries: As far as fisheries sector is concerned, the goal of Tanzanian Government is to have fisheries resource able to resist and/or adapt to climate change risks and continue supporting community livelihoods, productivity and diversity of the aquatic ecosystems and fisheries sector in general. The proposed SWAHAT interventions are also within the Government frameworks, and most particularly on: Promoting aquaculture, Enhancing protection and conservation of aquatic ecosystems productivity, and diversity.

The Tanzania Agriculture Sector Development Programme (ASDP I & II)

This programme was formulated from 2002-2005 with revisions to phase II in 2018. It attempts to address issues such as enabling farmers to have better access to and use of agricultural knowledge, technologies, marketing systems and infrastructure. In so doing, ASDP contribute to higher productivity, profitability, and farm incomes. The ASDP further promotes private investment in the agricultural sector in partnership with public sector but emphasizes such partnership needs to be based on an improved regulatory and policy environment. It is well known that agriculture is the hardest-hit sector by climate change in Tanzania (NAPA, 2007). Therefore ASDP should mainstream climate change, particularly adaptation and mitigation measures. But analysis shows that climate change was not integrated in ASDP.

This shortcoming was amplified by the ASDP review conducted in 2008, which indicated that climate change was found to have significant impact on crop production, water availability for irrigation and other uses (ASR/PER report 2008). However, integration of adaptation to climate change in planning and implementation of ASDP interventions has been well covered in ASDP II. ASDP II recognizes 7 thematic areas, which this SWAHAT project aligns with almost all of them. They include:

- i. Irrigation Development, Sustainable Water Resources and Land Use Management;
- ii. Agricultural productivity and Rural Commercialization;
- iii. Rural Infrastructure, Market Access and Trade;
- iv. Private Sector Development;
- v. Food Security and Nutrition;
- vi. Disaster Management, Climate Change Adaptation and Mitigation; and
- vii. Policy Reform and Institutional Support.

viii. National Strategy for Growth and Reduction of Poverty (NSGRP) – MKUKUTA
This is the backbone of the Country's Development Agenda. Higher and sustained agricultural growth is needed to meet Tanzania's National Strategy for Growth and Reduction of Poverty (NSGRP, also called MKUKUTA in Kiswahili) and the then (at time of writing the strategy) Millennium Development Goals of halving poverty and food insecurity by 2015 for four main reasons:

- i. About 80% of the poor live in rural areas and agriculture accounts for 75% of rural household incomes, hence significant reductions in overall poverty levels, particularly rural poverty, will require raising agricultural incomes;
- ii. Agriculture accounts for about 46.2% of Tanzania's GDP (2004) and for about 50% of exports, with agricultural growth having a larger direct impact on GDP growth than comparable growth in other sectors;
- iii. Agriculture stimulates economic growth indirectly through larger consumption linkages with the rest of the economy than other sectors. For example, US\$ 1 of new household income from export crop sales can lead to an addition US\$ 2 in local employment in the production of non-tradable; and
- iv. Meeting the country's food security needs in both rural and expanding urban areas requires higher agricultural growth contributing to higher incomes and lowering food prices. Food insecurity and malnutrition both reduce productivity and the ability of individuals to contribute to growth.

SWAHAT project aligns with country's efforts towards achieving the goals of this mainstream National Strategy.

3.2.6 The National Forest Policy (1998)

With regards to the forestry sub-sector, climate change is reported to have affected many of forest and ecosystem processes. The National Forest Policy of 1998 and subsequent acts programs and plans have the overall goal of enhancing the contribution of forests to sustainable development and conservation biodiversity for the benefit of current and future society. In Tanzania, forests play a major role in building adaptive capacities and resilience of poor and marginalized vulnerable communities such as those living in semi-arid areas. Protecting and conserving biodiversity through application of best practices in soil and water conservation; expanding forest cover and use of adaptive species as well as linking conservation areas is pivotal in adapting to climate change and ensuring continuity in the availability of ecosystem goods and services hence improving the livelihoods of Tanzanians. The proposed SWAHAT project will strengthen efforts invested by the Government Forestry Sector particularly on the following areas of emphasis:

- i. Afforestation programmes in degraded lands using more adaptive and fast growing tree species;
- ii. Develop community forest fire prevention plans and programmes;
- iii. Strengthen community based forest management practice;
- iv. Promotion of appropriate and efficient technologies to reduce use of wood in particular to this rural household firewood usage and
- v. Enhance the development of buffer zones and wildlife migratory routes.
- vi. The National Water Policy

The policy defines that water is critical to ecological systems and to the maintenance of the environment. The policy provides direction that, water resource management practices will focus on preventing negative environmental impacts of human activity, ensuring that water is used beneficially and efficiently, and ensuring that water related

activities aim at enhancing or causing the least detrimental effect to the natural environment. The SWAHAT project is in line with the policy in the following areas:

- i. Development of alternative water storage programs and technology for communities;
- ii. Promotion of water harvesting and storage facilities;
- iii. Development of reservoirs and underground water abstraction;
- iv. Community based catchments conservation and management programs;
- v. Development of new water saving technologies in irrigation.
- vi. Strategy on Urgent Actions on Land Degradation and Water Catchment (2006)

The Strategy was developed in 2006 with the overall objective of halting the environmental degradation particularly degradation of land and water catchments. The Strategy has identified twelve challenges, which need to be addressed in order to halt this degradation. The conservation of biodiversity and sustainable use of its resources is one of the issues being addressed under this Strategy. It is being implemented at all levels from the central government, local government, private sector and local communities.

Cognizant of the fact that the country is faced with widespread environmental degradation particularly degradation of land and water catchments, the environmental problem due to unsustainable agricultural activities in water catchments, on mountain tops, mountain slopes and in other fragile sections of mountain ecosystems. The SWAHAT project recognizes that land and water resources are under serious threats especially in semi-arid regions and thus thriving to address and minimize them.

3.2.7 National Gender Policy

Tanzania is committed to gender equity and has ratified international and regional conventions aimed at eliminating the different forms of discrimination against women and the vulnerable groups in society. This commitment is manifested in the adoption of a National Gender Policy, the establishment of gender focal points in Ministries, Departments and Agencies, and the amendment of the Constitution raising the percentage of seats reserved for women in Parliament from 15 to 20%, and to 30% in local governments. The government strategy is to achieve a 50% involvement of women through representation in all endeavors including the job sector. Women participation in SWAHAT activities is implemented and the aim is to reach 50% involvement. In Ntoba and Utwigu Village there is the **Hapa Kazi Tu Group** which engages in agriculture of vegetable gardens and bee keeping whereas there are 2 women in the group of 6 people. The number will increase after sensitization in the livestock keeping and aquaculture. SWAHAT project will also entail involvement of other disadvantaged social groups from across the whole project period. Major focus of gender mainstreaming within SWAHAT project is particularly in aquaculture, nursery management and tree planting, water governance interventions is to reduce drudgery in search for water, fuel woods, include enhancing their livelihood resilience.

3.2.8 National Human Settlements Development Policy 2000

This policy aims at harnessing the existing initiatives in shelter delivery and infrastructure by various actors in the public, private, informal and community sector as well as guide the rapid urban growth and the transformation of the settlement pattern. The policy recognizes that human settlement development requires essential services like water, roads, energy, schools, health services, drainage, sewerage system, and proper waste management system. SWAHAT project is in line with this policy as it will ensure basic service/ necessity like water is provided through the rehabilitation of the water harvesting dams hence also ensure socio economic activities are fostered.

3.2.9 National Water Policy 2002

Tanzania's National Water Policy (NAWAPO), adopted in 2002, provides a framework for water resource management, supply, sanitation, and environmental sustainability. The policy aims to address challenges related to water scarcity, quality, and access while promoting integrated water resource management (IWRM).

3.2.10 National Investment Policy (1996)

Established in 1996, the National Investment Promotion Policy (NIP) was designed to create a conducive environment for investors by:

- Encouraging private sector participation in the economy.
- Streamlining procedures for investment approvals.
- Providing incentives to priority sectors.

This policy led to the creation of the Tanzania Investment Centre (TIC), serving as a one-stop agency to coordinate and facilitate investment activities

3.2.11 Tanzania Development Vision 2025

The Tanzania Vision of 2025 aims at achieving a high-quality livelihood for its people, attain good governance through the rule of law, and develop a competitive and robust economy. It is also envisaged the pursued fast growth while effectively reversing current adverse trends in the loss and degradation of environmental resources and the accumulation of hazardous substances. SWAHAT project is in line with this strategy/ vision particularly in promotion of socio-economic activities that will promote quality livelihood through aquaculture, nursery management and tree planting, water governance interventions.

3.3 LEGAL FRAMEWORK

This section gives a summary of legal requirements on environmental management during construction, rehabilitation and operations of the water-harvesting dams.

Table 3-1: Legal Framework

Legislation	Requirements	Indicators
Environmental Management Act of 2004	• The Environmental Management Act is the principal legislation governing environmental management in the country. The Environmental Management Act (EMA) recognizes “the right of every citizen to a clean, safe and healthy environment, and the right of access to environmental resources for recreational, educational, health, spiritual, cultural and economic purposes.” • In the 3rd schedule of the Act and the EIA and EA regulations of 2018, this project falls under Type A category that requires a full ESIA.	• Registration of the project • Screening of the project • Development of and implementation of ESMP and its monitoring plan
The Water Resources Management Act, 11 of 2009.	This Act recognizes that fresh water is basic natural resources to sustain both animal and human life, and that reliable and safe drinking water are fundamental needs for improved social livelihoods and quality of life. The Act sets out fundamental principles of water use and conservation. According to the Act, each person residing in Tanzania has the duty to safeguard and protect water resources and to inform the authorities of any activity and phenomenon that may affect the quantity and quality of water.	SWAHAT project through implementation of Component I is coherent with the Act in the following: • Installation and rehabilitation of community water harvesting facilities • Drilling of Boreholes to obtain water for domestic use • Improved Management and conservation of the dams’ catchment areas
Occupational Health and Safety Act, 2003.	The project implementer is required to ensure all workers are provided with proper gears in accordance with the activities they are undertaking.	• Provision of PPEs • Safe working environment

Legislation	Requirements	Indicators
	Also ensure safe working environment for everyone and even the surrounding people	
Water and Sanitation Act of 2009	• The Act requires the delegation of management functions of water supply and sanitation services to the lowest appropriate levels taking into account the local government administrative systems. • Also transferring ownership of water supply schemes in rural areas to the respective communities and enabling all the beneficiaries and stakeholders to participate effectively in the management of the community water supply schemes.	Establishment of Community Owned/Based Water Supply Organization (COWSO/CBWSO)
The Village Land Act 1999	This Act guides the management and administration of land in villages and for related matters. The Act empowers village councils to manage all village lands per the principles of a trustee with the villagers being the beneficiaries. In the exercise of these functions, the village council is required to have regard to the principles of sustainable development and the relationship between land use, other natural resources, and the environment contiguous to the villagers and village land.	SWAHAT utilizes the village land whose uses where allocated for the same purposes as water harvesting dams. The project sites were officially allocated by village governments and local communities for community agricultural development services, where the old dams were established in the 1960s.

Source Consultant 2024

Other Policies

- **Adaptation Fund Policy**

The Adaptation Fund Policy envisages that a project should adhere and commit to environmental and social policies, and regulations of the Adaptation Fund. As a matter of principal the project will ensure that environmental and social risks will be assessed to identify any potential problems. Any risks identified must have a plan in place for avoidance and/or minimization during project implementation. A mechanism to monitor and report on the status of the measures taken will also be put in place. Access and equitability of the project benefits will be promoted to vulnerable communities in semi-arid areas. The project will be participating in the event by allowing local communities and other stakeholders to bring ideas on board from the onset of the project. The project will ensure that all marginalized and vulnerable groups of people in the project areas are engaged. With this project, women and children who are the most affected by the repercussions of drought and low farm productivity will be relieved from a huge burden. Other expected vulnerable people are the disabled, the elderly and people living with HIV. Gender consideration will be given emphasis in the project so that women and men access to the benefits of the project is scrutinized to ensure equality and inclusiveness.

3.4 INSTITUTIONAL FRAMEWORK

The project Organization Chart presented above represent the Project Management Unit where project implementation will be followed and is described below to indicate responsibilities for each stakeholders.

- **Minister Responsible for Environment**

The Minister is responsible for giving policy guidelines necessary for the promotion, protection, and sustainable management of the environment. The Minister approves an EIA and may also delegate the power of approval for an EIA to the DoE, Local Government Authorities, or Sector Ministries. The Minister also:

- Prescribes (in the regulations) the qualifications of persons who may conduct an EIA;
- Reviews NEMC reports on the approval of an EIA;
- Issues an EIA certificate for projects subject to an EIA; and
- Suspends an EIA certificate in case of non-compliance

Regarding this project, the Minister shall review NEMC reports on the approval of this EIA before issuing the certificate.

The proposed project will be implemented by the Vice President's Office, Department of Environment (VPO-DoE) through the National Environmental Management Council (NEMC) of Tanzania. NEMC is the National Implementing Entity (NIE) of the Adaptation Fund. Sokoine University of Agriculture (SUA) who is the Executing Entity (EE) will execute the project. SUA through its Directorate of Postgraduate, Research, Technology Transfer and Consultancy (DPRTC) will ensure the planned activities for the project are executed in accordance with institutional financial regulations and guidelines as planned in the budget. There is a project implementing team composed of technical researchers and executing officers who have a team

leader. The Project implementing team will coordinate with district and village level platforms to ensure smooth uptake of the project, participation and ownership at the local level.

- **National Environment Management Council**

According to the Environmental Management Act (2004), the NEMC has the following responsibility pertaining to EIA in Tanzania:

- Registers experts and firms authorized to conduct EIA;
- Registers projects subject to EIA;
- Determines the scope of the EIA;
- Set-ups cross-sectorial TAC to advice on EIA reviews;
- Requests for additional information to complete the EIA review;
- Assesses and comments on EIA, in collaboration with other stakeholders,
- Convenes public hearings to obtain comments on the proposed project;
- Recommends to the Minister to approve, reject, or approve with conditions specific EIS;
- Monitors the effects of activities on the environment;
- Controls the implementation of the Environmental Management Plan (EMP);
- Makes recommendations on whether to revoke EIA Certificates in case of non-compliance;
- Promotes public environmental awareness; and Conducts Environmental Audits.

Upon submission of this report, NEMC will review the ESIA/ESMP, and make a recommendation to the Minister.

NEMC is the National Implementing Entity (NIE) and will provide project management support, oversight and will act as the secretariat of the Project. The Council will also be part of the team that implements the project, where it will provide technical knowledge and expertise based on its experience implementing other climate change projects in Tanzania. The NIE further oversee compliance with its Environmental and Social Safeguard System and the Environmental and Social Safeguard Policy of the Adaptation Fund.

- **Sokoine University of Agriculture (SUA)**

SUA is the Executing Entity (EE) responsible for management, execution and delivery of project outputs. It will deliver the full range technical knowledge and expertise to the project from its wide range of professionals and experience in handling internationally funded projects. SUA will coordinate all the executing partners, by managing all subcontracts and monitoring their performance. SUA will be expected to ensure that The AF and NEMC Communication and Visibility Policies are adhered to. SUA will notify NEMC, in writing, about any expected variations on the project budget or co-finance.

SUA will provide project implementation infrastructure as well as staff time. A team of multidisciplinary experts who will be coordinated by the Project coordinator will implement the project. The project team will coordinate the execution of the project with key project partners made up of key sectorial institutions and Local Government Authorities. The project coordinator will report all implemented project activities and financials to DRPTC and NEMC. Each component will have a leader who will foresee activities under the particular component and report

to the coordinator. The project coordinator will be the overall in-charge of the project activities on behalf of SUA.

