



ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

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Project/ Programme Category: Regular Project

Title of Project/Programme: **Restoration of Lake Babati for enhanced Climate Change Adaptation in Babati District**

Type of Implementing Entity: National Implementing Entity (NIE)

Implementing Entity: **National Environment Management Council (NEMC)**

Executing Entity/ies: **World Vision Tanzania /Babati Town Council**

Amount of Financing Requested: **US\$ 4,000,000**

1.0 Project Background and Context

The Babati District (BD) is one of 5 districts of Manyara region which is located in northern Tanzania. The district comprises of a district council and a town council namely Babati District Council (BDC) and Babati Town Council (BTC) respectively. The BTC serves the urban segment of the district while the BDC serves the rural segment which is the largest. These two administrative authorities are key for development endeavors of the district. . Endowed with abundant natural resources the BD with support from the central government is working towards bringing socio-economic development to its people. However, the livelihoods of the people are still not sustainable and the majority are vulnerable to climate change impacts. With a population of 116,458 in BTC and 390,737¹ in BDC the district is not adequately capable of addressing the climate related challenges. Lake Babati (LB) which covers both urban and rural parts of BD with an area of about 12 km² is very crucial for the livelihoods of adjacent communities employing about 1000 artisanal fishers². Furthermore, a large proportion of women and girls are engaged in selling of fried fish from the lake. Besides fishing, some men and boys are involved in brick making business whereby the sites nearby the lake are used .In particular, the brick makers excavate along the lake buffer area to obtain the clay soil for making bricks. Generally, the lake is main source of water for irrigation farming, bricks making, livestock and many more. However, the Babati Urban Water Supply and Sanitation Authority (BAWASA) does not use water from the lake in its water supply systems. Instead, water is sourced from boreholes distributed in various parts of BTC. The reasons for not using water from the lake among others include unpredictable climatic variations , unclear hydrology of the lake and high nutrients load due to eutrophication which has implications on water quality.

While LB has a substantial contribution to the livelihoods of the people and economic development of both BTC and BDC, its management is very poor. Everyone has access to the lake at any time. Although there is a set of

¹ National Bureau of Statistics 2018

² Interview with Member of Parliament for Babati Urban Constituency, July 2021

regulations and rules in place, enforcement of the same is not done. For example, illegal fishing is rampant and currently there is no concrete plan to address that.

1.1 Socio-economic context

The livelihoods of majority of communities in BTC and some in BDC are supported by LB which is threatened by destructive anthropogenic activities and climate change. Climate variations affect agriculture production. Farmers experience low produce hence unable to meet the basic household needs. Food security is jeopardized, causing many to engage in casual labour to make some earnings to buy food. Lake Babati is the main source of water for dry season agriculture whereby farms are irrigated using the water from the lake. This enables the households to have a continued supply of food and income from sales of crop harvests.

With the increased unpredictability of rainfall due to climatic variation and the increased degradation of the lake, the vulnerability of the communities in both BTC and BDC is likely to worsen thus threatening their well-being. Moreover, the fact that most of the farming activities are conducted in close vicinity of the lake, poses a big risk in case of flood events. While the agricultural activities along the shore of the lake are conducted at the detriment of the lake ecosystem, they are also a source of hippo-human conflicts. The hippos which inhabit the lake are active at night, thus as they graze they find their way to the farmlands located in vicinity of the lake hence destroying crops. This is attributed to the fact that the lake buffer area has been encroached making it difficult for hippos to find pastures. The available pastures are also grazed by the livestock from the periphery of Babati Town Council and rural areas of Babati District Council. The pastoralists flock to the Lake for grazing and watering their cattle especially during the dry season when pastures become scarce elsewhere. Illegal fishing which is largely practiced at night is another source of hippo-human conflicts. Male hippos attack fishermen when they encounter them at night. The male hippos are very aggressive due to their territorial behavior whereby they tend to defend their territory in vicinity to water. There have been a number of reported cases on fishermen killings caused by hippos at night.



Figure 1: Farmlands in vicinity of the lake shore



Figure 2: Cattle grazing and watering in the lake



Figure 3: Destructive brick making in the lake buffer zone

1.2 Development context

The Babati district considers Lake Babati as one of tourist attractions and opportunity for investment promotion. According to Manyara region investment guide of 2018, lake Babati is highlighted as one of key investment areas particularly in the tourism industry. While the lake shore is potentially good for construction of tourist hotels, it is important that the existing policy and legal frameworks are observed.

If successfully restored and well managed, lake Babati can potentially contribute to the revenues of BTC through various sources. Fisheries can be the largest income earner of the town council if well regulated. Besides artisanal finishing done by local communities, there are many commercial fishers from other parts of Tanzania who seek fishing licenses for undertaking fishing activities in lake Babati. Currently, owing to high population of water weeds; waterways are blocked. Therefore, tourist activities inside the lake and other activities that would earn revenues for the BTC can not be conducted. Therefore, the removal of water weeds will not only contribute to ecosystem restoration efforts, but also facilitate waterborne economic activities such as canoeing and other water sports.

Owing to its favourable agricultural conditions, the Lake Babati basin attracts diverse groups of people from various parts of Tanzania who come and settle in this area. For example, it had 132,000 residents by the year 2016, with 40% of them in the economically active age group of between 15 and 44 years, and an average household size of 5.27³ The Water supply system does not adequately meet the water requirements of each water user leading to competition for water between sectors such as agriculture and domestic use. This is further exacerbated by high cost of water from BAWASA. As a result the majority of residents in BTC fetch water from lake Babati.

1.3 Environmental context

Lake Babati is within the East African Rift valley in Manyara region and it is a fresh water lake in semi-arid environment with relatively shallow but highly fluctuating water levels . Babati district receives an average rainfall between 450 mm (in lowlands) and 1,200 mm (in highlands) per year, with two rainy seasons. The short rain season begins in October and ends in December while the long rainy season starts in January with dry spell during February and ends in May.