- **District Level Partnership (DLP)**

At the local government level, there are departments and committees dealing with environment, agriculture, livestock, fisheries and water that have a close link with areas of SWAHAT project intervention. Members that participated include: nzega District Executive Director (DED), District Agricultural Irrigation and Cooperative Officer representing Local Government (TAMISEMI) and Subject matter specialist. District/community institutions and/or associations will be represented by existing NGOs and CBOs implementing activities related to the technology transfer. In this regard, the project will use the existing structures at the District level to steer the project implementation in the selected sites. The DLP is made up of members of technical and administrative teams that are ensuring smooth implementation of the project in their respective districts. The DLP is under the District Director and a selected Project focal person is serving as the secretary and the lead contact person of the District to the EE. The duties of the DLP has included the following:

- Selection of project sites using an objective criterion
- Facilitating community mobilization
- Approval of work plans at the District level
- Monitoring project progress
- Coordination of project implementation and ensuring synergies with other related projects and programmes at District level.
- Integrate and implement sustainability plan after the SWAHAT project life

- **Village/Catchment Environmental Committee**

In Tanzania, The Village Environmental Committees (VECs) are responsible in formulation and foreseeing various by-laws and are recognized by the law. Much of the project activities are undertaken at the village or sub-catchment level and they relate to climate change (an environmental aspect) and therefore under the jurisdiction of VECs. In this regard, the project is working with the VECs as entry points to the villages and community groups. The team at Village level representatives include: Village Extension Officer, Village Chair and Village Extension Officer and Farmers' group representatives. Feedback from the village environmental committees feed into the overall project implementation arrangement process. Feedback is captured during monthly meetings, synthesized and fed into the project implementation arrangements.

- **Local communities**

The local communities are involved in project design particularly in identifying problems, specific needs related to resilience to climate change, sites for project implementation and the role they play in project implementation. The local communities in Ntoba and Utwigu Village are to a greater extent engaged in all the project stages.

4 CHAPTER FOUR: BASELINE INFORMATION

4.1 Geographical Location

Nzega District Council is among eight local authorities of Tabora Region located 116 km north of regional headquarters. Other councils include Nzega Town, Igunga, Uyui, Urambo, Tabora Municipal, Kaliua and Sikonge. The council is located northeast of Tabora region, bordered by Igunga district in the East and Uyui district council in the South, West and North. In terms of international identification, the council lies between Latitude 3°45' - 5°00' South of Equator and 32°30' - 33°30' Longitude East of Greenwich.

4.2 Land Area and Land Use Pattern

The land area covered by the District is 6,788 Sq-km which is 8.9 per cent of the area covered by the region. The altitude varies from 1000m to 1800m above sea level, and annual rainfall ranges between 500mm and 800mm. Vegetation in this area consists of the grassland and acacia species; hence the District is semi-arid in nature.

4.2.1 Existing Land Uses

The existing land use in Nzega District Council is divided to various land uses such as settlements areas, agriculture, grazing, forest reserve areas, mining, water bodies and other uses such as conservation and infrastructure way leave.

- **Settlement Area.** In Nzega District council covers an area of 15,426 Ha and mostly are located along village centres. Other settlements are located along three major roads of Nzega District council including Nzega - Kahama road, Nzega to Tabora and Nzega – Tabora via Bukene road.
- **Scattered Settlements and Farming.** In Nzega District council constitute one of the biggest land uses with total land coverage of 131,682 hectares representing 18.4 percent.
- **Forest Reserve Area.** Nzega District council is endowed with natural resources which are natural forest which covers about 115,216 Ha representing 16.1 percent.
- **Grazing Land.** Areas which are currently used as grazing land in Nzega District council include Kisasiga Ranch, Bukene holding ground and other areas (open natural grassland) that form grazing land with total area of 19905 Ha. However, most of people use their farm plots as grazing lands in their areas after harvesting, 2.8 percent.
- **Water Bodies.** Nzega District Council is endowed with water bodies in form of surface water runoff, underground water, rivers dams and season's streams which are found almost around the council and they are being used as a resource for fishing, irrigation, and as a source of water for animals and human beings, this covers 0.07 percent.
- **Infrastructure way Leave.** Infrastructure contributes significantly in social and economic development of Nzega District council including road network, Weigh Bridge, high power tension, railway line as well as East African Crude Oil Pipeline buffer zone with a total area of 2,910n Ha, this covers 0.4 percent.
- **Mining Area.** Nzega District council has potential areas for mining. The mining found in the district council include Gold, silver which are found in villages of Mwangoye, Nata,

Mwamala, Ikindwa, Igusule and Lusu wards. However, there are no large-scale mining activities taking place in the area since Resolute Mine closure in 2014. Most of the mining activities are conducted at small scale, this cover 0.3 percent.

- **Agriculture/Farming (Low Land area -Mbuga).** Areas mainly found in Kahamanhalanga, Lusu, Lyamalagwa, Bulambuka, Bulende, Budushi and Bukene villages, this covers 19.33 percent.
- **Mixed Use.** In Nzega District Council include areas covered by agriculture, settlement, grazing etc. and it consist of 290,529 Ha which is 40.5% of the total District Council area. These areas are found almost in different parts of all wards within the district.

4.3 Climate

4.3.1 Rainfall

Climate Nzega district Council has one rainfall season starting from early November and ending on June. It receives rainfall between 650mm and 1,200mm annually, falling between the months of October or November and December and a dry period from January to February/March and a second lower peak occurring soon after the dry spell is over in February or March and the rains then tail off in June. Rainfall is critical for agricultural production, which is the mainstay of the Nzega Town Council's economy and livelihood. Thus, human settlement and land use patterns influenced by the distribution of rainfall such that there is a concentration of people on the eastern area. Temperatures range from 28o C to 30o C. The highest temperatures are experienced in October just before the onset of rainfall. Temperatures fall gradually to December and thereafter remain relatively constant up to May. From June to August the district experiences low temperatures. The total annual precipitation ranges from 1,200mm and drops to 650 millimeters or less. The peak is in December followed by a slight dry spell in January. A second lower peak occurs in April and the rains fade off in April/May. However, the rainfall pattern in the region is extremely variable and unpredictable.

4.3.2 Temperature

The temperatures in the District Council vary according to altitude but generally range from about 20oC in July to 30oC during the month of October. Moreover, temperature differences are observed between day and night and may be very high with hot afternoons going up to 32oC and chilly nights going down to 15oC.

4.3.3 Relative humidity

Nzega District Council is within proximity of an overcast and light in saturated relative humidity. It experiences high humidity in month of April and less humid in a month of October. Further, an average annual humidity in Tabora is 58%.

4.3.4 Pan evaporation

The maximum and minimum monthly mean daily pan evaporation are 6.6 mm/day (November) and 5.2mm/day (January) with standard deviations of 1.2 mm/day and 0.8 mm/day respectively.

4.3.5 Soil types

Nzega District in Tanzania exhibits diverse soil types crucial for its agricultural landscape. These include rock and very shallow soils primarily found on steep hillsides, suitable more for grazing and fuel wood production than intensive cultivation. Well-drained sandy soils dominate in areas like Ikindwa and Mwamala, characterized by low fertility and easy leaching. Medium mixture soils with better nutrient retention are prevalent in Puge and Ndala, while black clay soils in Mwakashanhala and Nata offer high fertility, ideal for crops like cotton. Upland soils with impeded drainage in Mogwa and Igusule restrict crop choices due to waterlogging, whereas nutrient-rich Mbuga soils in Lusu and Tongi, prone to seasonal flooding, support a variety of food and cash crops. Understanding these soil characteristics is essential for sustainable agricultural practices and land management in Nzega District.

4.3.6 Topography

The district forms part of the Central Plateau of Tanzania which is relatively homogeneous with gently undulating plains intersected by seasonally flooded valley bottoms. In the extreme Northeast, this pattern gives way to open flat land suitable for cultivation and covered by well or moderately drained soils of sandy loam texture.

4.3.7 Drainage Pattern

Nzega District forms part of the vast central plateau of Tabora region, an area of flat and gently undulating plains broken in places by prominent hills. Most parts of the district lie between 1,100 meters and 1,300 meters above sea level and form the main watershed separating rivers flowing north eastward into the Manonga River and the Wembere Swamps. The district harbours the second largest basin in the region, that of the Manonga river and Wembere Swamp, draining ultimately into Lake Eyasi.

4.3.8 Sunshine hours

The average annual daily sunshine hours are 7.9 hr/day. The maximum and minimum monthly mean daily sunshine hours are 9.2 hr/day (September) and 6.5 hr/day (January) respectively.

4.3.9 Wind-run

The wind run records shows 95 km/day (1.1 m/sec) as the average annual daily wind run; 140 km/day (September) and 53 km/day (February) as the maximum and minimum monthly daily wind run respectively. Wind season that exceeds 100 km/day (1.2 m/sec) extends only from August to December.

44 Physical Features

4.4.1 Rift Valley Zone

North-East Zone This zone is in the north-east corner of the region bordering the Manonga River to the north and Wembere Plains in the east. Annual precipitation is between 700 millimetres in the east to 850 millimetres in the west. The zone covers an area of about 3,500 square kilometres. The topography is gently rolling with poorly defined drainage lines. There is a low escarpment in the north where the plain falls to the area adjacent to Manonga Valley. This zone is densely populated mainly due to immigration from the more densely settled regions to the

north. Soils are mainly black clays or clay loams (black cotton soils), which make the zone an important cotton growing area with maize and sorghum being grown as food crops. There is a larger population of livestock, especially cattle, which are extensively used for ploughing.

4.4.2 Miombo woodland Zone

This is an undulating area with occasional inselbergs. The soils are reddish loamy sands with dark grey to black clays in valleys and depressions. The zone, however experiences medium rainfall of 500mm to 700mm per year. Major crops grown here are maize, millet, sorghum, cassava, sweet potatoes and groundnuts. Beekeeping and hunting are also major economic activities of the people in the zone.

4.4.3 East-Central Zone

The zone is in the north-east of the region between the North-East Zone and the Miombo Zone and includes the Wembere Plains. It is an area with more incised drainage than the rest of the region, except for the area on the extreme east, which is the flood plain of the Wembere River. The altitude varies from 1,000 to 1,800 meters above sea level and receives rainfall from 500 millimetres to 800 millimetres per year. In the western part of the East Central Zone vegetation and soils are mixed. The soils are sandy loams with the vegetation consisting of belts of Miombo Woodlands interspersed with Cambretum bush. To the east, acacia species become dominant on the heavier soils, while the Wembere Plains consist of grassland with a small area of acacia.

45 SOCIAL ECONOMIC CHARACTERISTICS

This section presents socio-economic information of the Project site, demographic characteristics, social services and facilities, social dynamics and other cross cutting issues which are relevant to the ESIA Study.

4.5.1 Population and Demographic Trends

According to the NBS (2022), Population and Housing Census, Nzega District Council has a population of **574,498** people (283,140 male, and 291,353 female) with an annual population growth rate of **3.8%** and a population density of **80.28** people per square kilometers. The Council has an average household size of 3.3 and sex ratio of 93. The project site is within Ndala Ward in Ntoba village and Utwigu ward in Utwigu village. Ndala Ward hosts about **25,570** people while Utwigu ward hosts 23,104. The average household size for Ndala Ward is 3.3 While Utwigu 3.5.

4.5.2 Economic Activities

About 85 percent of Nzega district economy comes from farming. The sector is managed by smallholder-farmers and most of them do not use improved farming practices and mostly depend on rain fed farming. As a result, yield per acre is relatively low. The district mainly cultivates maize, sorghum, bulrush millet, groundnuts, sunflower, paddy, Bambara nuts, cassava, sweet potatoes, tomatoes and to a lesser extent finger millet and grapes.

Apart from farming, livestock also have great potential of contributing significantly to the district economy. The common livestock are traditional cattle breed, sheep and goats. However, improved dairy cattle also form a source of income, especially in ward with urban characteristics.

Besides livestock, forestry products are also prominent sources of the district economy. The potential products include timber; honey and wax; charcoal and fuel wood from Chinene forest.

4.5.2.1 Agriculture

Arable farming

As noted before in this section, the district economy mainly depends on farming. Information obtained from District Agricultural Officer reveals that the sector employs more than 80% of the district population. Farming by most of the household is on subsistence basis. Information from district natural resource office (2008) indicates that 378,207ha, which is 70% of the total district area are suitable for agricultural activities (Arable land). The report further indicates that out of the total arable land only 164,637ha were under crop production. This area constitute to about 30% of total district area and 44% of total arable land. Cultivated Areas of Major Food Crops Analysis indicated that the total arable land under cultivation is decreasing from 292,639ha in 2003/04 to 171,023ha in 2005/06, signifying that people are losing interest in crop production due to among other reasons, persistent drought and poor technology employed in farming.

Area for irrigation

Nzega has a total area of 1250 hectares which is favorable for irrigation which is found in Ijanija, Nzega Ndogo, Itilo, Mwanzoli and Miguwa wards. Out of 1250 hectares favorable for irrigation only 150 equivalents to 12 percent has been utilized and the rest 1100 hectares are unutilized which is equivalent to 88 percent of the total irrigation area in the Town.

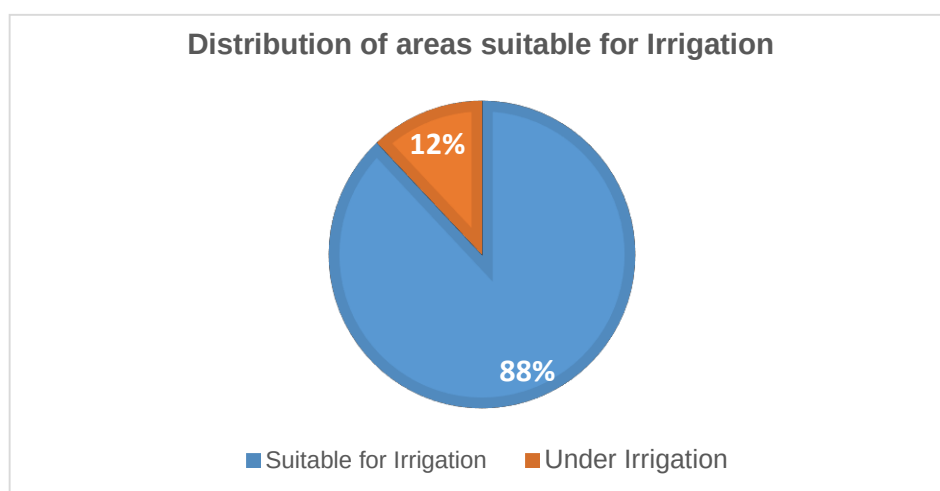


Plate 4-1 Distribution of areas suitable for irrigation

Plate 4 indicates that 88% of the area suitable for irrigation in Nzega district is not utilized; this suggests that more effort is needed to mobilize human and financial resources to ensure that the potentials of this sub-sector are not lost.

Fruits and Vegetable Production and Processing

Nzega District Council is excellent for Agriculture production and is typified by a range of climatic conditions, thus offering diverse opportunities for production of fruits and vegetable. High temperatures and high rainfall of the tropical climate in the area make it suitable to produce various fruits and vegetable crops. Nzega district is richly endowed with a large variety of fruits and vegetables. Less than 5% of fruits and vegetables produced are processed locally. There is room for large scale production of a range of tropical as well as temperate fruits and vegetables. Fruits and Vegetable found in Nzega District Council are Bananas, Mangoes, Tomatoes, Onions, and Cabbages, Pumpkin, Oranges, Water melody and Guava.

4.5.2.2 Livestock

Livestock are important for subsistence by providing meat and milk to enrich diet. Livestock keeping is among the two major economic activities in Nzega District Council. One is crop production, the second is livestock keeping. Chicken are the dominant livestock type in the Town followed by cattle. Chicken contributed 39.01 percent and cattle 35.25 percent of the districts' total livestock population 174,494 of in the season of 2016/17. Nzega District Council frequently experiences land use conflicts between pastoralists, crop farmers and also with TANAPA due to desertification of natural forests reserves. To rescue their livestock from starving, livestock keepers encroach on forests/game reserves and farms to feed them.

Livestock infrastructures in Nzega district

Information obtained from Ward Executive Officers of all wards in the district (2008) revealed that there is a significant shortage of livestock infrastructure in the district. The status of required and available livestock infrastructure in the district is given in Table 3.8. The result in the table among other things shows that the district has 13 dips, 6 livestock health centres, 15 slaughtering slabs and 9 skin drying racks

4.5.2.3 Bee-keeping

Beekeeping in Nzega District Council is an emerging and important activity for both income generation and environmental conservation. The area's climate and vegetation are conducive for beekeeping, providing a natural environment for honey production and other bee products. Various communities, including both organized groups and individual farmers, are engaged in beekeeping activities.

4.6 Economic Infrastructure

Economic infrastructures such as road, railway, air transport; and electricity and telecommunication network are in poor condition; and in some areas do not exist. Road for instance, despite the fact that most of the residence in the area depends on roads for their travel and transport activities, the condition of road is very poor especially during rainy season. Apparently, the aforementioned situation has significant effect on the individual income and the district economy as a whole. The following sub-sections present an account of each type of infrastructure in the district.

4.6.1 Road networks

Nzega district has an estimated road network length of 320km in which 34km are trunk roads, 78km are Regional roads, 82km are district roads and 126km are feeder roads. 39.4% of the roads in the district are feeder roads, 25.6% district roads 24.4% regional roads, 10.6% trunk roads. The classification of road networks based on the surface condition reveals that about 208km which is 65% of roads in the district are earth roads, 90km (28%) is gravel and 22km (6.8%) are tarmac roads.

4.6.2 Telecommunication infrastructure

Human activities now days have been improved by the availability of telecommunication system such as telephone, internet and e-mail services playing a significant role in socio-economic development in the country.

Communication companies available in the district include: TTCL telephone network and mobile phone service providers like Airtel, VODACOM, TIGO, ZANTEL and Halotel. Furthermore, there are also about 3 receivable radio stations in district, namely; (TBC), Radio Free Africa (RFA), and Radio ONE, serving the entire district.

4.6.3 Energy

The district indicates that the main sources of energy in the district are; fuel, charcoal and kerosene. Others include animal dung and gas.

4.7 SOCIAL SERVICES

Adequate social services are important for the development and wellbeing of a community under consideration. In this regard, provision of adequate social services to communities has been a foremost goal in development policies in many governments. These social services involve health, education and water and sanitation. Health issues discussed in this section includes morbidity, mortality and health facilities. Issues in the education sector include primary and secondary school profiles. In general, the content in this section discloses the status and the way social services are rendered in the district.

4.7.1 Water supply and sanitation

Nearly all places in the district are rural, rural water supply in the district for domestic use is still a development challenge. By 2022, the district has a total number of 92 water sources. These are 26 bore holes, 57 shallow wells and 9 other sources. In this context other sources include dams, springs and rain water reservoir. A good percent (71%) of these water sources are functioning, whereby they serves 58% of the total population. However Nzega district council is one among the beneficiaries of Lake Victoria water project, therefore number of people are supplied with water from Lake Victoria.

4.7.2 Health sector

Health services in Nzega district are provided by the Government, NGO's and a growing number of private dispensaries and pharmacies. The district has mobile clinics which operates during local and national vaccination campaigns. There is also health development Programmes such as Child Protection Development and Survival Programme which is supporting health services at

village level. The district has no hospital, it has three health centres owned by the government, 28 dispensaries, out of which 25 are owned by the government and the remaining 3 are privately owned.

4.7.3 Education sector

The demand for investment in educational services is also enormous. The government endures the most of providing education to most of the schooling population. Lately, the private sector has been involved to a certain extent, but the fact remains that the capacity of educational institution from elementary to college levels can hardly accommodate just a proportion of the huge supply of prospective students.

5 CHAPTER FIVE: STAKEHOLDERS VIEWS AND CONSULTATION

5.1 Introduction

Section 89 of the Environmental Management Act No. 20 of 2004 provides for directives on public participation issues and its importance in the EIA. The EIA and Audit Regulation (2005) provide further details and procedures for public participation in the EIA process. The term “stakeholders” has now become common in the EIA process. The stakeholders include those parties positively and negatively affected by the project. Stakeholder participation involves processes whereby all those with a stake in the outcome of a project actively participate in decisions on planning and management. They share information and knowledge, and may contribute to the project, so as to enhance the success of the project.

In this EIA study the stakeholder is given a very broad definition and would encompass all different international and regional agencies, government agencies, beneficiaries, institutions and all other formal or informal groups associated with a project.

5.1.1 Objectives of the Public Consultations and Engagement

Objectives of public consultations and engagement are:

- Informing stakeholders
- Gaining their views, concerns, and values
- Taking account of public input in decision making
- Influencing project design
- Obtaining local knowledge
- Increasing public confidence
- Improving transparency and accountability in decision-making; and
- Reducing conflict

5.2 IDENTIFIED STAKEHOLDERS

These were identified during literature review and interviews. From one stakeholder, the team was connected to another stakeholder, in chain like or network process. The following stakeholders were identified:

- *Nzega District Council*
- *Internal Basin Drainage*
- *Ndala and Mwanhala Wards*
- *Local government (Ntoba and Utwigu Village)*

- *Project beneficiaries*

During consultative Meetings, consultations were done through direct interviews and focus group discussions. Typically, the Agenda for these consultations included:

- Informing stakeholders
- Gaining their views, concerns, and values
- Taking account of public inputs in decision making
- Influencing project design
- Obtaining knowledge local communities
- Increasing public confidence in the proposed project
- Improving transparency and accountability in decision-making; and
- Reducing conflict among the beneficiaries to the implementation of the project



Plate 5-1 Consultative meeting with Ntoba and Utwigu villages respectively

5.2.1 CONCERNS OF STAKEHOLDERS

The scoping study has identified main concerns and issues raised by different stakeholders. Based on the concerns raised, an issue analysis was carried out and categorized by sector as follows:

Table 5-1 Stakeholders' views and Concerns

S/N		Institution/Position	Issue raised	Response
1.	Eng. Joseph Modes	DED - Nzega	- Accepted project - There is large number of livestock in Tabora as well as in Ntoba and Utwigu, therefore there is a need of dipping points. - Tree planting is important for sustainable development	SUA will be responsible for construction of dip points in Ntoba and Utwigu
2.	Margwe Tsere	Community development officer - CDO	- All activities including irrigation to be conducted at least 100 meters from the dam - Community engagement is very important - Awareness on the dam safety to the community - The existing dams are old one, therefore the improvement of these dams will be of more benefits - Gender balance must be well observed - Employment opportunities to the local people	- Participatory group discussion and monitoring of the progress of project implementation - All concerns will be considered during project implementation
3.	Obadia Mayanja	Ag. DEMO	- All activities including irrigation to be conducted at least 100 meters from the dam - Awareness on the dam safety to the community - The project will help in environmental conservation through tree planting	Proponent will conduct capacity building on importance of biodiversity to livelihoods and associated risks

			The project will reduce soil erosion and Surface run off	
4.	Danford Samson	Manager Internal Drainage Basin Water Board	- IDBWB must be fully engaged in all project stages since it is the responsible authority. - Dam design must be submitted to IDBWB for review - Design must include sand trap as a dam conservation measures - There must be prohibition/warning signs for safety purposes	- There will be no construction of new Dam. Activities conducted will only be removal of siltation on the existing dam and renovation of the embankment and installation of water gates. - Proponent will put special warning sign to prohibit human activities at the dam area
5.	Shukrani Tuli	DLO	- The project component ie tree planting is of great importance as it conserve environment and soil erosion - Also there is a need of Livestock drinking point	- Regular farmers and expert's meetings for continued monitoring of implementation of land conservation measures to minimize land degradation and soil erosion in vegetable gardens and management of fishponds - Water drinking point will also be provided
6	Danford Samson	Manager Internal Drainage Basin Water Board	- IDBWB must be fully engaged in all project stages since it is the responsible authority - Dam design must be submitted to IDBWB for review - Design must include sand trap as a dam conservation measures - There must be prohibition/warning signs for safety purposes	- Internal drainage Basin Water Board will be consulted in all phases of the project - All designs will be submitted to IDBWB for scrutiny

7.	Mathew B. Hamka	Ntoba Village Chairperson	• They accepted the project • The proposed site is under ownership of village office • The project component ie tree planting is of great importance as it conserve environment and soil erosion • Employment opportunities to the local community (Ntoba Community)	• Will be considered during project implementation • Sua will provide public awareness programs to the community
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			• There is a need of awareness on the process of tree planting, so that they will do by themselves after project life cycle • Livestock dipping point will help reduce livestock diseases like pneumonia, Ticks, trpanosomiasis, anaplasonosis etc.	
8.	Fortunata Lubengo	N. Utwigu Chairperson	• Infrastructures required for conveying water to the irrigation areas must be installed immediately so that the community will engage themselves in irrigation activities • Local government and the local people must be engaged fully in all phases • Employment opportunities to the local people to make themselves the sense of ownership of the project	• Will be considered during project implementation • Capacity building at district, village and community levels on existing laws and bylaws relevant to the project • Participatory selection and establishment of user rights village committee • Implementation of proper grievance management mechanism
9.		Project Beneficiaries	• The dam walls/embankments must be well strengthened so as to avoid overflow during rainy season • Trees and vetiver grasses to must be planted in the upstream to prevent soil erosion and reduce siltation • The project is of great profit as it improves irrigation activities	• Will be considered during project implementation

			• Also associated facilities like bee keeping, livestock dipping points, livestock watering points all these are very useful to the community, as most of the people are agriculturalists and Livestock keepers. • There is a need of agro-veterinary and Agro-inputs centres which will provide all materials and requirements for agricultural and Livestock farming • The project ensures constant supply of water as sourced from the Borehole.	
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Source: Consultant,2024

6 CHAPTER SIX: IMPACTS ASSESSMENT AND IDENTIFICATION OF ALTERNATIVES

6.1 Introduction

As per the first schedule of Tanzania Environmental Impact Assessment and Audit Regulations, 2005. This project falls under Category B projects that require a comprehensive project brief. The anticipated environmental impacts have been analyzed according to the stages of the project life namely site selection phase, mobilization phase, construction phase, the operational phase and finally the decommissioning phase.

6.2 Impact Identification

The impacts are categorized into Pre-Construction phase impacts, Construction phase impacts, Demobilization phase impacts and Operational phase impacts. The main receptors of impacts associated with the anticipated Infrastructure Rehabilitation include physical resources (hydrology, surface water quality, soils, air quality and noise); ecological resources (vegetation); material assets, public health and safety, aesthetics and landscape.

Potential Positive Impacts

- i. Gender equity and Women's empowerment.
- ii. Improved livelihood.
- iii. Improved resilience to climate change impacts.
- iv. Employment/Income generation.
- v. Benefit to local producers and suppliers of goods and services.
- vi. Opportunities for skills acquisition and technology transfer.
- vii. Improved agriculture and irrigation practices.
- viii. Improved water availability.
- ix. Controlled surface runoff and flooding

Potential Negative Impacts

- i. Loss of /disturbance of biodiversity (flora, fauna and ecosystem)
- ii. Deterioration/impairment of local air quality
- iii. Nuisance and disturbance on/offsite receptors from noise pollution
- iv. Depletion at points of source of construction materials
- v. Erosion of the topsoil and reservoir sedimentation
- vi. Disruption of traffic flow during mobilization
- vii. Damage to the dam and conveyance system due to effects of natural factors and processes.

Table 6-1: Impacts Matrix Table for The Proposed Project

S/N	Environmental parameters/Impacts	Impact Rating Criteria					Impact Significance Rating				Significance Summary
		Spatial Scale	Temporal Scale	Reversibility	Cumulative Effects	Residual Impact	Mobilization Phase	Construction Phase	Demobilization Phase	Operation and Maintenance	
1.	Job creation and increased income	N	MT	IR			+2	+3	+1	+2	+3
2.	Improved Livelihoods	L	ST	R			+2	+3	+1	+2	+3
3.	Improved resilience to climate change impacts	L	ST	R			+1	+2	0	+3	+3
4.	Gender equity and Women's empowerment	L	ST	R	✓		+2	+3	+1	+3	+3
5.	Benefit to local producers and suppliers of goods and services	L	ST	R			+3	+3	+1	+3	+3
6.	Opportunities for skills acquisition	L	LT	IR	✓		+2	+3	+1	+3	+3
7.	Improved agriculture and irrigation	L	LT	R	✓	✓	+1	+1	0	+3	+3
8.	Availability of water	L	MT	R			-1	+2	-1	+3	+3
9.	Controlled surface runoff and flooding	L	LT	R	✓		-1	-2	0	-1	-2
10.	Loss of /disturbance of biodiversity (flora, fauna and ecosystem)	L	MT	R			-1	-3	-1	-1	-3
11.	Deterioration/impairment of local air quality	L	LT	R			-1	-3	-2	-1	-3
12.	Nuisance and disturbance on/offsite receptors from noise pollution	L	LT	IR		✓	-1	-3	-1	-2	-3
13.	Depletion at points of source of construction materials	R	LT	R		✓	-1	-3	0	0	-2
14.	Erosion of the top soil and reservoir sedimentation	L	LT		✓	✓	+1	-2	0	-1	-2
15.	Damage to the dam and conveyance system due to effects of natural factors and processes	L	MT			✓	0	-1	-1	-3	-3
16.	Improved community life and services	L	MT				+1	+2	0	+3	+3

Key: Spatial Scale: Local (L), Regional (R), National (N)

Temporal Scale: Short Term (ST), Medium Term (MT), Long Term (LT) Reversibility: Reversible (R), Irreversible (IR) Significance: Highly Adverse (-3); Adverse (-2); Mild Adverse (-1); No impact (0); Mild Beneficial (+1); Beneficial (+2); highly Beneficial (+3)

6.3 Environmental Impacts

6.3.1 Positive Impacts

Mobilization and Construction Phase

i. Employment/Income generation

During rehabilitation and re-construction of dam, borehole drilling, setting up bee hives, planting trees and pastures, people shall be employed by the project implementing entity to do mobilization works such as the quarrying and material extraction, transportation activities, preparing tree nursery, watering, setting up bee hives, plating pasture and watering etc. It is anticipated that the sub-projects will provide some employment opportunities to the local people directly or indirectly during project implementation. The local people from the project area, especially Ntoba ward shall be given priorities in recruitment processes to increase their income. This should increase the income to all those who have direct and indirect opportunities to be employed by the contractor.

ii. Opportunities for skills acquisition

Engagement rehabilitation of dams and related infrastructure activities can lead to the transfer of skills and knowledge among local producers. Training programs and workshops often accompany such projects, enhancing the capacity of local people and improving their ability to utilize the resources efficiently. SWAHAT project engaged the community in different sub-projects:

- The community were advised to form groups of which they will be trained in different aspects concerning projects
- Ntoba and Utwigu people have also been trained on the best methods of bee keeping using modern bee hives,
- People have been educated on the preparation of nurseries for tree seedlings and later on the best ways to plant trees and care for them and watering the trees in order to conserve the environment.