The lake has since 1964 experienced environmental stresses which emanate mainly from land use change. Several studies on flooding of the lake has attributed flooding to changes in land cover. For example a study in 1995 concluded that “an analysis of rainfall trends in the region, a water-balance model simulating lake levels under both forested and deforested-degraded catchment conditions, and a series of interviews with senior citizens, all indicate that changes in the landscape, i.e. deforestation and land degradation, induced the floods. No rainfall trend has been found that can explain the flood events”⁴. A recent study on land use/land cover change in 2020 revealed substantial urban development as the town of Babati expanded, and also showed the intensification of crop cultivation throughout Lake Babati Basin during the period between 1973 and 2018 (Figure 3). A disproportionately large area of land which was covered by forests in 1973 has been converted into farmlands and urban development activities as of 2018. Furthermore, owing to siltation the lake depth has reduced from 8 m to 4 m between 2000 and 2018⁵ .

³ Esri Living Atlas 2016.

⁴ <https://www.jstor.org/citation/info/10.2307/521276?refreqid=excelsior%3Ac9357b74b77a7fb6f25aa5fcf53aa595>

⁵ Babati Town Council (2017) Strategic Plan for Conservation of Lake Babati and its Surroundings (2011-2017). Babati, Tanzania

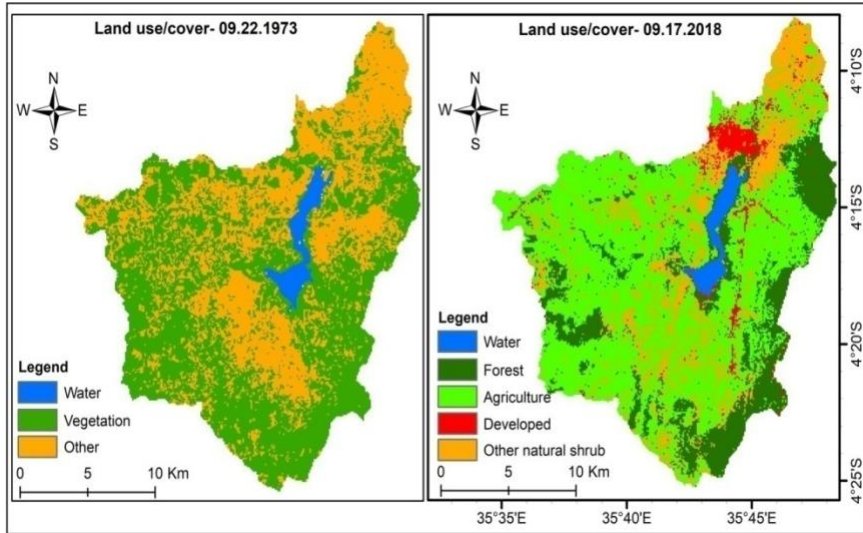


Figure 3: Land use /land cover change in Lake Babati Catchment between 1973 and 2018 ⁶

Rainfall variability is very common with no clear trend. For example, there have been cycles of rainfall fluctuations during the period between 1973 and 2009 (Figure 4). However, the 2006 -2009 period shows a short trend of declining rainfall in Babati district. A study conducted in 2009 suggests that the Babati district is subject to large regional inter-annual variations in rainfall due to the El Niño-Southern Oscillation (ENSO) as well as orographically induced rainfall in the highlands⁷.

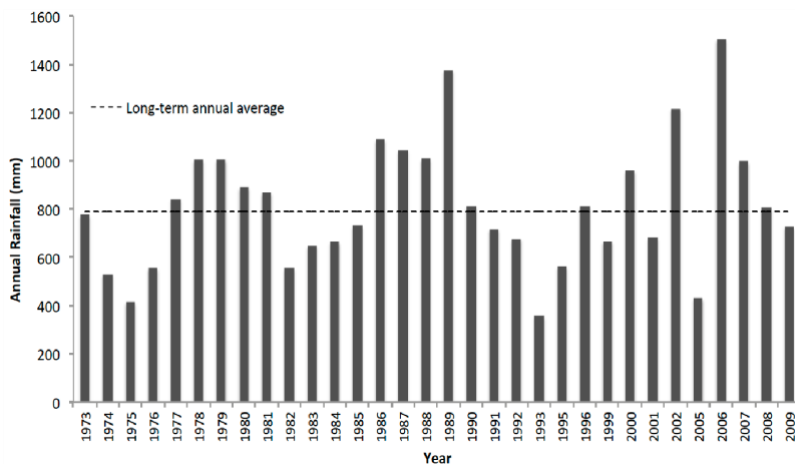


Figure 4: Annual Rainfall record at Babati station (1973–2009)⁸

⁶ Peter, K.H., Nnko, H.J and Mubako, S (2020). Impacts of anthropogenic and climate variation on spatiotemporal pattern of water resources: a case study of Lake Babati, Tanzania. Sustainable Water Resources Management 6:47 . <https://doi.org/10.1007/s40899-020-00400-z>

⁷ Kijazi, A.L.; Reason, C.J.C. Analysis of the 2006 floods over northern Tanzania. *Int. J. Climatol.* **2009**, *29*, 955–970

⁸ Mbanguka, René; Lyon, Steve W; Holmgren, Karin; Girons Lopez, Marc; Jarsjö, Jerker (2016). Water balance and level change of Lake Babati, Tanzania: sensitivity to hydroclimatic forcings. *Water*, 8(12):572.

1.4 Scope of the project and location of project areas

The project will be implemented in Babati District, particularly in the catchment of Lake Babati which spans across both the BTC and BDC. The lake faces on-site and off-site threats which ought to be addressed to foster restoration efforts and build climate change resilience of not only lake adjacent communities but also the economy of Babati district, Manyara region and the country at large. On-site threats include unsustainable fishing practices in the lake, agricultural activities, livestock grazing, deforestation and destructive brick making along the lake shore. Such activities are typical in BTC which increases pressures to the Lake from its urbanization undertakings. While the town council promotes investment projects with a view of generating revenues, it is imperative that such investments pose no harm to the lake, its entire ecosystem and the livelihoods of lake dependent communities.