SWAHAT project empowers local communities, improve agricultural practices, and contribute to overall economic development, fostering a culture of continuous learning and innovation to the local community.

iii. Increase of government revenue collections

Through the use of locally available materials during the construction phase of the Ntoba and Utwigu dam, the project will contribute towards growth of the economy by contributing to the gross domestic product. Businesses supplying consumables such as diesel, oil and lubricants for the site machinery will benefit from increased turnover due to the demand increase on account of the dam. The consumption of these materials, fuel oil and others will attract taxes including VAT which will be payable to the government, hence increasing government revenue while the cost of these raw materials will be payable directly to the producers. The impact is predicted to be positive, cumulative, short term and of high significance.

Operational Phase

iv. Gender Equity and Women's Empowerment

Women, especially in rural areas, often depend on natural resources like water and land for livelihoods. Climate change disrupts these resources, affecting women more than men because of their traditional roles in water and food management. Adaptation projects that acknowledge these gendered impacts can create solutions tailored to women's specific needs, thus addressing their vulnerabilities more effectively.

Many adaptation projects provide women with access to technology, finance, and skills development, helping them diversify livelihoods and build resilience against climate change. For example, SWAHAT project offers women with skills on sustainable agriculture whereby they grow tomatoes, maize, and vegetables, resource management and empower them economically and socially.

v. Improved livelihood

Rehabilitation increases the dam's capacity to store water, hence ensuring a reliable supply of water for domestic use, irrigation, and livestock, especially during periods of long and excessive drought. This stable water supply supports agriculture, leading to improved food security and increased income for farming communities as they will implement irrigation farming even during dry season. When farmers are able to diversify into multiple types of crops, they are not exclusively dependent on one type of produce. For example, they may grow cereals, vegetables, and fruit trees. This diversification means that even if one crop fails due to adverse weather conditions, they can still rely on others to sustain their income.

vi. Improved resilience to climate change impacts

Reliable water storage and tree planting activities help communities adapt to unpredictable weather patterns by providing a buffer during droughts and dry spells. The existing dam is the main source of water for irrigation to the Ntoba and Utwigu community as well as for the livestock, the rehabilitation and its associated facilities like borehole, livestock watering points, planting of cow pastures, these proposed project and sub projects are great weapons towards climate change impacts. This stability allows communities to plan better, invest in their farms, and reduce vulnerabilities linked to climate variability.

vii. Improved agriculture and irrigation

Rehabilitation of dam and drilling of borehole as part of SWAHAT project components often leads to the development of more efficient irrigation systems, such as drip or sprinkler irrigation. These methods minimize water wastage and ensure that crops receive adequate moisture, improving overall water management of water and hence improved overall yield and productivity. Improved irrigation supports increased food production, contributing to local food security and reducing reliance on food imports. This is particularly important for Village and District council as they are vulnerable to climate impacts.

viii. Availability of Water

Rehabilitation increases the dam's capacity to store water as it includes removal of siltation and improving or strengthening the embankments, ensuring a reliable supply for domestic use, irrigation, and livestock, especially during periods of drought. This stable water supply supports agriculture, leading to improved food security and increased income for farming communities.

ix. Controlled surface runoff and flooding

SWAHAT project is associated with number of components like dam rehabilitation, borehole drilling, bee keeping, planting of livestock pastures as well as planting of trees. Therefore rehabilitation of Ntoba and Utwigu dams includes removal of siltation which lead to the increase in the dam depth hence increase in the water storage capacity which results to:-

- **Regulated Water Flow:** Rehabilitation of dams allows for better control of water flow, which can significantly reduce surface runoff and flooding in surrounding areas. By managing the release of water during heavy rainfall, communities can prevent excessive flooding downstream.
- **Retention of Excess Rainwater:** Dams can act as buffers by capturing and storing excess rainwater, mitigating the impact of sudden downpours and reducing the risk of flash floods.
- Also planting trees and pastures (grasses) at the upstream of the dam leads to control of surface runoff and reduces soil erosion.

x. Increased Livestock Productivity

Healthy livestock are more productive. Animals that are free from parasites tend to have better growth rates, improved milk production, and enhanced reproductive performance. Dipping regularly ensures that livestock do not suffer from anemia, skin irritations, or weight loss caused by parasites, thereby increasing overall productivity. A livestock dipping area is a critical investment in the health, productivity, and welfare of animals. It helps protect livestock from parasites, prevents disease transmission, and supports the economic sustainability of farming operations. The construction of dipping area as part of SWAHAT project is critical and a very important investment which will help the community dealing with livestock farming.

6.3.2 Negative Impacts

Mobilization and Construction Phase

i. Loss of /disturbance of biodiversity (flora, fauna and ecosystem

Changes in water flow regimes due to dam operation can negatively affect aquatic habitats. Fish migration patterns may be disrupted, affecting breeding and feeding grounds for various aquatic species. Dams can alter water temperature, sediment transport, and nutrient cycling, leading to changes in water quality that can harm aquatic biodiversity. For instance, increased sedimentation can smother spawning grounds and decrease light penetration, impacting plant growth. Dams can fragment ecosystems by creating barriers to wildlife movement, isolating populations, and hindering gene flow among species. This fragmentation can lead to reduced genetic diversity and increased vulnerability to extinction.

ii. Deterioration/impairment of local air quality

The rehabilitation of dam and borehole drilling involves significant earth-moving activities, which can generate large amounts of dust. This dust can deteriorate air quality and pose health risks to local communities, especially individuals with respiratory conditions. On the other hand, the use of heavy machinery (such as excavators, bulldozers, and trucks) during construction and drilling activities can lead to the emission of particulate matter and volatile organic compounds (VOCs), contributing to air pollution. Routine maintenance and fueling of machinery can also result in accidental spills and leaks, releasing harmful substances into the air and potentially contaminating local water sources.

iii. Nuisance and disturbance on/offsite receptors from noise pollution

The use of heavy machinery such as excavators, bulldozers, and cranes generate significant noise. These machines are essential for earthmoving, construction, and drilling tasks, contributing to elevated noise levels in the surrounding areas. Trucks and transport vehicles used to deliver materials to the site or remove debris also contribute to noise pollution. The sounds of engines, loading and unloading, can further add to the overall noise levels. Exposure to high noise levels can lead to hearing problems, hypertension, increased stress and anxiety, negatively impacting mental health and well-being. The noise can affect both human beings and animals/wildlife.

iv. Depletion at points of source of construction materials

During construction of livestock watering points, livestock dipping points the contractor will require construction materials like gravels, sand, water etc. The extraction of construction materials (such as sand, gravel, and stone) often leads to overexploitation of natural resources. This can deplete local reserves and create long-term sustainability challenges for communities relying on these resources. Also, the removal of vegetation during resource extraction can increase soil erosion. This not only affects the immediate area but can also impact surrounding ecosystems, leading to sedimentation in waterways and further degradation of habitats.

v. Erosion of the topsoil and reservoir sedimentation

The removal of vegetation for construction activities and agricultural expansion can destabilize the soil, making it more susceptible to erosion by wind and water. Eroded soil and sediment can wash into reservoirs, leading to sediment accumulation. This can reduce the storage capacity of the reservoir, impacting its ability to store water for irrigation, drinking, and flood control.

Soil erosion results in increased sediment load in stream and rivers, leading to rapid siltation of water reservoirs. Thus, sediment yield prediction is important when dams are built for water impoundment. Further due to population increase, these activities are increasing and intensifying with time to the extent that during the rainy season sediments from those areas are carried into the dam from upstream areas. This may result in a reduction in the depth of the dam, quantity.

Operational Phase

vi. Damage to the dam and conveyance system due to effects of natural factors and processes

Natural factors like earthquakes and floods can cause dam failure. Extreme weather events can cause flooding, which may exceed the design capacity of the dam. Overtopping can erode dam structures and lead to failures, while increased water pressure can damage spillways and other components. High flow velocities during floods can cause erosion at the base of the dam or around spillways. This situation can undermine the dam's structural integrity and lead to potential failures.

vii. Risk to children's

Children are particularly vulnerable to various risks. The presence of open water bodies, such as reservoirs or newly constructed channels, can pose sinking risks for children, especially if proper safety measures are not in place. The recent incidence occurred 2023 whereby one person died by sinking into the dam while chasing the duck/waterfowl, since there is no any control or safety measures in place.

viii. Increased soil and water pollution downstream

Construction activities may also result into soil and water pollution by emissions, spillage or surface runoffs. Movement of vehicles and the use of machines at site may result in accidental oil spillage. Pollutants on the soil could be washed into the downstream with surface runoffs. Water pollution may also result from the ex-filtration from the workers constructed toilet pit, whereby nutrients and pathogens may be transported with subsurface flows into downstream water sources. Water pollution may result into serious health problems to downstream users. Examples of diseases caused by consumption of contaminated water include diarrhea, dysentery, cholera etc. The impact is considered to be negative, short term and of moderate significance.

ix. Reduced water quality due to pollution

During operation, the project is likely to have significant adverse effects on water quality

unless mitigated. The principal areas of concern are pesticides, fertilizers, and waste, both solid and liquid. Crop pests and diseases are serious problems in the catchment area at present and will become worse with the intensification of agriculture due to the availability of permanent water. Horticultural crops are at especial risk. In response, farmers will increase their use of pesticides for crop protection. Pesticide types, methods of application and associated practices such as cleaning equipment are such as to ensure multiple, frequent entry of pesticides and pesticide residues to water. Once in the water, the active ingredients of the various products will either be adsorbed onto soil particles, or break down at various rates or, if stable, will maintain their toxicity and move into the food chain. The proximity of the command area to the River and direct connections from the fields through the drainage system suggests that contaminants will find their way rapidly to River.

Availability of permanent water will intensify agriculture practices (Irrigation) and will result in a significant increase in the use of fertilizers due to

- The use of improved seeds and crop varieties which require and respond to high nutrient levels
- Increased ability of farmers to purchase inputs, and
- A possible reduction in soil fertility if flooding and livestock are controlled (less silt, less scattered manure). Crops vary in their ability to take up nutrients from fertilizers according to growth stage, soil conditions, temperature etc., and is inevitable that a significant proportion of the nutrients in the fertilizers will be removed from fields in soluble form in drainage waters.

x. Emergency of Water Conflicts

As populations grow and economies develop, the demand for water for various purposes, including agriculture, and domestic use, increases. Rehabilitation of Ntoba and Utwigu dam will attract number of people to invest in irrigation activities. Agriculture, especially irrigation, is a major consumer of water, and competition for water resources for irrigation can lead to conflicts. Upstream farmers may overuse water, leaving downstream users with shortages. Conflicts may arise between traditional smallholder farmers and modern irrigation schemes.

xi. Alteration of Water Flow and Ecosystems

Rehabilitation may modify the flow of water downstream, affecting riverine ecosystems, wetlands, and floodplains. The changing flow patterns can negatively impact aquatic species that depend on specific water levels and conditions. Fish migration, for example, may be interrupted by altered flow rates or blocked paths. If water storage patterns change, the natural flooding of floodplains, which provides critical habitat for many species, may be reduced.

xii. Population Influx

As the rehabilitation improves water access, nearby communities may grow in size, attracting people from other areas. Both urban and rural populations could expand, putting pressure on the available water resources. With an influx of people, competition for water especially for irrigation and domestic use may intensify. Local communities, farmers, and new settlers could clash over who gets priority access to water.

xiii. Impacts on Aquatic and Terrestrial Ecosystems

High levels of nitrogen and phosphorus from agricultural runoff can lead to eutrophication, causing: Algal blooms that deplete oxygen levels in the water, Mass die-offs of fish and other aquatic organisms due to oxygen depletion (hypoxia), Disruption of aquatic food chains as some species thrive while others decline. Overuse of Fertilizers leads to soil acidification and nutrient imbalances, reducing agricultural productivity in the long term. Also pesticide residues in Soil can kill beneficial soil organisms, reducing biodiversity and natural pest control. Increased Soil Erosion leads to loss of vegetation due to herbicide overuse can make land more vulnerable to erosion.

xiv. Lack of Water Budgeting for Onsite Activities

Without proper budgeting, water shortages can lead to wilting crops, lower productivity, and reduced food supply. Conflicts between Farmers and Other Water Users: When water is insufficient, farmers may compete with other users (e.g., livestock owners, domestic users), leading to disputes and social tensions. Over extraction of Groundwater: Farmers may resort to excessive groundwater pumping, leading to depletion and long-term sustainability issues. Livestock require consistent water supply; lack of budgeting can lead to dehydration, reduced milk/meat production, and increased animal deaths.

xv. Risk of Dam Damage Due to Flooding

Flooding poses a significant risk to dam structures, potentially leading to catastrophic failures with severe environmental, economic, and social consequences. The risk of dam damage due to flooding can result from excessive water inflow, poor design, lack of maintenance, and climate change impacts. A breached dam can unleash massive floodwaters, destroying downstream settlements, infrastructure, and farmland. Destruction of Ecosystems: Floodwaters can wash away vegetation, wildlife habitats, and aquatic ecosystems. Water Pollution: Floods can carry sediments, chemicals, and waste, contaminating water sources. Flooded fields can result in crop destruction and soil erosion, affecting food security.

xvi. Spread of Diseases

The dam may create stagnant water pools, which serve as breeding grounds for disease-carrying vectors like mosquitoes (leading to malaria and dengue fever). Also Poor sanitation and contamination of water sources during and after rehabilitation can lead to diseases such as cholera, typhoid, and dysentery. On the other hand the improved water supply might lead to an influx of people, straining sanitation infrastructure and increasing disease transmission

64 Analysis of Alternatives

In the EIA process, it is important to consider different alternatives or options, which will achieve the project's objectives. It is also important to include a consideration of what would happen without the project– that is the no-project alternative. Environmental assessment for each alternative is also carried out, since each alternative is likely to have a different set, or degree, of impact. In this EIA consultations with stakeholders and site visits provided the basis for identifying alternatives. The following types of alternatives are presented for consideration:

• No Project Alternative

The no-project alternative entails retaining the current status quo without a rehabilitation of Ntoba and Utwigu dam, drilling of borehole, construction of livestock watering points and dipping points etc. Adopting this option would mean avoiding most of the negative impacts associated with the project and missing all the positive benefits. Therefore, adopting a no-project alternative would mean failure to implement the climate change adaptation program hence imposing more impacts to the community.

• Alternative Site

Alternative site means that, the project not to be implemented in the proposed site ie Ntoba and Utwigu village, and subjected to new site. Given the nature, timeframe and objectives of the project, the SWAHAT project settled at Ntoba and Utwigu as the most feasible site. The alternative site would have been identifying a separate land parcel for the construction of dam and associated facilities. The cost of the identified land might make the project unviable. The site is the most logical and convenient because there is already an existing dam. Furthermore, the search for an alternative site would imply an increase in the expenditure, time and costs for the project implementing entity. Therefore, we discard this option.

6.5 Sustainability of the Project

Project sustainability refers to the ability of a project to maintain and continue its benefits and positive impacts over time, beyond the period of initial implementation and funding. A range of factors can influence the sustainability of development projects. Elements that increase the likelihood of sustaining the proposed project include

- Project design and implementation;
- The implementing entity
- Political will and
- Broader community integration.

Self-contained projects are less likely to be sustained than projects that are well integrated with existing systems. The primary idea of the SWAHAT project emerged from the semi-arid community members. Drought and water scarcity are adaptation challenges most pressing in their livelihoods. A solution to these problems will translate into multifaceted benefits.

Based on this, the project is designed to have full support from the communities and their respective local governments which will create and enhance ownership of project, as the SWAHAT team builds on their original idea and they (as beneficiaries) will be put at the centre of participation during identification, designing, implementation, monitoring and evaluation of all interventions.