Interventions in BTC will involve 4 wards namely **Nangara, Bonga, Singe** and **Bagara**. Such wards were selected due to their proximity to the lake. Moreover, most of the activities which adversely impact the lake are found in those wards. On the other hand, off-site threats are those emanating from deforestation and unsustainable farming practices upstream leading to soil erosion which contributes to siltation and eutrophication. This results into an outgrowth of water hyacinth, water sedges and other water weeds which block the underwater life and waterways. In particular, the water sedges have engulfed a significant proportion of the lake making movement in the lake by boat impossible (Figure 5). The off-site activities occur partly in some hamlets of Babati town council and a large proportion of rural areas of Babati district council which are upstream of the lake. Interventions in BDC will involved 2 wards namely **Ayasanda** and **Riroba** whose communities practice unsustainable agricultural practices leading to soil erosion and low crop yield.



Figure 5: Water hyacinth and water sedges in the lake

1.4 Project objectives

The project will progress activities geared towards restoration of Lake Babati and enabling climate resilient livelihoods in climate impacted and environmentally degraded areas of Babati District. Therefore, the project’s main objective is to restore the severely degraded ecosystem of Lake Babati hence building the capacity of adjacent communities in tackling climate change impacts through practical solutions; that have concrete and tangible outputs. Specifically, the project envisages achieving the following:

- (i) Promoting soil erosion control measures upstream of the lake catchment
- (ii) Mechanical control of aquatic weeds in the lake
- (iii) Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts
- (iv) Supporting climate resilient and environment friendly livelihood activities
- (v) Institutional capacity building of BTC, BDC and lake adjacent communities in planning , implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.

1.5 Project Components and Financing:

Table 1: Project components

Project Components	Expected Concrete Outputs	Indicative activities	Expected Outcomes	Amount (US\$)
1. Promoting soil erosion and sediment control measures	1.1 Improved land management with reduced erosion and improved crop yield	1.1.2 Train & support lake adjacent communities to implement soil and water conservation techniques 1.1.2 Establishment of demo farms (farmer field schools) 1.1.3 Tree nursery establishment 1.1.4 Supply of seedlings for tree planting for restoration of degraded sites upstream	Improved management of Lake Babati Catchment	957,000
	1.2 Improved water resources management	1.2.1 Earthen dike construction 1.2.2 Construction of charcoal dams 1.2.3Community awareness raising on integrated water resources management 1.2.4 Establishment of Water Users Association (WUA) for lake Babati		

		1.2.5 Training of WUA leaders on good governance, financial management, water use conflict management and water resources management		
2. Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages	2.1 Improved water transport and other lake based activities	2.1.1 Removal of the aquatic weeds using harvester machine and other specialized equipment 2.1.2 Collection and sorting of the harvested water weeds	Improved water quality and lake visibility	380,000
	2.2: Improved crop yield and livestock production	2.2.1 Using the harvested weeds to feed livestock 2.2.2 Production of compost manure from weed residues 2.2.3 Training of farmers on compost manure production	Improved food security	
3. Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts	3.1 The population of hippos in the lake kept at acceptable ecological limits	3.1.1 Baseline assessment to estimate the hippo population 3.1.2 Gathering information on the required legal procedures for cropping of hippos 3.1.2 Cropping the recommended number of hippos	Increased crop yield, reduced hippo-human conflicts and improved resilience to climate change impacts	590,000
	3.2 Barbed wire fence constructed along the lake buffer zone	3.2.1 Technical design 3.2.2 Procurement of equipment Construction of the fence 3.2.3 Tree planning along the wire fence		
4. Supporting climate resilient and environment friendly livelihood activities	4.1 Drip irrigation systems for horticulture production supported	4.1.1 Site selection and community mobilization to agree on the selected site for the irrigation schemes 4.1.2 Installation of drip irrigation system 4.1.3 Training on horticulture production for selected crops 4.1.4 Procurement and installment of greenhouses in selected sites 4.1.4 Provision of start up capital to farmers groups and support extension services 4.1.5 Support business development activities and enabling farmers to access local and international markets	Increased income, food security and resilience to climate change impacts	1,000,000

		4.1.6. Establishment and building capacity of horticulture producers cooperative		
	4.2 Water troughs for livestock constructed	4.2.1 Establishment of water supply system from the lake to support watering of livestock 4.2.1 Material mobilization 4.2.3 Cattle water trough construction		
	4.3 Fish ponds for improved aquaculture constructed	4.3.1 Training on basic aquaculture principles 4.3.2 Site selection 4.3.3 Fish ponds construction 4.3.4 Supply of fingerlings 4.3.5 Supply of fish feeds and training on fish feed management		
	4.4 Environment friendly brick making technology supported	4.4.1 Training 4.4.2 Site selection 4.4.3 Purchase of machines(hydraform machines)		
	4.5 Beekeeping enterprises supported	4.5 .1 Training on apiary management 4.5.2 Training on honey processing /value addition 4.5.3 Support in beehives production 4.5.4 Provision of protective gears		
5. Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning , implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results	5. 1 The capacity of Babati Town Council and Babati District Council in facilitating the adoption of climate resilient and environmental friendly interventions improved	5.1.1 Training Needs Assessment 5.1.2 Training of Babati Town Council and Babati District Council officials on climate smart agriculture including mainstreaming of climate change into development plans and budgeting process. 5.1.3 Facilitating district officers to provide technical assistance to farmers on climate smart technologies and practices 5.1.4 Disseminating project results and share lessons learnt through various communication methods and channels including monthly reflection meetings	Improved capacity of Babati Town Council, Babati District Council and communities in planning and implementin g adaption actions	463,000

and lessons learnt.	5.2 Capacity of the community based groups/organization in managing climate resilient and environmental friendly interventions improved	5.2.1 Build capacity of farmers associations on planning for climate related action 5.2.2 Train farmers associations on climate smart agriculture and sustainable and integrated water management practices 5.2.3 Supporting Community Based Trainers (CBT) in training peer farmers 5.2.4 Facilitate farmers exchange visits/study tours		
	5.3 The capacity of Babati Town Council and Babati District Council in law enforcement related to restoration and protection of lake Babati improved	5.3.1 Training on law enforcement 5.3.2 Provision of equipment to support patrols to combat illegal fishing in lake Babati 5.3.3 Provision of 2 vehicles to facilitate lake catchment protection activities		
1. Project execution cost				322,050
2. Total Project cost				3,390,000
3. Project cycle Management Fee charged by the Implementing Entity				287,950
4. Amount of financing requested				4,000,000

Projected Calendar

Milestones	Expected Dates
Start of Project Implementation	August 2022
Mid-term Review	February 2024
Project Closing	August 2025
Terminal Evaluation	February 2026

PART II: PROJECT JUSTIFICATION

PARTII A: Describe the project components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience.

The project is conceptualized and designed in such a manner that it comprises of concrete adaptation activities. Such activities are envisaged to contribute to climate resilience among lake adjacent communities in Babati district most of whom are vulnerable to climate impacts. The project will include five (5) components, the details of which are provided below.

Component 1: Promoting Soil erosion and sediment control measures

This component aims at restoration of the degraded LB ecosystem. A significant portion of the lake catchment area is severely degraded. Today many farmers in hilly slopes experience low crop yield due to soil erosion. This resulted from deforestation activities and failure to implement soil and water measures in their farmlands. The productive capacity of land has declined due to poor farming practices which affect the soil health and cause unnecessary water loss.

Output 1.1 Improved land management with reduced erosion and improved crop yield

Soil and Water Conservation (SWC) techniques are among the smart agriculture technologies and practices. They enable capturing and water/moisture retention in the soil, reduce evaporation losses and retain nutrients hence supporting plant growth even in drought conditions. For hilly sites of Babati, technologies such as contour farming and terraces will be supported. Furthermore, dike construction along the lake buffer and charcoal dams will be promoted for enhanced control of sediment inflow to the lake. This will go hand in hand with tree planting in severely deforested sites. The project aims at restoring at least 100 ha of vegetation (30 ha in BTC and 70 ha in BDC). At least 500 farm households will be trained on soil and water conservation methods in BD. The training will be conducted in two phases whereby the first phase will involve training of Community Based Trainers (CBT) who will then train their peers in the second phase. 100 CBTs will be trained whereby 50 will be women and 50 will be men.

The project will also promote the establishment of tree nurseries with a view of not only restoring the degraded forests in the lake catchment area, but also generating income from the sale of seedlings. Seedlings of appropriate tree species will be supplied. Indigenous tree species will be promoted so as to restore the natural vegetation. While the communities in BD have the right to use natural resources including the lake and forest resources, the government has crafted some laws and regulations that govern resource use. However, due to weak enforcement, destructive use of resources is on the rise. Therefore, this project will build the capacity of local institutions to supervise lake catchment restoration activities and enforce resource use laws and regulations. The project will support 12 tree nursery groups in BTC and 8 groups in BDC. Each group will have at least 20 members consisting of men, women and youth. Furthermore, each group will have a target of producing and supplying at 10,000 seedlings.

The indicative activities to be implemented under this output include the following:

Activities

- Training on soil and water conservation techniques
- Establishment of demo farms
- Training on tree nursery establishment
- Support tree nurseries and supply of seedlings

Output 1.2: Improved water resources management

The project will also foster lake protection efforts downstream with a view of controlling sediment inputs to the lake. To this end, measures such as an earthen dike construction along at least 30m buffer of the lake will be supported. Furthermore, a total of 8 charcoal dams will be constructed in the lowlands of the lake catchment with a view of trapping sediments. Both BTC, BDC and communities will be involved in catchment conservation activities. In particular, community engagement in water resources management is one of the principles of integrated water resources management (IWRM). Thus the project will support the formation of Water Users Associations (WUAs) with a view of protecting water resources and addressing water use conflicts among various water users. This will ensure equitable water allocation and access to water for all. The indicative activities to be implemented under this output include the following:

Activities

- Earthen dike construction
- Construction of charcoal dams
- Community awareness raising on integrated water resources management
- Situational analysis of water resources in the project sites
- Establishment of WUAs
- Training of WUA leaders on good governance, financial management, water use conflict management and water resources management

Component 2: Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages

Aquatic weeds are those unabated plants which grow and complete their life cycle in water and cause harm to aquatic environment directly and to related eco-environment relatively⁹. While the aquatic weeds may be useful when their populations are within the acceptable limit, they are harmful for the fish and fisheries when population goes beyond the limit hence requiring necessary interventions. They compete with fish for water, nutrients, light, niche and oxygen and thus reduce the yields. Aquatic weeds pose a big threat to the lake Babati hence affecting the lake biodiversity and economic activities which depend on the lake such as tourism, fishing and patrol operations. The most dominant weeds in the lake are the water sedges which have grown up to the height of 2 m or more.

Output 2.1 Improved water transport and other lake based activities

The project will progress interventions towards removal of aquatic weeds in the lake notably the water sedges. This is envisaged to improve the economic activities in the lake such as fishing and water transport. Furthermore, with the improvement of water transport in the lake, the BTC will be well positioned to successfully enforce the fisheries regulations. The project will support the following activities:

- Hiring of harvester /dredging equipment for removal of the weed
- Harvesting of the weeds
- Collection and sorting of the harvested weeds
- Processing of the weeds into other useful forms

Output 2.2 Improved crop yield and livestock production

Based on the activities in output 2.1, the harvested weeds will be processed to make compost manure which can be used in farmlands and fish ponds. In particular, the interventions on horticulture in component 4 will make use of such manure. The project will also facilitate sorting of water sedges so as to obtain the good quality material that may be used to feed animals. This will be great help to pastoralists who face grazing challenges during the dry period.

The following are indicative activities:

- Collection of the harvested material
- Sorting of the harvested materials
- Training of farmers on compost manure making
- Compost manure making
- Supply of the harvested weeds to pastoralists

⁹ Lancar, L. and Krake, K. (2002). Aquatic Weeds & their Management. International Commission on irrigation and Drainage. p.1- 65

Component 3: Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts

Like other water bodies, Lake Babati's buffer zone ought to be protected as per Tanzanian Environmental Management Act, 2004 which prohibits activities within a 60 m buffer of a water body. However, due to weak enforcement of this law, the buffer area of the lake comprises of various activities which threaten its sustainability. This component will progress interventions towards securing the buffer area with a view of restoring the degraded land and vegetation in the buffer zone. Therefore, a barbed wire fence will be constructed along the buffer area. This is envisaged to improve the buffer area of the lake and thus contributing to its protection, The fence once built will also reduce hippo human conflicts as the hippos will remain inside the fence. Furthermore, the fence will control entry of livestock in the lake.