The project is in line with the Government of Tanzania development agenda. It aligns with most of Government's policies and strategies. This project will therefore be included in governments' plans and interventions. The sustainability plan for SWAHAT Project is as follows:-

6.5.1 Social sustainability

The project was identified through participatory processes that involved assessing climate risks and adaptation priorities in the target communities. Stakeholders engaged include District departments, village authorities, environmental committees, schools, traditional leaders, and local NGOs. This inclusive approach has fostered community ownership and embedded the project into the social fabric of the area.

Key elements of social sustainability include:

- Community-led planning, implementation, and monitoring.
- Alignment with the Adaptation Fund's social and environmental safeguards.
- Empowerment of marginalized groups to ensure equity in benefits.
- Long-term community motivation to maintain project infrastructure.

These efforts ensure that once project funding ends, community-driven structures and motivations will sustain the interventions.

6.5.2 Institutional sustainability

The project will be implemented through existing government and community institutional structures. District Councils, village governments, and other local institutions will actively participate in planning and execution. Importantly, the project will leverage:

- Local knowledge systems and indigenous adaptation strategies.
- Institutional learning from other climate resilience programs.
- Government expertise to support technical and administrative functions.

Project assets such as dams, irrigation canals, tree nurseries, and fishponds will be formally handed over to local authorities and community institutions. This approach ensures:

- Institutional continuity and responsibility.
- Sustained technical support from the government.
- Integration of the project into long-term district development plans.

6.5.3 Technical sustainability

Technical sustainability will be achieved through:

- Engagement of District extension officers and subject matter specialists in all phases.
- Capacity building across project components to enhance the skills of local staff.
- On-the-job training and hands-on demonstrations for community members.
- Documentation and dissemination of best practices for scaling in other areas.

The project's participatory design will ensure that local farmers, technicians, and water user groups acquire practical skills in dam maintenance, soil and water conservation, and integrated farming systems.

6.5.4 Financial sustainability

Another important ingredient for sustainability is the income generation aspect attached to the project. Farmers are always sensitive in venturing into practical interventions that does not give them returns within a short time (in terms of income/ food). The proposed integrated technologies for crops, fishery, livestock, fruits, vegetables and forestry activities are designed in such a way that there is short term but sustainable income generation from the investment. This will motivate project and non-project farmers to adopt the interventions and hence a sustainability window. Community mobilization and awareness interventions will help them to organize financial mobilization that will contribute in financing management of the project investments after project ends. In addition to the financing from the community, local and central governments are expected to mainstream these interventions into their respective development plans and budgeting.

6.5.5 Environmental sustainability

The project includes several interventions aimed at safeguarding and restoring the local environment, such as:

- Reforestation using locally adapted species to restore vegetation and reduce erosion.
- Protection and management of dam catchment areas through vegetation cover maintenance.
- Promotion of renewable energy sources (e.g., solar power) and fuel-efficient stoves to reduce biomass dependency.
- Environmentally sustainable farming practices including composting, water reuse, and nutrient cycling to reduce pollution.

These actions will ensure long-term resilience of ecosystems, improve microclimates, and support biodiversity in the project area.

6.5.6 Measures to Ensure Post-Project Sustainability

To further guarantee sustainability during and after project completion, the following measures will be put in place:

- Full community participation, ensuring local ownership and responsibility.
- Early and ongoing involvement of Local Government Authorities to facilitate project integration into official plans.
- Establishment of a Water Users Committee to oversee dam management, trained in governance, budgeting, and resource mobilization.
- Continuous technical training for farmers and youth on water harvesting system management.
- Income from the project's productive components will be partially reinvested in maintenance and future improvements.
- Strengthened institutional linkages between community groups and district-level planning and funding frameworks.

7 CHAPTER SEVEN: IMPACTS MITIGATION MEASURES

7.1 Introduction

This section outlines strategies and measures to minimize, avoid, or counteract the potential negative impacts of a proposed project on the environment and surrounding communities. This chapter helps ensure that the project adheres to environmental regulations and standards while reducing harm to ecosystems, human health, and the socio-economic fabric of the area. The developer is committed to the implementation of mitigation measures contained in this report. Table 7-1 presents mitigation measures for the outlined impacts.

Table 7-1: Mitigation measures for the identified Impacts

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
Mobilization &Pre-construction	Loss of vegetation and fauna habitat	• Clearing of vegetation shall be as minimal as possible so as to avoid much destruction of this natural, unique and small ecosystem. • The Contractor shall clearly mark out the extent of clearing within the approved worksite and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas. • The implementing entity shall help to afforest the area when the rehabilitation/construction work is complete. • The plant species include the endemic ones which will be cut down in the project site and their stock shall be reserved in the upstream and downstream area • Carry out risk assessment during implementation of the project • Carry out selective clearance or removal of trees in the area designated for agricultural sites. • Offsets through planting of trees in the degraded land sites is bigger than the cleared sites in each project community
	Deterioration/impairment of local air quality	• Water sprinkling at the project area to minimize dust emission • Use of properly maintained equipment, Use of fuels and lubricants of approved quality

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
		• Routine inspection and maintenance of combustion emission sources (such as generators, diesel engines, equipment's). • No vehicles or equipment to be used that generates excessive black smoke. • Maintenance will ensure that equipment is operating efficiently and is not producing excessive emissions. Where practical, contractors will inspect machines and vehicles on delivery. • Moreover, contractors will enforce vehicle load restrictions to avoid excess emissions from engine overloading.
Construction Phase	pollution Nuisance and disturbance on/offsite receptors from noise pollution	• The contractor and project proponent shall ensure all machinery and vehicles are fitted with appropriate mufflers, and that all mufflers and acoustic treatments are in good working order. • All workers should be provided with protective equipment PPEs • Also shall ensure all machinery and vehicles are regularly maintained and broken parts are replaced immediately. • The contract shall ensure machinery and vehicles are operated efficiently and according to the manufacturers specifications, by trained and qualified operators; and development and implementation of appropriate safety measures

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
	Depletion /degradation at points of sources of construction materials	• Construction materials will be from the authorized source only. These authorized dealers should have license from the Ministry of Energy and Minerals. • Also restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will done in association with local government and local environmental NGOs.
	Noise Pollution	• Working hours and rules will be established based on the needs to reduce the noise causing nuisance and disturbance, especially by avoiding the cumulative effect of increased noise due to simultaneous operation of different kinds of construction machinery and equipment. • Best practice procedures will be implemented in order to reduce construction noise. • Also all equipment will be properly maintained, silenced where appropriate and operated to prevent excessive noise and switched off when not in use
	Increased soil and water pollution downstream	• Good house-keeping shall be practiced within material storage compounds or vehicle maintenance yards where the possibility of spillage is great. • Capacity building to promote integrated soil conservation practices • Minimize soil disturbances by machines during dam construction • Forests and fruit tree planting

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
Construction Phase		• Reduction of use of fertilizers and pesticides will minimize pollution and associated components of semi arid landscapes such as rivers, and ponds. • Vertiver grasses may be used to control areas prone to erosion. • Silt fences may be used to reduce suspended solids from surface water runoff. • Regular water quality monitoring at the down stream
	Damage to the dam and conveyance system due to effects of natural factors and processes	• The engineering design and construction of the dam shall ensure that the dam and conveyance system can withstand normal natural processes. The engineering design and construction shall ensure minimal disturbance to the natural terrain of the area. The hills upstream shall be left to act as natural barriers to contain the water in the project site. This will ensure that some parts of the project area will remain undisturbed to maintain natural scenery. The spillway shall be properly designed to ensure that the dam capacity is not exceeded.
	Sediment loads transported into the dam and degradation of water quality	• The natural vegetation in the sides/neighborhoods of the project area shall be conserved whenever possible to minimize soil erosion. • Compaction of embankments shall be done to meet the recommended compaction in the design. • Also the project proponent will plant tree around dam boundaries to compensate on tree losses as well as to

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
Construction Phase		minimize wind which is one of the factors for excessive evaporation and control erosion
	Danger of people drowning either accidentally or intentionally looms within the dam	Awareness raising and education to the communities including posting banners and warning signs at appropriate places shall be provided to advice farmers/villagers on proper use of the dam and by laws shall be enacted to protect the dam from those who would have wanted to use it carelessly.
	Spread of Diseases	- Drain or fill stagnant water around construction sites to reduce mosquito breeding - Ensure access to safe drinking water and promote hygiene education - Train workers and local communities on hygiene, disease prevention, and safe sex practices - Distribute personal protective equipment (PPE)
	Soil Erosion	- Install barriers to prevent soil from being washed into water bodies. - Schedule major earthworks during dry seasons to minimize erosion risks.

Operation Phase	Improved Agriculture	• Implementation of the proposed project will induce a commercially sustainable agriculture for improved income level for the household, and thus help in poverty reduction, which is the core socioeconomic problem in the area. • Poverty is to be reduced through provision of reliable water, which apart from creating the condition for more production and intensification will also reduce the high risk in agricultural production
	Potential unsustainable use of water and pesticides	• Compliance with environmental laws • Integrated soil fertility and pest management • Resource use efficiency by recycling wastewater from aquaculture into model vegetable gardens • Water User Association will be set up at community level to be able to control sources of irrigation, quantity and volume of water use on irrigation. • Routine check on water sources during project implementation should be enforced by water use authority

	Potential gender inequality in project participation	• The project is committed to ensure 50% participation of women in most project components. In this respect, • Project activities in all components have to be gender sensitive and to empower women. • All project staff will be trained in gender- sensitive approaches. • Incorporate gender sensitive approaches into training, workshops and awareness raising activities. • Mechanisms for selection of beneficiaries will be gender-sensitive to ensure equal participation of men and women taking into consideration different needs. • Develop capacity building for women empowerment and continued monitoring and support of their involvement in the community
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Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
Operation Phase	Opportunities for skills acquisition	• This impact is high and of great importance and therefore it will be enhanced by ensuring there is skill transfer through an elaborate programme. • Staff will be categorized and each group will be supervised by dedicated skilled personnel to ensure on job training. • The proponent will encourage job on training through observation and trial under supervision
	Benefit to local producers and suppliers of goods and services	• Wherever possible the project will procure materials from local sources. The use of locally available materials and labour for the proposed rehabilitation of dam and construction of associated facilities will contribute towards growth of the economy by contributing to the gross domestic product.
	Lack of Water Budgeting for Onsite Activities	• Encourage drip irrigation and rainwater harvesting to reduce wastage. • Train farmers on water-saving techniques like mulching and soil moisture retention. • Encourage drip irrigation and rainwater harvesting to reduce wastage. • Train farmers on water-saving techniques like mulching and soil moisture retention.
	Impacts on Aquatic and Terrestrial Ecosystems	• Promote integrated pest management to reduce reliance on chemical pesticides. • Encourage organic farming and the use of natural fertilizers like compost and manure. • Train farmers on the proper application and timing of fertilizers and pesticides to minimize runoff • Educate farmers on the dangers of agrochemical use.

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
Decommissioning	Occupational health and public safety hazards	• All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise. • A comprehensive contingency plan will be prepared before demolition begins, on accident response. • Adherence to safety procedures will be enforced at all stages of the exercise. • All workers, pursuant to labor laws, shall be accordingly insured against accidents. • All workers will be provided and instructed to wear protective clothing during demolition, including helmets. • Demolition work will be limited to daytime only avoid workers accidents due to poor visibility.
	Noise Pollution	• During decommissioning the contractor will coordinate activities that produce the most noise levels and portable barriers will be installed to shield compressors. • Use of equipment designed with noise control elements will be adopted where necessary. • Use of very noisy equipment will be limited to daytime only. • All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. • The demolition exercise will be limited at day time only.
	Loss of employments	• The only major impact that will result when the project is decommissioned is loss of jobs.

Project Phase	Potential Environmental Impact	Mitigation/Enhancement Actions
		Also will prepare workers for forced retirement by providing skills for self-employment, wise investment and will provide relevant skills to workers through on job training to make them marketable after decommission.
	Decline in agricultural production	Demolition of dam, Bore hole will lead to insufficient water supply hence other sources of water must be identified
	Ground Contamination by hydrocarbons and chemical	- Use designated area for refueling and servicing - Storage facility for hydrocarbon must well-kept in bounded wall - Train work force on hydrocarbon/chemical spill prevention and management - Any heavy equipment will be supplied with spill kits.
	Produce areas of bare soil which cause erosion, siltation changes in natural water flow and damage to aquatic ecosystems	Tree and grass planting to reduce soil erosion

Source Consultant 2024

8 CHAPTER EIGHT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Introduction

The Environmental and Social Management Plan (ESMP) presents the implementation schedule of the proposed mitigation measures to both environmental and social impacts as well as planning for long-term monitoring activities. For the proposed rehabilitation of Ntoba and Utwigu dam and installation of associated facilities, the ESMP is given in Table 8-1. The ESMP also includes the associated environmental costs needed to implement the recommended mitigation measures. Additional recommendations are provided in ESMP to enable the facilities to be more environmentally friendly. The implementation steps will involve the contractor, project implementing entity, District Councils, Water basin board, users, and the local communities at large.

8.2 Implementation of the ESMP

SUA as proponent shall be the main implementer of the ESMP through other organs. The environmental measures incorporated in engineering design will be attached to the Bills of Quantities and Contract Documents. In order to ensure the sound development and effective implementation of the ESMP, it will be necessary to identify and define the responsibilities and authority of the various persons and organizations that will be involved in the project. The following entities will be involved in the implementation of this ESMP:

- Funding Institutions
- Sokoine University of Agriculture.
- Consultants.
- Contractor.
- The National Environmental Management Council (NEMC).