Output 3.1 The population of hippos in the lake kept at acceptable ecological limits

During field visits to lake adjacent communities, it was frequently reported that hippos in the lake have been become a nuisance to the community. This is due to several reported cases of crop destruction and human killings. While the community has a right to complain about hippos, it is important to recognize that hippos need to live their ecologically framed life whereby the need to get out the lake and graze at night. If the lake buffer zone was not disturbed by agricultural fields, hippos wouldn't have destroyed the crops. To address, the project will among others reduce the number of hippos in the lake if need be. The following activities will be implemented:

- Baseline survey to estimate the hippo population
- Liaising with relevant government authorities on procedures for cropping hippos
- If found feasible, cropping of hippos will be done

Output 3.2 Barbed wire fence constructed along the lake buffer zone

Besides controlling the number of hippos as mentioned in 3.1 and controlling the sediment inflow to the lake as stated in component 1, the project will support the construction of a barbed wire fence of about 4 km (circumference) along the lake buffer area. This is ensure that hippos do not cross the fence and no entry to the lake buffer zone by livestock and or other activities. There will be special entry gates for only authorized individuals and activities. This will not only contribute to lake protection, but also enable the BTC to control illegal fishing practices and hence increase their revenues from fisheries. The fence will be constructed along the earthen dike to be constructed in component 1. Both the wire fence and earthen dike will be reinforced by trees to be planted . The following activities will be implemented :

- Purchase of materials
- Construction of a barbed wire fence
- Tree planting along the constructed fence

Component 4: Supporting climate resilient and environment friendly livelihood activities

Like other districts of Tanzania, the livelihoods of communities in Babati district depend on climate sensitive resources. Thus it is important that adaptation strategies that target climate resilient livelihoods are promoted. Livelihood integration and diversification is recommended so as to maximize the resilience. This is because reliance on only one means of livelihood may risk increased climate vulnerability if that particular livelihood activity fails. Integration of livelihoods increases cost effectiveness as may generate some co-benefits and synergies. For example, the integration of tree planning, aquaculture and beekeeping on the same farm creates synergies. Trees protect soils and enhance water infiltration in the soil, poultry farms supplies manure to the fish ponds. The nutrient-rich water from the fish ponds are then used to irrigate horticultural crops adjacent to the fish ponds. Thus this kind of integration enhances productivity while ensuring cost effectiveness. Furthermore, beekeeping may be integrated in the same

farm for enhanced pollination and increased income accruing from sale of honey. About 1000 farm households are expected to benefit from the livelihood intervention in both BTC and BDC directly; and 20,000 farm households will benefit indirectly. The adoption of integrated climate resilient and environment friendly livelihoods is envisaged to improve the household income by at least 20 % by the end of the project.

Output 4.1 Drip irrigation systems for horticulture production supported

Horticulture farming involves growing fruits and vegetables, products highly needed in daily meals. Important to note in agriculture is that farmers normally diversify livelihoods through cultivation of variety of crops such as maize, beans, sunflower, cowpeas, Irish potatoes, onions and carrots. Farmers in Babati district can potentially receive income from the sale of Irish potatoes, onions and carrots. These are the main horticultural crops common across all the in Babati district . Horticulture crops production normally generates higher earnings per unit area and is often an alternative to farmers with small acreage to get adequate income. Horticulture is a fast growing non-traditional crops sub-sector in Tanzania, producing different varieties of fruits, vegetables, flowers and other ornamental plants, spices and herbs crops for domestic and export market. The potential to increase income lies in the fact that horticultural production shifts resources from low value crops to high value ones, and hence increases the returns that small-scale farmers get. Research findings have shown that small-scale farmers who produce fruits and vegetables earn more than those who produce cereals. Sales from other crops are not promising and are sometimes unreliable due to fluctuations in production due to changing rainfall patterns and lack of fertilizers to replenish soil fertility. Many households complained about poor production of non-horticultural crops due to limited land , unreliable rainfall and loss of fertility in their farms. The advantage of horticultural crops is that they are all weather crops though cultivated in wetlands where there is adequate availability of water. Furthermore, they can be produce on small area size provide high returns. Moreover, there is a reliable market. The demand for Irish potatoes, onions and carrots is always high in most urban centres such as Babati, Arusha and Dar es Salaam.

Activities

- Training on horticulture production for selected crops
- Installation of drip irrigation system
- Construction of greenhouses
- Supporting the provision of extension services to farmers
- Support business development activities and enabling farmers to access local markets including tourism market

Output 4.2 Water troughs for livestock constructed

As stated in the previously sections, pastoralists graze their cattle in the buffer zone of the lake and such cattle obtain water directly from the lake. This is not a recommended practice as it has adverse impacts to the lake. Interview with one of pastoralists who bring cattle to the lake indicated that most of pastoralists cannot afford the metered water from BAWASA ,hence their only option is to send their cattle to the lake. Therefore, the project will support the construction of water troughs for easy access of water by livestock. The water will be sourced from the lake through a controlled water supply system. The following activities will be implemented:

- Establishment of water supply system from the lake to support watering of livestock
- Material mobilization
- Cattle water trough construction

Output 4.3 Fish ponds for improved aquaculture constructed

Under the prevailing conditions of overfishing in lake Babati , aquaculture has a huge potential for reducing fishing pressure and contribute to community livelihoods. In the integrated farming settings, freshwater fish production is recommended as the farm will have other activities requiring freshwater. Fishponds will provide nutrients through the nutrient-rich water to be used for cultivation of horticultural crops in the other side of the farm. Moreover, the fishponds will provide source of water for the bees. The project intends to support at least 50 ponds with a view of reducing fishing pressure on Lake Babati. Such fish farmers will be in groups and shall include men, women and youth. The project will support 1,000 direct beneficiaries (fishers) in groups of 20 involving both BTC and BDC.

The following activities will be conducted

- Training of farmers on production of various aquaculture products
- Designing and construction of fish ponds/floating fish cages for aquaculture production
- Purchase and distribution of fingerlings to farmers
- Supporting the fish farmers with a starting capital for purchasing feeds

Output 4.4 Environment friendly brick making technology supported

The conventional brick making practice involves burning of bricks which makes use of trees as source of energy. Due to high demand of bricks in Babati town, many trees have been cut for burning bricks. Although in some parts of Tanzania, burning of bricks is done using saw dust and rice husks, in Babati town fuelwood is predominantly used. Unlike the conventional system, the hydraform brick making technology is environment friendly. Because the stabilized soil bricks are cured in the sun, the need for fuelwood is eliminated thus protecting forests. The project will support a total of 20 brick making groups (12 in BTC and 8 in BDC) whereby each group will be given a hydraform brick making machine. Therefore, project will progress the following activities:

- Site selection
- Procurement of hydraform machines
- Training of brick making groups

Output 4.5 Beekeeping enterprises supported

Honey production is another livelihood activity with a potential to increase resilience to climate change impacts. Beekeeping is a practical tool for raising the awareness of communities on the importance of forest management and conservation¹⁰. Compared with cultivated crops, beekeeping is not very much affected by climate variations and can provide a more predictable source of income. Besides, the pollination contributes to crop yields. The climate resilience of the beekeeping enterprise lies in the fact that the honey bees can tolerate high temperatures to some extent. The integration of beekeeping in a farm will facilitate crop yield through pollination. The direct beneficiaries will include 10 beekeeping groups in BTC and 20 beekeeping groups in BDC whereby each group will have 20 members including men, women and youth.

Activities

- Training on sustainable beekeeping practices
- Provision of modern beehives and other related items
- Training on honey processing and packaging
- Provision of honey processing equipment such as honey centrifuge machine and many more

Component 5: Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning , implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.

¹⁰Geburu, Y.G., Gebre, A.E and Beyene G. (2016). Review on the role of honey bee in climate change mitigation and poverty alleviation. Livestock Research for Rural Development 28 (3)

Institutional capacity building for planning and management of adaptation actions is key for successful interventions. The project will work in an integrated manner on strengthening the capacity of local government authorities, farmers associations and communities regarding promoting the adoption of climate smart agriculture /soil and water conservation practices. Furthermore, the communities will be capacitated to practice climate smart agriculture in their farming activities. The project will also promote learning and knowledge management so that the key messages from the project reach as many people as possible. This will be done by facilitating the district councils and local communities to share and communicate the project results and lesson learnt. Thus, the project will craft mechanisms by which the project results and lessons will be disseminated to the wider community of Babati district, Manyara region and the entire country at large.

Output 5.1 The capacity of Babati Town Council and Babati District Council in facilitating the adoption of climate resilient and environmental friendly interventions improved

The local institutions operating within project areas have a potential influence of transforming agricultural practices from destructive to conservation practices. This is because of their direct interaction with farmers as well as their planning and decision-making roles in formulating agricultural related policy and legislations. The farmers in the project areas depend solely on rain fed agriculture. Rain fed field crops are amongst the most vulnerable crops to climate change. Several technologies are harnessed to risk coping, including the introduction of adapted selected varieties, supplementary irrigation and irrigation management, integrated pest management, no-till and crop rotation practices and so forth. Thus, it is important to build capacity of the local institutions in promoting the adoption of climate smart agriculture and practices that combat soil erosion. This will result in among others increasing farmers' capacity on how to practice operate under climate uncertainty. This will assist the implementation of climate resilient interventions and practices by farmers and thus amplifying the adaptation mechanism as well as increase farmers' resilience.

At present, both BTC and BDC not well capacitated to integrate climate change adaption activities in their development plans. Through training and financial support to be provided by this project, the district officers will be capable of planning and implementing adaptation activities. This is envisaged to ensure project sustainability as the districts will be able to implement some of the activities even after project termination. The capacity building activities will involve 5 officers from the region, 5 officers BTC and 5 officers from BDC and 60 leaders from the project hamlets/villages.

Proposed activities:

- Training needs assessment
- Development of training modules
- Training of local government officials in BTC and BDC on climate change, including mainstreaming of climate change into development plans and budgeting process.
- Facilitating district officers to provide technical assistance to farmers on climate smart technologies and practices
- Disseminate project results and share lessons learnt through various communication methods and channels

Output 5.2 Capacity of the community based groups/organization in managing climate resilient and environmental friendly interventions improved

Building capacity of the farmers associations/cooperatives and communities in promoting the adoption of climate resilient practices is very important. Farmers association in project areas are mainly composed of farmers and led by farmers themselves who for a large extent live within the respective project areas. Adoption of soil and water

conservation practices argely based upon farmer to- farmer transfers of information, knowledge, experience and resources. Lead farmers who are locally influential farmers within farmers associations are vital to this process. The proposed project will train and capacitate farmers associations and communities at large in in promoting the adoption of soil and water conservation practices. The training will be provided to 5 100 selected members of farmers cooperatives in BTC and 150 selected members in BDC. The trained farmers will be expected to transfer the acquired knowledge to their peers.

Activities:

- Build capacity of farmers associations on planning for climate related action
- Train farmers associations on soil and water conservation management practices
- Supporting Community Based Trainers (CBT) in training peer farmers

- Facilitate farmers exchange visits/study tours

5.3 The capacity of Babati Town Council and Babati District Council in law enforcement related to restoration and protection of Lake Babati improved

Given the prevailing condition of mismanagement of natural resources including illegal fishing and deforestation, in Babati district, particularly in the catchment of lake Babati; it is important that some immediate interventions be effected. Due to blocked waterways owing to aquatic weeds and inadequate human and financial resources, patrol operations to combat illegal fishing in the lake are not conducted. Generally, there is no concrete plan and interventions to enforce environmental protection laws and regulations in BTC. Therefore, the project will progress interventions which will be geared towards supporting the law enforcement with a view of protecting the environmental resources on which the livelihoods of the people depend. Activities to be implemented will include the following:

- Training on enforcement of natural resource-based laws
- Provision of equipment to support patrols to combat illegal fishing in the lake
- Provision of 2 vehicles to facilitate lake catchment protection activities

PATR IIB. Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund. (

All five components of this project are designed to contribute to the environmental, economic, and social benefits especially at the community level whereby local farmers and marginalized groups (incl. women, youth and people with disabilities) will directly benefit through the improved capacity to adapt to the impacts of climate change. This project also complies to the Environmental and Social Policy of the Adaptation Fund whereby relevant risks are clearly identified, and mitigation measures are proposed.