Table 8-1: Environmental and Social Management Plan

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
Mobilization &Pre-construction	Loss of vegetation and fauna habitat	- Clearing of vegetation shall be as minimal as possible so as to avoid much destruction of this natural, unique and small ecosystem. - The Contractor shall clearly mark out the extent of clearing within the approved work-site and instruct all construction workers to restrict clearing to the marked areas and not to work outside defined work areas. - The implementing entity shall help to afforest ate the area when the rehabilitation/construction work is complete. - The plant species including the endemic ones which will be cut down in the project site and their stock shall be reserved in the upstream and downstream area	SUA Contractor &	4,000,000
	Deterioration/impairment of local air quality	Water sprinkling at the project area to minimize dust emission	SUA Contractor &	10,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		• Use of properly maintained equipment, Use of fuels and lubricants of approved quality • Routine inspection and maintenance of combustion emission sources (such as generators, diesel engines, equipment's). • No vehicles or equipment to be used that generates excessive black smoke. • Maintenance will ensure that equipment is operating efficiently and is not producing excessive emissions. Where practical, contractors will inspect machines and vehicles on delivery. • Moreover, contractors will enforce vehicle load restrictions to avoid excess emissions from engine overloading.		
Construction Phase	pollution Nuisance and disturbance on/offsite receptors from noise pollution	• The contractor and project proponent shall ensure all machinery and vehicles are fitted with appropriate mufflers, and that all mufflers and acoustic	SUA Contractor &	3,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		treatments are in good working order. • All workers should be provided with protective equipment PPEs • Also shall ensure all machinery and vehicles are regularly maintained and broken parts are replaced immediately. • The contract shall ensure machinery and vehicles are operated efficiently and according to the manufacturers specifications, by trained and qualified operators; and development and implementation of appropriate safety measures		
	Depletion /degradation at points of source of construction materials	• Construction materials will be from the authorized source only. These authorized dealers should have license from the Ministry of Energy and Minerals. • Also restoration of the borrow pits/quarries after use constituting leveling the area and seeding or planting of trees and/or grasses will done in	SUA & Contractor	4,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		association with local government and local environmental NGOs.		
	Noise Pollution	- Working hours and rules will be established based on the needs to reduce the noise causing nuisance and disturbance, especially by avoiding the cumulative effect of increased noise due to simultaneous operation of different kinds of construction machinery and equipment. - All workers must be provided with PPEs - Best practice procedures will be implemented in order to reduce construction noise. - Also all equipment will be properly maintained, silenced where appropriate and operated to prevent excessive noise and switched off when not in use	SUA Contractor &	3,000,000
	Increased soil and water pollution downstream	Good house-keeping shall be practiced within material storage compounds or vehicle	SUA Contractor &	6,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		maintenance yards where the possibility of spillage is great. • Capacity building to promote integrated soil conservation practices • Minimize soil disturbances by machines during dam construction • Forests and fruit tree planting. • Vertiver grasses may be used to control areas prone to erosion. • Silt fences may be used to reduce suspended solids from surface water runoff. • Regular water quality monitoring at the down stream		
	Damage to the dam and conveyance system due to effects of natural factors and processes	• The engineering design and construction of the dam shall ensure that the dam and conveyance system can withstand normal natural processes. • The engineering design and construction shall ensure minimal disturbance to the natural terrain of the area.	SUA Contractor &	15,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		- The hills upstream shall be left to act as natural barriers to contain the water in the project site. This will ensure that some parts of the project area will remain undisturbed to maintain natural scenery. - The spillway shall be properly designed to ensure that the dam capacity is not exceeded.		
	Sediment loads transported into the dam and degradation of water quality	- The natural vegetation in the sides/neighborhoods of the project area shall be conserved whenever possible to minimize soil erosion. - Compaction of embankments shall be done to meet the recommended compaction in the design. - Also the project proponent will plant tree around dam boundaries to compensate on tree losses as well as to minimize wind which is one of the factors for excessive evaporation and control erosion	SUA & Contractor	8,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
	Danger of people drowning either accidentally or intentionally looms within the dam	Awareness raising and education to the communities including posting banners and warning signs at appropriate places shall be provided to advice farmers/villagers on proper use of the dam and by laws shall be enacted to protect the dam from those who would have wanted to use it carelessly.	SUA & Contractor	3,000,000
	Soil Erosion	- Install barriers to prevent soil from being washed into water bodies. - Schedule major earthworks during dry seasons to minimize erosion risks.	SUA	1,000,000
	Spread of diseases During Dam Construction	- Drain or fill stagnant water around construction sites to reduce mosquito breeding - Ensure access to safe drinking water and promote hygiene education - Train workers and local communities on hygiene, disease prevention, and safe sex practices - Distribute personal protective	SUA	2,000,000

		equipment (PPE)		
Operation Phase	Improved Agriculture	• Smart agriculture, sustainable water use, use of environmental friend agrochemicals. Etc. • Train farmers on modern farming techniques, pest control, and fertilizer application • Use organic matter and conservation tillage to maintain soil fertility. • Provide market linkages to connect farmers with buyers and value chains.	SUA	2,000,000
	Risk of Dam Damage Due to Flooding	• Increase spillway capacity to handle extreme flood events. • Implement early warning systems for heavy rainfall and rising reservoir levels • Conduct regular dam inspections and strengthen weak points. • Use erosion-resistant materials to reinforce embankments.	SUA	1,500,000
	Lack of Water Budgeting for Onsite Activities	• Encourage drip irrigation and rainwater harvesting to reduce wastage. • Train farmers on water-saving techniques like mulching and soil moisture retention. • Encourage drip irrigation and	SUA	500,000

		rainwater harvesting to reduce wastage. • Train farmers on water-saving techniques like mulching and soil moisture retention.		
	Impacts on Aquatic and Terrestrial Ecosystems	• Promote integrated pest management (IPM) to reduce reliance on chemical pesticides. • Encourage organic farming and the use of natural fertilizers like compost and manure. • Train farmers on the proper application and timing of fertilizers and pesticides to minimize runoff • Educate farmers and local communities on the dangers of excessive agrochemical use.	SUA	1,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
	Potential unsustainable use of water and pesticides	• Compliance with environmental laws • Integrated soil fertility and pest management • Resource use efficiency by recycling wastewater from aquaculture into model vegetable gardens • Water User Association will be set up at community level to be able to control sources of irrigation, quantity and volume of water use on irrigation. • Routine check on water sources during project implementation should be enforced by water use authority	SUA	2,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
	Potential gender inequality in project participation	• The project is committed to ensure 50% participation of women in most project components. In this respect, • Project activities in all components have to be gender sensitive and to empower women. • All project staff will be trained in gender- sensitive approaches. • Incorporate gender sensitive approaches into training, workshops and awareness raising activities. • Mechanisms for selection of beneficiaries will be gender-sensitive to ensure equal participation of men and women taking into consideration different needs. • Develop capacity building for women empowerment and continued monitoring and support of their involvement in the community	SUA	5,000,000

	Soil Erosion	• Build temporary drainage systems to manage water runoff and reduce erosion. • Use contour plowing or terracing to reduce runoff speed on slopes. • Educate nearby communities on soil conservation practices and regulate land use around the dam. • Implement sediment flushing or dredging techniques to manage silt buildup.	SUA	1,500,000
	Opportunities for skills acquisition	• This impact is high and of great • importance and therefore it will	SUA	1,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		be enhanced by ensuring there is skill transfer through an elaborate programme. • Staff will be categorized and each group will be supervised by dedicated skilled personnel to ensure on job training. • The proponent will encourage job on training through observation and trial under supervision		
	Benefit to local producers and suppliers of goods and services	• Where ever possible the project will procure materials from local sources. • The use of locally available materials and labour for the proposed rehabilitation of dam and construction of associated facilities will contribute towards growth of the economy by contributing to the gross domestic product.	SUA	1,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
Decommissioning	Occupational health and public safety hazards	- All workers will be sensitized before the exercise begins, on how to control accidents related to the demolition exercise. - A comprehensive contingency plan will be prepared before demolition begins, on accident response. - Adherence to safety procedures will be enforced at all stages of the exercise. - All workers, pursuant to labor laws, shall be accordingly insured against accidents. - All workers will be provided and instructed to wear protective clothing during demolition, including helmets. - Demolition work will be limited to daytime only avoid workers accidents due to poor visibility.	SUA Contractor &	5,000,000
	Noise Pollution	During decommissioning the contractor will coordinate activities that produce the most noise levels and portable barriers will be installed to shield compressors.	SUA Contractor &	3,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
		• Use of equipment designed with noise control elements will be adopted where necessary. • Use of very noisy equipment will be limited to daytime only. • All workers operating in noisy areas or operating noisy equipment will be provided with earpieces to protect against extreme noise. • The demolition exercise will be limited at day time only.		
	Loss of employments	• The only major impact that will result when the project is decommissioned is loss of jobs. • Also will prepare workers for forced retirement by providing skills for self-employment, wise investment and will provide relevant skills to workers through on job training to make them marketable after decommission.	SUA & Contractor	4,000,000
	Decline in agricultural production	• Demolition of dam, bore hole will lead to insufficient water supply hence other sources of water must be identified	SUA & Contractor	5,000,000

Project Phase	Environmental Impact	Mitigation/Enhancement Actions	Responsible Institution	Cost/ Year (Tsh)
	Ground Contamination by hydrocarbons and chemical	• Use designated area for refueling and servicing • Train work force on hydrocarbon/chemical spill prevention and management • Any heavy equipment will be supplied with spill kits.	SUA Contractor &	5,000,000
	Produce areas of bare soil which cause erosion, siltation changes in natural water flow and damage to aquatic ecosystems	• Tree and grass planting to reduce soil erosion	SUA Contractor &	3,000,000
TOTAL MANAGEMENT COST				96,000,000

Source: Consultant 2024

9 CHAPTER NINE: ENVIRONMENTAL MONITORING PLAN

9.1 Introduction

The correct and successful implementation of impact mitigation measures to reduce adverse impacts on environmental conditions needs to be ensured by a proper monitoring Programme. This chapter presents the Environmental and social monitoring plan (EMP) that will be carried out throughout the project implementation to mitigate the impacts and enhance the benefits of the project. The EMP outlines the specific actions that shall be undertaken to ensure that the Project complies with all applicable laws and regulations related to environmental impacts and impact mitigation. The EMP deals with all mitigation required for the physical, biological and socio-economic impacts and focuses on the impacts of higher significance as provided in table 8.1 above.

9.2 Objectives of EMP

The EMP applies to, and will be implemented throughout, all phases of the project: mobilization, operation, and decommissioning. The objective of the EMP is to set out clearly the key components of environmental and socio-economic management for the proposed project and thereby ensure that the following concepts are realized throughout the mobilization, construction, operation, and decommissioning.

- Negative impacts on the physical, biological and socio-economic environments are mitigated.
- Benefits that will arise from the development of the proposed project are enhanced;
- Support smooth implementation of project with minimum losses to environmental and social infrastructure;
- Compliance which is guided by national, international laws, standards and guidelines e.g. Effluents standards, noise level standards, occupational and safety standards etc and best practice is achieved; and
- Good will and good relations with communities, and governments at local and national levels are maintained.

9.3 Monitoring responsibility

Implementation of the EMP is the solely the responsibility of the project proponent. SUA shall supervise and monitor components of the monitoring plan and keep record of monitoring outcome. NEMC has the ability to provide the necessary supervisory oversight to ensure the mitigation measures are working and where they are not remedial measures are established. SUA is committed to protect and will enhance the environment.

Detailed parameters to be monitored have been considered along with the institution responsible (s). The SUA will endeavor to ensure that resources are available to implement the EMP throughout all phases of project development and decommissioning. The EMP will be subject to the principle of continuous improvement.

The details of environmental issues, environmental impacts, and proposed parameter to be monitored and timing agencies responsible for execution of proposed actions during mobilization, construction, operation and decommissioning stages are presented in Table 9-1 below.

Table 9-1: Environmental Monitoring Plan

Project Phase	Impact	Parameter	Frequency	Units	Target	Responsible Institution	Cost/ (Tsh)	Year
Mobilization phase	Deterioration of local air quality	SO ₂ , NO ₂ , PM ₁₀ ,	Once per Month	Mg/l ppm	Acceptable TBS Standards	SUA Contractor &	5,000,000	
Construction Phase	pollution Nuisance and disturbance on/offsite receptors from noise pollution	Noise level	Once per Month	dBA	shall not exceed 75 dB(A)(peak readings), day time	SUA Contractor &	3,000,000	
	Depletion /degradation at points of source of construction materials	Documentation on resource procurement practices	Monthly	Affected resource	No degradation of local resources, no complaints from local people	SUA Contractor &	4,000,000	
	Noise Pollution	Noise levels, sound	Monthly	dBA	shall not exceed	SUA Contractor &	3,000,000	

Project Phase	Impact	Parameter	Frequency	Units	Target	Responsible Institution	Cost/ Year (Tsh)
		abatement measures in place			75dB(A) daytime or 55dB(A) at night		
	Increased soil and water pollution downstream	Fuel and hazardous material storage areas, plant, machinery, re-fuelling & delivery area	Monthly Inspection	mg/l	Less contamination level as per TBS standards	SUA & Contractor	6,000,000
	Damage to the dam and conveyance system due to effects of natural factors and processes	Strengths of the dam embankments	Once after quarterly		Construction as per design specification	SUA & Contractor	15,000,000
	Sediment loads transported into the dam and degradation of water quality	Water turbidity	Monthly	NTU	<25NTU	SUA & Contractor	8,000,000

Project Phase	Impact	Parameter	Frequency	Units	Target	Responsible Institution	Cost/ Year (Tsh)
	Danger of people drowning either accidentally or intentionally looms within the dam	Number of people drowning awareness program in place	Continuous	Number of Cases	Low risk to community, No exposure	SUA & Contractor	3,000,000
Operation Phase	Improved Agriculture	Rate of production	Quarterly	Tons produced	As maximum as possible	SUA	2,000,000
	Opportunities for skills acquisition	Number of Local people trained	Continuous during operation	Number of Local people employed	As maximum as possible	SUA	1,000,000
	Benefit to local producers and suppliers of goods and services	Procurement records	Monthly	Amount	As maximum as possible	SUA	1,000,000
	Air quality impairments	PM2.5, PM10 CO ₂ SO ₂ , NO _x , NO ₂ , NO		µg/m ³ ppm ppm ppm	Air Quality Standards Regulations 2007	SUA	2,000,000
	Water Quality	Electrical Conductivity pH, BOD, COD, DO, NO ₃ ⁻ , PO ₄ ³⁻ ,	After every 6 Months	µS/cm mg/L mg/L µg/L	Water Quality Standards) Regulations, 2007		2,000,000

		lead, Mercury, Pesticide Residues TDS, TSS Turbidity		µg/L mg/L NTU			
	Soil pollution	pH, Moisture content, Nitrogen (N) Salinity	After every 6 Months	pH Level % of moisture mg/L dS/m	Soil Quality Standards) Regulations, 2007.	SUA & Contractor	2,000,000
	Environmental quality improvement	Number of trees planted	After every 6 Months	Number	As maximum as possible	SUA & Ntoba and Utwigu Community	1,000,000
Decommissioning	Occupational health and public safety hazards	Registered worker Injury/ illness, Proper use of PPEs	Monthly	Number of injuries/inci dents	OSHA 2003, Low risk to workers, No exposure	SUA & Contractor	5,000,000
	Noise Pollution	Noise Level	Monthly	dBA	noise emissions	SUA & Contractor	3,000,000

Project Phase	Impact	Parameter	Frequency	Units	Target	Responsible Institution	Cost/ Year (Tsh)
					shall not exceed 75 dB(A)(peak readings), daytime or 55 dB(A) (peak readings) at night		
	Loss of employments	Pension fund remittance	Once/Year	Employees registered for pension fund	All workers	SUA & Contractor	4,000,000
	Decline in agricultural production	Production rate Availability of water	Quarterly	Tons produced	All Agriculturalists	SUA & Contractor	5,000,000
	Ground Contamination by hydrocarbons and chemical	Nitrate, Lead, Turbidity, DO, pH	Monthly	mg/l, NTU	As per TBS standards	SUA & Contractor	5,000,000
	Produce areas of bare soil which cause erosion, siltation	Erosion rate	Monthly	Size of the eroded land	No exposure to erosion	SUA & Contractor	3,000,000

Project Phase	Impact	Parameter	Frequency	Units	Target	Responsible Institution	Cost/Year (Tsh)
	changes in natural water flow and damage to aquatic ecosystems						
TOTAL MONITORING COSTS							83,000,000

Source Consultant 2024

10 CHAPTER TEN: COST BENEFITS ANALYSIS

10.1 Introduction

The cost-benefit analysis presents a brief comparison of environmental and social costs of implementing the proposed project versus benefits accrued from the project implementation. It is a clear fact that it is not possible to account for all the impacts accrued from the implementation of the project. This is because some of the impacts are direct while others are indirect; others are short-term while others are long-term, some of the impacts are site specific while others cross the boundaries of the project area to affect a much larger population, though it may not be necessarily a significant impact. Similarly, valuation of these impacts is more or less dictated by the social group biases tied to the environment to which the project has been subjected. Therefore, the methodology used in this cost benefit analysis, will be based on comparing between the following:

10.2 Financial Cost Benefit Analysis

Cost-benefit analysis is normally done in the framework of feasibility study of an activity. The aim of cost benefit analysis is to inform the project developer to make a decision on:

- Whether it makes economic sense to continue with the project;
- Whether the chosen option is a cost-effective alternative; and
- The estimate of the size of a project.

Generically the costs include:

- Capital expenditures
- Operating and maintenance costs;
- Staff costs;
- Materials and;
- Environment, health and other social costs.

Benefits may include:

- Better understanding of the target business;
- Accurate targeting of the resource;
- Potential for additional revenues generated from new resources;
- Protection of environment and health; and
- Provision of other social benefits.