Environmental benefits

The proposed project is expected to have multiple environmental benefits. The adoption of soil and water conservation techniques (which are also climate smart) other best environmental conservation practices such as tree plantation will improve the natural vegetation cover thereby contributing to proper management of soil and water

resources thus reducing siltation of lake Babati. In particular, tree planting will significantly contribute to the restoration of forests which were previously cleared for various reasons. Restoration of lake Babati along its shorelines will reduce sediment inflow to the lake. Furthermore, the construction an earthen dike and barbed wire fence will secure the lake buffer area from invasion by farmers and pastoralists. Removal of aquatic weeds will save lives of many fish which are currently overstressed by the presence of water hyacinth and water sedges hence contributing to their ecological integrity. Furthermore through the support to be provided under institutional capacity building, the lake ecosystem will be closely monitored ensuring that destructive and illegal activities stop. This is envisaged safeguard the environment of the lake and its surroundings thus ensuring environmental sustainability. The project will also contribute to environmental protection through the introduction of environment friendly brick making technology which eliminates use of fuelwood for burning bricks.

Economic benefits

This project has significant economic contribution to the economy of Babati district and country at large. The project will combat crop damages done by hippos thus enabling farmers to harvest their crops and earn some income. With the drip irrigation system in place and greenhouse units over 1000 farmhouse holds are envisaged to produce more crops which will not only increase household food security but also income. The income of beneficiary households is expected to increase by at least 20% through implementing climate resilient and environment friendly livelihood strategies as explained in component 4 of the project. The activities to be implemented under components 1 – 4 will transform the economic status of communities from resource-poor and vulnerable to resource-rich and resilient to climate shocks. The implementation of livelihood based enterprises such as aquaculture, cultivation of high value horticultural crops and beekeeping offers many economic benefits.

Table 2: Projected annual average income from proposed livelihood activities (US \$)

Livelihood activities	Project Component	Project time frame				
		Baseline	2022/2023	2023/2024	2024/2025	2025/2026
Environment friendly brick making	4	0	4000	8000	10,000	12,000
Horticulture		2500	6000	10,000	12,500	15,000
Aquaculture/fisheries		3000	5600	7000	9500	11,500
Beekeeping		1200	6,000	7,200	9,600	10,500

Social benefits

The project offers many social benefits which can be realized through the proposed interventions aiming at livelihood improvement. The construction of barbed wire fence along the lake will alleviate hippo-human conflicts which have had negative impacts to the community especially crop damage and killings of people, notably fishermen. The livelihood activities to be supported by the project will have a multiplier effect whereby the benefits will trickle down to more vulnerable and marginalized groups in the community. At least 1000 farm households will benefit from the project interventions. Women economic empowerment through livelihood activities to be conducted by women groups will empower women to participate in socio-economic development endeavors. Furthermore, a sizeable

number of youth will benefit from the livelihood activities. By empowering the youth economically, the project will make them stay in their local communities and contribute to community development instead of migrating to urban areas in search of employment. This will also improve the gender relations by increasing the number of women and youth in decision making processes at various levels.

PART II C. Describe or provide an analysis of the cost-effectiveness of the proposed project

The cost-effectiveness of the project's adaptation interventions will be greatly enhanced by the executing entity. Considering the costs and benefits of implementing this project, it is worth noting that the implementation of this project will lead to more resources being saved and more livelihoods being improved. Failure to implement the project will lead to reduced wellbeing of people of Babati and reduced food security (crop damage by hippos and low fish catch from the lake due to aquatic weeds). The resources to be committed in this project will result into long term and sustainable impacts to lake Babati and adjacent communities.

All the construction activities will use a force account approach with a view of minimizing the costs. Therefore, no contractor will be involved unless the work cannot be done by the government officers. For example, construction of an earthen dike , charcoal dams, water troughs and barbed wire fence will be done by relevant government engineers who will be paid allowances for their time spent in the project. Furthermore, the project will involve the communities who will volunteer to provide labor. Where necessary some will be paid a modest allowance for their participation especially for activities requiring some technical knowledge.

Cost effectiveness is also demonstrated in component 4 whereby the livelihood activities to be supported by the project were carefully selected after consultative meetings with the beneficiaries and economic feasibility analysis. Although the communities have some other livelihood activities such as small businesses and cultivation of staple food crops, their average income/day is below the poverty line. By supporting activities such as beekeeping, aquaculture and horticulture farming the project will be investing the AF resources in livelihoods with high economic returns thus enhancing not only the livelihoods and wellbeing of the people of Babati but also their resilience to climate change impacts. Table 3 provides more analysis of cost effectiveness.

Table 3: Project costs and benefits

Project Component	Project Cost (USD)	Concrete adaption benefits	Avoided losses	Trade-offs
1 Promoting soil erosion and sediment control measures	957,000	<ul style="list-style-type: none"> • Increased agricultural productivity • Increased food security food • Increased household income • Increased knowledge on water resources management • Reduced sediment inflow to the lake • Increased availability of fish in the lake due to reduced siltation and water weeds • Increased resilience to climate change Impacts 	<ul style="list-style-type: none"> • Reduced lake depth due to siltation • Loss of fish due to increased water weeds • Food insecurity • Malnutrition 	<ul style="list-style-type: none"> • Siltation of may lead to the disappearance of the lake • Construction of terraces and ridges in farmlands upstream alone may be not be effective in controlling sediment inflow in the lake.
2. Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages	380,000	<ul style="list-style-type: none"> • Increased visibility of the lake • Boat transport will be possible 	<ul style="list-style-type: none"> • Increased blockage of the lake • Fish life saved 	<ul style="list-style-type: none"> • Loss of revenues from lake based economic activities • Loss of fish • Loss of biodiversity