SWAHAT has undertaken a feasibility study and has confirmed that the project is economically viable.

10.3 Non-Quantifiable Benefits

Social Benefits

- Improved livelihoods and resilience of the rural communities to climate change;
- Improved nutrition of local communities as a result of access to fruits and vegetables.
- Increased food security among community members.

- Reduction in drudgery for women and children from long-distance walk-in search of water;
- Increased number of people with knowledge on establishment, propagation and management of fruits and forest tree species;
- Reduced drudgery as a result of improved availability of fuel wood;
- Improved household livelihoods through adoption of diversified sources of incomes, food, and associated technologies;
- Enhanced efficiency in participation and contribution of women and other marginalized social groups in agriculture and local economy;
- Reduced health risks to human and animals as a result of minimum pesticide application;
- Increased farmers' resilience to climate change impacts through adoption of IPM technologies for controlling emerging pests and diseases;
- Increased understanding on selection of suitable germ plasm of selected forest and fruit trees for Adaptation and resilience;
- Improved knowledge of farmers on fish farming practices;
- Increased innovations options for resilience and adaptation to climate change;
- Increased knowledge on types of technologies and status of adoption in crops, poultry and livestock production.

Economic benefits

- Increased employment opportunities resulting from fruits and forestry venture;
- Sustained and resilient crop yields in dry years where conventional agriculture approaches would have limited success;
- Increased business opportunities through sales of timber and non-timber forest products;
- Increased alternative sources of income generation from sales of fruits and forest tree seedlings from nurseries;
- Reduced post-harvest losses of horticultural crops through increased knowledge on postharvest handling;
- Increased income diversification from crops, livestock, fish, and forest products leading to increased household financial flow and stability to cope with hardships (hunger, floods, and drought);
- Improved financial savings costs that would have been incurred to purchase pesticides;
- Increased knowledge of farmers on production value chain of vegetables, fish, apiculture, forests and fruit trees;
- Improved crop and livestock productivity through adoption of economically feasible pest management options;
- The wages received by workers (temporal and permanent during construction phase) that will help them improving their living standards and socio-economic wellbeing;

- Revenues to the local government and District at large through taxes and sales of the various agricultural products.

Environmental benefits

- Vegetation restoration- the areas that are affected by floods, drought will be restored through planting of fruit and forest trees. At least 100,000 trees will be planted during the project implementation. The local government and communities will be capacitated to continue production of seedlings and planting after the project;
- Reduced land degradation- Vegetation restoration through tree planting and restoration of vegetation cover will ultimately lead to reduced land degradation caused by surface run off and floods;
- Habitat restoration- Vegetation restoration will harbor more flora and fauna organisms that had migrated due to unfavorable conditions. Hence, habitat restoration will lead to improved ecosystem resilience;
- Resilience to Climate Change Impacts- through vegetation and habitat restoration, which consequently reduce land degradation, the natural resilience of the environment to climate change effects, will be increased while also reducing biodiversity loss;
- Increased water availability for enhanced resilience and productivity of agro-ecosystems goods and services;
- Improved water use efficiency for farming and livestock needs by the community;
- Reduced use of pesticides in crop and livestock production which contributes to environmental degradation;
- Improved pollination through apiculture integration;
- Increased knowledge on protecting catchment areas, water storage capacity, and reduced siltation rates;
- Increased knowledge on water use rights, governance and skills on water resource management;
- Increased knowledge on environmental awareness, adaptation to climate change and resilience.

10.4 Quantifiable Cost

- **Tangible Costs**

The project investment cost is estimated to be \$ 125,546 which is equivalent to 340,385,995.71 TZS, the budget covers construction and installation of all facilities. The project costs will include costs for site preparation; excavation activities; re-installation of dykes and construction of spillways; installation of boreholes; health and safety activities etc. While the ESMP costs about 96,000,000 TZS and monitoring costs about 83,000,000 TZS.

- **Intangible costs**

Restriction of Land Use and Land Rights: Easement of the land where the proposed water harvesting dams, irrigation schemes, nurseries will be constructed will result in longterm changes in the way that piece of land can be used.

Negative environmental effects within the project site such as impacts on surface water, terrestrial ecosystem, occupational health and safety, and visual impacts result on indirect costs.

10.5 Environmental Cost and Benefit Analysis

Environmental cost benefit analysis is assessed in terms of the negative and positive impacts. Furthermore, the analysis considers whether the impacts are mitigatable and the costs of mitigating the impacts are reasonable.

As it has been mentioned in Chapters 6 – 9, the potential benefits of the project, in terms of environmental, financial and social benefit are substantial. The environmental impacts identified are reasonably mitigatable and the financial resources needed to mitigate negative impacts, when compared to the required investment are relatively small. Most importantly the project will create resilience and adaptation to climate change impacts which are real and whereas these benefits are intangible and crosscutting to the nation and the world at large.

11 CHAPTER ELEVEN: DECOMMISSIONING CONCEPTUAL PLAN

11.1 Introduction

The project implementation which entails the Installation and rehabilitation of community water harvesting facilities integrating agriculture, livestock, tree planting and aquaculture is considered as a sustainable long-term investment which emphasizes adaptation and resilience.

Thereby the design life of the project cannot be ascertained. However, in cases of unforeseen events such as disasters caused by extreme weather conditions that might lead to destruction of the project infrastructures the following scenarios might be deployed:

- Major rehabilitation or upgrading of project structures.
- Development of a completely new project at the project site.

Therefore, the post-design life is expected to involve rehabilitation, upgrading, and modernization of the facilities, with a possible expansion (retrofitting and addition of new technology). As a result, impacts from decommissioning are not expected to arise in the near future unless retrofitting and upgrading of the facilities were not feasible. The following are some of the key forces for the decommissioning plan.

- **Structural Integrity Issues**

Over time, dam infrastructure deteriorates due to natural wear and tear, environmental factors, and poor maintenance. Structural weaknesses such as cracks, leaks, or foundation erosion can compromise the safety and functionality of the dam. If the dam can no longer meet modern safety standards, there is a risk of failure, which could lead to catastrophic flooding, loss of property, and even human casualties. In such cases, decommissioning becomes necessary to eliminate these risks and ensure public safety.

- **Environmental Factors**

Ntoba and Utwigu dam may face severe environmental challenges, including sedimentation and eutrophication. Heavy sediment accumulation can significantly reduce the dam's storage capacity, making it inefficient for water supply and irrigation. Eutrophication, caused by excessive nutrient buildup from agricultural runoff and waste disposal, can lead to algae blooms, affecting water quality and aquatic life. Additionally, climate change may bring extreme weather conditions such as prolonged droughts or excessive rainfall, making the dam unreliable for water storage. If these environmental concerns outweigh the benefits of maintaining the dam, decommissioning may be the best option.

- **Economic and Financial Constraints**

Maintaining and repairing an aging dam can be costly, especially if it requires major

renovations to comply with safety and operational standards. If the cost of maintaining Ntoba and Utwigu Dam exceeds its economic benefits, decommissioning may be a more viable alternative. Additionally, financial challenges such as limited government funding or shifting economic priorities may make it unsustainable to continue investing in the dam. In some cases, new, more cost-effective water supply technologies may emerge, rendering the dam obsolete and prompting its removal.

- **Social and Demographic Changes**

As populations grow, water demand increases, which may put excessive pressure on the dam. If Ntoba and Utwigu Dam can no longer meet the growing needs of the surrounding communities, alternative water supply solutions may be necessary. Changes in land use, such as urbanization and industrial expansion, may also reduce the relevance of the dam. Additionally, conflicts over water allocation and displacement of local communities may create social unrest, necessitating the dam's decommissioning to resolve such issues.

- **Alternative Water Sources Development**

With advancements in water supply technology, alternative sources such as groundwater extraction, desalination, and rainwater harvesting may reduce the need for the dam. If more efficient water management solutions are introduced, the continued existence of Ntoba and Utwigu Dam may no longer be justifiable. Furthermore, modern irrigation techniques that require less water storage may reduce reliance on the dam, making its decommissioning a practical decision.

- **Legal and Regulatory Compliance**

Government policies and environmental regulations may influence the decision to decommission Ntoba and Utwigu Dam. If the dam fails to meet updated safety, environmental, or water resource management regulations, authorities may mandate its removal. Legal disputes over land ownership, water rights, or environmental concerns could also lead to decommissioning. Ensuring regulatory compliance is essential to avoid legal penalties and community conflicts.

- **Ecological Restoration Initiatives**

Restoring natural river flow and ecosystem health is often a key motivation for dam decommissioning. Dams can disrupt natural aquatic habitats, block fish migration, and alter sediment transport. Removing Ntoba and Utwigu Dam could help restore biodiversity and improve water quality in the region. Additionally, the area previously occupied by the dam could be converted into a conservation zone or wetland, promoting environmental sustainability.

Generally, the decision to decommission Ntoba and Utwigu Dam must be based on a thorough assessment of structural, environmental, economic, social, and regulatory factors. If the dam poses safety risks, fails to meet water demands, becomes economically unsustainable, or negatively impacts the environment, decommissioning may be the most viable solution. Proper planning and stakeholder engagement will be crucial to ensure a smooth transition and minimize adverse effects on communities and ecosystems.

12 CHAPTER TWELVE: SUMMARY AND CONCLUSION

12.1 Summary

SWAHAT has ensured that the project is located at an appropriate site and is environmentally sound. The project shall have several positive impacts emanating from both the construction and operational phases. These positive impacts include improved livelihoods and resilience of the rural communities to climate change; improved nutrition of local communities as a result of access to fruits and vegetables; increased food security among community members; Vegetation restoration; Reduced land degradation; Habitat restoration; improved welfare of girl child and women at large through reduced drudgery from collection of fuel wood among others as it has been outlined within the report.

The proposed project will also provide some negative impacts, which in turn need to be minimized and mitigated during the construction and the operational phases. Several of these negative impacts are rated low and short-term, thus have minimal impacts. The negative environmental impacts that will result from the establishment of the project include increased health and safety risks during construction and rehabilitation phase, biological disturbance, visual impacts and generation waste, among others.

SWAHAT is committed to implementing the various measures put in place to mitigate the negative environmental, safety, health, and social impacts associated with the life cycle of the project as outlined within the project report.

It is recommended that in addition to this commitment, the project implementation entity shall focus on implementing the measures outlined in the ESMP as well as adhering to all relevant national and international environmental, health and safety standards, policies, and regulations that govern establishment and operation of such projects. It is further recommended that the positive impacts that emanate from such activities shall be maximized as much as possible. It is expected that these measures will go a long way in ensuring the best possible environmental compliance and performance standards.

12.2 Conclusion

It is, therefore, concluded that the implementation of the SWAHAT project which entails the Installation and rehabilitation of community water harvesting facilities integrating agriculture, livestock, tree planting and aquaculture would entail no significant adverse impacts to the environment and surrounding communities rather provide resilience and coping mechanisms to challenges caused by the climate change impacts. This project will create resilient communities in the semi-arid areas of Tanzania which will subsequently improve the livelihoods and socio-economic welfare of the communities provided that the recommended mitigation measures are adequately and timely implemented. The identified impacts will be managed through the proposed mitigation measures and implementation system laid down in this ESIA.

REFERENCES

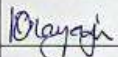
1. Nzega District Council Economic Profile 2023
2. SWAHAT Agreement Document
3. The United Republic of Tanzania, 2004. Environmental Management Act No. 20 (2004), Cap. 191, Dar es Salaam, Tanzania

APPENDIXES

Appendix i. Stakeholders Consultation and Meeting Minutes

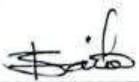
STAKEHOLDERS CONSULTATION FORM ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATION AND INSTALLATION OF COMMUNITY WATER HARVESTING FACILITIES, INTERGRATING SUBSIDENCE AGRICULTURE, LIVESTOCK, TREE PLANTING AND AQUACULTURE

INSTITUTION: NZEGA DISTRICT COUNCIL

DATE	FULL NAME	INSTITUTION	POSITION	PHONE NUMBER	SIGNATURE
9/11/2024	Eng. MODEST JOSEPH	NZEGA DC	DED	0765600994	
9/9/2024	Margwe Tsere	NZEGA DC	PCDO	0684772068	
09/09/2024	OBABIA M. MAXWINGA	NZEGA DC	Ag. DEMO	0755691137	
09/09/2024	STUKRAMI TULI	NZEGA DC	SLO	0785118954	

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA NZEGA DC KATA NDALA KIJILI NTOBA

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
07/09/2024	MATHEW B. HAKKA	KATAWALA	MUKITI	078478007	
07/09/2024	SIMON L. DAVID	UTAUALA	VEO	0787604318	
07/09/2024	FABIAN S. SEBASTIAN	MIFUKO	LFO	0757755237	
07-09-2024	MICHAEL KUMBELE	MURUGA NYUKI	MUKITI KIKUNDI	0684492588	
07-09-2024	EMANUEL JOHNA	MKULIMA	MKULIMA KIKUNDI	0	
07-09-2024	PETER SIMBICA	MKULIMA	KIKUNDI	0784803979	

AFISA MTENDAJI
KIJILI CHA NTOBA
NZEGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOMBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOMBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA...NZEKA DC..... KATA...NDALA..... KIJILI...NTOBA.....

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
07/09/2024	SIYAZA UBANI NIMIGWA	OFISI YA MTENDAJI KATA YA NDALA	Senior Agriculture Officer	0783923032	
07/09/2024	JOHN ELIAS MUGANYA	M/KITONGOSI		06923184	
07/09/2024	ANDREASELE KISHIKI	MJUMBE/NTOBA MDALU		0688274137	
07/09/2024	AGNES C. LUZIGA	M/KITONGOSI	Ahili	0788370106	Ahili
07/09/2024	ROBERT R. MABULA	M/KITONGOSI	Mabula!	0687085879	Mabula!
07/09/2024	JOHN JOSEPH	MJUMBE	MKULIMA	0757246570	

AFISA MTENDAJI
KIJILI CHA NTOBA
NZIGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA
MRADI WA UJENZI NA UKARABATI WA MIUNDOBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA
MIUNDOBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA..... KATA..... KIJJI.....

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
07/07/2024	SHABAN MIHREB	NTORA	Mikulima	0678730930	SHABAN

AFISA MTENDAJI
KIJJI CHA NTOBA
NZIGA

STAKEHOLDERS CONSULTATION FORM
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATION AND
INSTALLATION OF COMMUNITY WATER HARVESTING FACILITIES, INTERGRATING SUBSIDENCE
AGRICULTURE, LIVESTOCK, TREE PLANTING AND AQUACULTURE

INSTITUTION:.....INTERNAL DRAINAGE BASIN WATER BOARD IDBWB.....

DATE	FULL NAME	INSTITUTION	POSITION	PHONE NUMBER	SIGNATURE
01	DANFORD SAMSON	IDBWB	BWD	0766 728383	<i>[Signature]</i>
02	Eng. Moses Nisulubi	— v —	Eng	0783405050	<i>[Signature]</i>
03	Eng. Myachoi Mwamba	— v —	Eng.	0742528992	<i>[Signature]</i>

MUHITASARI WA KIKAO CHA WADU WANAKIKUNDI WAKU
FAIKA WA MRADI WA BWANA LA KABUDYO CHA ARE
HE 07/01/2024 KWENYE KIJISI CHA NIOBI.

ARENDA:

AFISA MTENDA
KIJISI CHA NT
NZIGA

- 1: KUFUNDA KIKAO:
- 2: AFISARI ZA MAZINDIRA KWENYE MRADI WA BWANA LA
KABUDYO:-
- 3: KUFUNDA KIKAO:-

• KUFUNDA KIKAO:- Mwenyekiti alifunga kikao
mnamo Saa 6:14 Mchana.

• AFISARI ZA MAZINDIRA KWENYE MRADI WA BWANA LA
KABUDYO:- Mtaalam wa mazingira kutoka Saa Morogo
to alieleza kwa wanakikundi wanufaika wa mradi
wa bwana la Kabudyo na wanufaika wa mizinga ya
Kisasa ya nyuki pamoja wanajamii wanufaika wa miche
ya matunda ya miembe na miti ya cubao na kixuli.
Alipenda kufahamu changamoto na athari za mazin
gira kwenge mradi wa bwana la Kabudyo wanajamii
wanufaika wa mizinga walieleza changamoto ya kukatwa
miti yao yenye mizinga na kuxunwa asali kwenge
mizinga yao na waku wawawamirifu.

Wadau wanakikundi waliwashukuru wahisani loto
ka Saa Morogo kwa kuwawezesha kuwaletea ma
di huu kutoka ambao utaongeza kipato kwenge
jamii kwa kuangiza bustani za xiboga xiboga na
xuwagiliaji wa xashamba pamoja na kuwawesha
mifugo yao kwa kutengeneza xabirika ambayo
yalishatengenezwa kwenge mradi wa bwana pamoja
na kupatiwa mizinga ya Kisasa ambayo wanaki
kundi wamepatiwa kwa kila kitongoji mizinga
kitano wanufaika wanahitaji kuongezwa mizinga
zaidi.

Wanajamii waliwasilisha changamoto xubalixubali
za kutunga mradi ili pasitokee maafa kwenge bwana
la Kabudyo pia wanufaika wa miche ya miembe ameleza
changamoto ya upatikanaji wa maji ya kuwagilia
miche aliyopatiwa ambayo inaendelea vizuri kabisa
asidiwe kuelixubwa kisima karibu na shamba
la miche hipo.

Wadau walimuomba mtaalam wa mazingira kuwale
tea Salar ya kuxuta maji na matanki pamoja na

Kupandikiza Samaki Kwenye Bwawa la Kabudyo
Pia Mtaalam wa mazingira alipenda kufahamu kutoka
ku wadau wanufaika hali ya mauso ya asili yaani soka
la asili lipoje wadau walieleza soka la asili liko vizuri
linapatika vizuri liko juu.

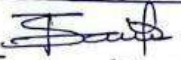
Pia wadau walieleza changanoto ya magonywa ya
mifugo na mimea kwani magonywa ya mifugo majesho
yakoteshwe ili mifugo ianze kuongeshwa pamoja na
pembejeo ya kilimo linapatika kwenye maduka ya
kilimo kwa bei ya juu. Masao ya wakulima huathirika
na wadudu xibaxibali.

Wadau wameomba kujengwa dosho lililopo munda
mbiru yake ilishaharibika halitunzi maji vizuri
hadi sasa halifanyikazi kabisa wameomba majesho
yaongezwe kwenye kata ya Ndala.

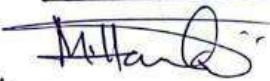
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to alizozitwa alazipikisha sehemu husika ili yafa
nyupe kazi pia amewashukuru kwa mzaoni yao
walioyazitilisha kwake pia kwa kipindi kilicho
baki kwenye madi wawaletee daraja za mifugo
Michakato ikafanywe kazi kwa kushirikisha wataala
m kutoka Saa Morogoro.

Kutenda Kikao: Mkwiti alipunga kikao xnama
Saa 8:00 Mchana.

SATHH YA KATIBU


Simon D. David
AFISA MTENDAJI
KIJISI CHA NTOBA
NZEGA

SATHH YA MKWITI


MATHEW HAMKA BUMBALA
MKWITI SERIKALI
YA KIJISI CHA NTOBA
KATA YA NDALA
NZEGA

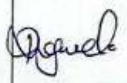
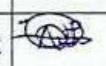
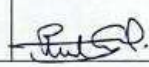
MAHODHURIO YA KUKAO CHA WADHUJI
YIONGOZI WANUFAIKA WA CURADI WA BWAWA
LA KABUJO WA KISIJI CHA NTOBA CHA 07/9/2024

JINA KAMALI	WADHUJI	NO. SIMU	SATHIHI
1. MATTHEW H. BUNDAZA	MUKITI	0784788047	Mthembu
2. SIMON L. DAVID	NEO	078760438	Neo
3. SIYAZA UBANI NIMWA	A/KILIMO	0783923032	Nimwa
4. PETER SIMBILA	KIKULIMA	0784803979	Simbila
5. ROBERT R. MABUKA	M/KITONGOZI-BARUA	0787085879	Mabuka
6. JOHN JOSEPH	MURAKA	0757248570	Joseph
7. LUKAS MTHUMBE	MTHUMBE	0783140412	Mthumbe
8. GEORGE MATHANGI	MTHUMBE	078700018	Mthumbe
9. JOHN ELIZ NGAYWA	M/KITONGOZI	0692318467	Ngaywa
10. MICHAEL KUMLELO	M/KITONGOZI	0684492588	Kumlelo
11. SEBASTIAN RASHIDI	RASHIDI KIKULIMA	0786311980	Rashidi
12. EMANUEL JOHN	M/KULIMA	0782790754	Emmanuel
13. BENEDICTOR KULINDUKA	MTHUMBE	0786606861	Kulinduka
14. ANDREW KISHIKI	MTHUMBE	0688274137	Kishiki
15. FABIAN S. SEBASTION	M/MIFUKO	0757755237	Sebastion
16. AGNES CHILU LUZIGA	M/KITONGOZI	0788370106	Chilu

AFISA MTENDAJI
KISIJI CHA NTOBA
NZIGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOMBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOMBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA... NZEGA KATA... UTWIGU KIJILI... UTWIGU

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
9/9/2024	SIRA -BORCO BALICHAKO	NZEGA -DC	WEO-UTWIGU	0625477229	
	FAUJA -Y. KIGWELA E	NZEGA -DC	WAO-UTWIGU	0626366445	
	EMANUEL P. NDAM BILE	NZEGA -DC	FELD - UTWIGU	0675731607	
	FORTUNATA . N. LUBENGO	NZEGA - DC	VEO - UTWIGU	0765-323129	
	PIUS BERCHUMAR MWAGENI	NZEGA -DC	MOL. UTWIGU	0768317525	
	RAMADHAN K. MUKAMBA	NZEGA DC	KATIBU - LYOMBA	067791997	

AFISA MTENDAKA
KIJILI KWA UTWIGU
NZEGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOMBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOMBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA.....NZEGA..... KATA.....UTWIGU..... KIJILI.....UTWIGU.....

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
9/9/2024	Tausi Petro	NZEGA H M E	MJUMBE	0692378960	T. Petro
9/9/2024	SALUMU RAMEDHANI	NZEGA DC	MW/KALALO	0789486051	S. Ramadhani
9/9/2024	VERONICA JUMA	NZEGA DC	MWAMBANA	0787694968	V. Juma
	ASHA MASONGA	NZEGA DC	MJUMBE	0689250925	Amasonga
	AMBRAS M. MASHAWE	NZEGA DC	MJUMBE	0782061822	A. Mashawe
	ANTHONY M. MSHARBE	NZEGA DC	MJUMBE	0788328415	A. Msharbe

AFISA MTENDAJI
KIJILIKO UTWIGU
NZEGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

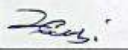
WILAYA.....NZERA..... KATA.....UTWIGU..... KIJILI.....UTWIGU.....

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
9/9/2024	AMIS SELEMAN	NZERA DC.	MJUMBE - Mwananchi		K. Selemu
9/9/2024	ALLY.S. MUMINGI	) -)	KTB. KIKUNDI	0782905580	Mumingi
9/9/2024	BUNDAKA C. WIGWILE	11 - 1	MHASTIBU: KIKUNDI	0783839182	Budy
9/9/2024	SALUMU NI. MAGANZO	71 -	M/KATI. KUPENDWE	06782993631	Salumu
9/9/2024	HAMISI SH. MASHAANA	11 -	MJUMBE	0788661691	M. Mashana
9/9/2024	IRATU H. NGAYULA	X	KATIIBU	0788468906	I. Ngayula

RAFISA MTENDAKA
KIJILI CHA UTWIGU
NDEGA

FOMU YA MAONI YA WADAU KWA AJILI YATATHMINI YA ATHARI KWA MAZINGIRA NA JAMII KWA AJILI YA MRADI WA UJENZI NA UKARABATI WA MIUNDOMBINU YA KUVUNA MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOMBINU YA KILIMO, UFUGAJI, UPANDAJI MITI

WILAYA... NZEGA KATA... UTWIGU KIJIKI... UTWIGU

TAREHE	JINA KAMILI	TAASISI	CHEO/NAFASI	NAMBA YA SIMU	SAHIHI
9/9/24	PELAGIA S. KIMARO	NZEGA	mJumbe	0785063377	
9/9/24	ELIZABETH MALALE	NZEGA	mJumbe	0788636360	EM
	RAMADHAN - WIMBILI	NZEGA	H/14 - KUKI UTWIGU	0659955415	
	Zakayo Saahy Sanga	mjube		0785 800164	

-AFISA MTENDAO
KIJIKI UTWIGU
N2EGA

MUHITASARI WA KIKAO CHA TAHHIMINI YA ATHARI
KWA MAZINGIRA NA JAMII KWA AJILI YA MEMBI
WA UJENZI NA UKARABU WA MIUNDOMBINU YA
KUUUNA MAJI YA MUHA, IKIWA NI PAMOJA MIUNDO-
MBINU YA KILIMO, UFUGAJI, UPANDAJI MITI: 9/9/2024

AGENDA:

- 1: KUFUNGA KIKAO.
- 2: UTAMBULISHO
- 3: TAHHIMINI YA ATHARI KWA MAZINGIRA NA JAMII
KWA AJILI YA MRADI WA UJENZI NA UKARABU
- 4: TI WA MIUNDOMBINU YA KUUUNA MAJI YA
MUHA, IKIWA NI PAMOJA MIUNDOMBINU YA
KILIMO, UFUGAJI, UPANDAJI MITI.
- 4: MENGINEYO
- 5: KUFUNGA KIKAO.

AGENDA NO 1: KUFUNGA KIKAO:

Mwenyekiti wa kikao alifunga kikao
Mnamo saa 7:00 Mchana kwa kuwashukuru
Wajumbe waliopo.

AGENDA NO: 2: UTAMBULISHO:

Katibu wa kikao aliwakanbisha
Wageni kujitambulisha na Wajumbe kujitambu-
lisha. Wote tulitambua.

AFISA MTENDAJI
RIZIJI CHA UWIGU
WAKO

AGENDA NO 3: TATHIMINI YA ATHARI KWA
MAZINGIRA NA JAMII KWA AJILI YA MRADI WA
UJENZI NA UKARABUJI WA MIUNDOMBINU YA KIUUMA
MAJI YA MVUA, IKIWA NI PAMOJA MIUNDOMBINU YA
KILIMO, UFIGAJI, UPANDAJI MITI.

Katika agenda hii muwazeshaji kutoka
chuo cha suu alisema kuwa anafika kusika
changamoto na athari zinazotoka ili uawaze
kujie kutoka kwa wadau. Hivyo baadhi ya
wadau walitoa changamoto mbalimbali
Moja ya changamoto hizo ni ukosefu wa
maji katika mashamba huswa katika kipindi
cha Kianga; Miche ya miti ya miembe
kuathiriwa na mchwa, ukosekanaji wa
vifaa kama gumbi, mbolea na dawa za
kumwagiliza mimea, upungufu wa majosha
ya mifugo. Katika mradi wa mizinga ya

Nyuki wadau pia walitoa changamoto
zinazowakabili, Katika changamoto hizo
taasisi ya Shule ya Msingi utwigu Mwalimu
Pius alisema wao kama taasisi wanaomba
kuongezea mizinga zaidi Maana taasisi
yao inayo ena kubwa kimo wanamba
kuongezea mizinga mingine. Kwa SAS
Wanayo mizinga mitano.

H lakini pia baadhi ya
Wadau walisem, tayari wanayo mizinga
lakini hawana vifaa vinavyoendesha

Kuvuna na kuhifadhi asali baada ya kuvunaili waweza kuhifadhi zaidi na zao la asali.

Katika Mradi wa Bwawa la Ubaka Wadau Wameeleza kuwa Baada ya Bwawa hilo kuchimbwa limetengani vitongio hasa kipindi cha muwa hivyo Wamesema wajengewe shule ya secondary lyombo Maana watoto wengi wanashindwa kuenda shule kipindi cha muwa, pia kama kuna uwezekano basi pata kuwepo daraja-bwawa wajengewe daraja ili kurahisisha wanaajami kupita wakati wote.

Mbali na hayo yote Wadau Wamesema pia ukosekanaji wa soko la uhakika hapa katika mazao wanayolima. pia wanakikundi wamezishwa ili waweza kustesha wenyewe miti ili kuondoa ule uhanibifu wa miti kufika eneo husika zikiwa zimengauka

Pia Wadau Wamesema kuongezwa miti ya Matunda katika taasisi mbalimbali zilizopo katika kata yetu, na kuweo na uipeperushi au vitabu vingavyoonyesha hatua ya kwanza hadi ya mwisho katika utunzi wa Nyuki.

Baada ya wadau kutoka changamoto zao zinazotokana na miradi mwezeshaji alianza kutoa ufafanuzi wa lugha zilizotolewa kuwa changamoto ya uhanibifu wa bwawa itafanywa kazi mwanzi ni hatua kwa jamii inayozunguka.

na huyo zote watafanyika
taasisi na Watubuni Wakeguzi na kufanya
tathmini maana Miradi inaendelea hatua kwa
hatua kwa kupata maoni mbalimbali kuto
ka kwa Wadau Kama ilivyofanyika leo.

Kuhusu kuchimba visima utafiki
utafanyika, Na Katika Vikundi vilivyopewa
Mizinga Viga vitatolewa ili kuwalinda na
athari za Nyuki.

Mwali na huyo Mwezaishaji
alisema Elimu kuhusu Nyuki, Upandaji wa
Miti na elimu kuhusu Bwawa Watakuja
Wataalamu na kuendelea kutoa elimu -
Maana ni muhimu kwa ufanisi wa
Miradi endeleu.

Mwezaishaji aliendelea kuwambia
Wadau kuwa kwa huyo Miti iliyotolewa na
Mizinga iliyotolewa Wadau wa Vikundi Waonyake
juludi kubwa ili kupata matolao chanya
ambayo yataleta uhamasishaji wa wafadhili
ili Waongeze Mizinga au Miti ya Matunda.

AGENDA NO 4: MENGINEYO

Katika agenda hii, Msimamizi wa
Miradi Katika Ngezi ya Kata, alisisitiza
kwa Wadau Watunze huyo Miradi vizuri
Kulingana na Maelekezo ya Wataalamu
Wanayotoka. Utunzaji wa Miti na Mizinga
ya Nyuki na Utunzaji wa bwawa.

JAFISA MTEGESA
RJANICA TEWISA

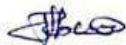
AGENDA NO 5: KUFUNEA KIKAO:

Mwenyekiti alifunga Kikao Mnamo

Saa nane na rusu: 8:30 Machana kua
Kuwashukuru Wamezaishaji kua kanchaguo
Kata ya utwigu na kuwashukuru wadau
wote waliokhudhuma.

KATIBU:

FORTUNATA N. LUBENDO



AFISA MTENDAJI
KATA YA UTWIGU
S.L.P 4-NZEGAI
TAREHE 9/9/2024



SIRA-B. BALICHANG

AFISA MTENDAJI
KATA YA UTWIGU
S.L.P 4-NZEGAI
TAREHE 9/9/2024

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