		<ul style="list-style-type: none"> • The fish population will increase as a result of removal of water weeds • Increased crop and livestock productivity from the harvested water weeds 		
3. Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts	590,000	<ul style="list-style-type: none"> • Increased conservation of hippos • Restoration of the lake buffer vegetation • Reduced crop damage by hippos • Reduced killings of people by hippos 	<ul style="list-style-type: none"> • Crops damage • Human killings • Invasion of the lake buffer area 	<ul style="list-style-type: none"> • Government to spend more money compensating families whose loved ones are killed by hippos • Increased crop damage by hippos • Increased vulnerability to climate change impacts
4. Supporting climate resilient and environment friendly livelihood activities	1,000,000	<ul style="list-style-type: none"> • Enhanced resilience to climate change impacts • Increased household income • Reduced income poverty • Improved management of marine ecosystems 	<ul style="list-style-type: none"> • Abject poverty • Degradation of lake catchment • Food insecurity • Malnutrition • Health problems 	<ul style="list-style-type: none"> • Increased degradation of lake Babati catchment • Loss of biodiversity • Increased vulnerability to climate change impacts • High adaption cost – especially when the rainfed agriculture fails and communities have no alternative livelihoods

<p>5. Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning, implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.</p>	<p>463,000</p>	<ul style="list-style-type: none"> • Increased capacity of local government authorities and communities to plan and implement climate change adaption interventions • Increased coordination of climate actions at local level • Increased resilience to climate change impacts • Increased capacity to communicate project outcomes and key lessons learnt 	<ul style="list-style-type: none"> • Inability to foresee climate impacts • Increased vulnerability to climate change impacts • Loss of livelihoods • Food insecurity • Abject poverty 	<ul style="list-style-type: none"> • Increased victims of climate impact impacts due to poor planning and unpreparedness of local government authorities • Increased adaption cost • Failure of climate change adaption interventions (any intervention should include a component for building the capacity of local institutions to coordinate and plan for climate actions otherwise such an intervention may fail)
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PART II D: Describe how the project is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

This project is designed to maintain consistency with national and subnational policies, sustainable development strategies and plans on climate change as well as cross-sectoral policies such as those on forestry, agriculture, livestock, fisheries, water and environment. The United Republic of Tanzania has signed and ratified several multilateral agreements including those under United Nations such as the UNFCCC, UNCCD and the CBD. All national level policy and legislations take into account these agreements.

This project aims to tackle climate change related challenges facing communities around Lake Babati by building their adaptive capacity as well as resilience against the adverse effects brought by climate change. Important policies, strategies and plans, which the project conforms with are summarized in the following paragraphs:

The National Climate change Strategy (2021)

Water is conceived being among the main source of livelihoods, harnessed for domestic, agriculture, industrial use. Climate change is negatively impacting water sources, therefore addressing these climate change induced impacts will allow continuous availability for these elements which are important for sustaining livelihoods, economic growth and social development. In response, as due to the growing concerns over negative climate changes and climate variability, Tanzania like many other countries has vested into several initiatives to curb the situation include developing the National Climate Change Strategy. National Climate Change Strategy was devised seeking for enhancing the technical, institutional and individual capacity of the country to address the impacts of climate change. In order to achieve this aim, the National Climate Change Strategy has identified several strategic interventions (SI), among which are proposed by this project, such as interventions to control soil erosion which leads to siltation of water bodies such as ponds and lakes hence affecting water quality and quantity .

Forest Policy (1998)

Climate change is reported to have affected the forestry sub-sector by dwindling forest ecosystems. 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 of biodiversity for the benefit of current and future generations. In Tanzania, forests play a major role in building adaptive capacities and resilience of poor and marginalized vulnerable communities. 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 project will strengthen efforts invested by the Government Forestry Sector particularly to (a) Enhance conservation of forests biodiversity and control of invasive species; (b) Supporting alternative livelihood initiatives for forest dependent communities; and (c) Strengthening and up scaling of community based forest management best practices.

Agriculture Policy:

In Tanzania, the agricultural sector is figured as the back bone of the national economy, employing more than 80% of the country population of about 60 million people. Agricultural 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 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.

The Agriculture policy and plans have set and implemented several priorities, which the project will also contribute to so as to enhance resilience of the more vulnerable farming communities to climate-induced impacts. These include installation of water efficient irrigation schemes; Promoting early maturing and drought tolerant crops; Addressing soil

and land degradation by promoting improved soil and land management practices/techniques; Strengthen early warning systems at District level.

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 interventions are also within the Government frameworks and most particularly on: Promoting aquaculture, Enhancing protection and conservation of aquatic ecosystems productivity, and diversity.

National Adaptation Programme of Action (NAPA):

The Government of The United Republic of Tanzania recognizes that the extreme vulnerability of communities and the surrounding natural systems to the effects of climate change escalates poverty and slows down achievement of Millennium Development Goals (MDGs) and several other National Development Strategies such as National Strategy for Growth and Poverty Reduction (NSGPR/MKUKUTA) and Vision 2015. The National Adaptation Programme of Action (NAPA) of 2007 was developed to respond to these challenges particularly to identify and prioritize activities that addresses adaptation to climate change so as to avoid the risks of increased vulnerability and costs, which come along with effects of climate change. NAPA underscores that Agriculture, Water and Forestry are high priority sectors that requires interventions for adaptation to climate change. The project conforms with NAPA activities described in each sector, which aims to enhance the resilience to the vulnerable communities of Babatito the impacts of climate change.

Tanzania Nationally Determined Contributions (NDCS)

Tanzania Nationally Determined Contributions (NDCS) has put much emphases on Intended Contributions to Agriculture, livestock, forest, energy, Coastal, Marine Environment and Fisheries, water resource, tourism, human settlement and health

National Environmental Action Plan (NEAP)

NEAP developed to support the country towards meeting key international environmental obligations, which include conventions related to Biodiversity and Forests, Climate Change, Sustainable Land Management; Environmental Pollution, Hazardous Waste and Chemicals Management; Sustainable Oceans, Coastal Zones, and protection of Coral Reefs.

PART IIE. Describe how the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc. ,and complies with the Environmental and Social Policy of the Adaptation Fund

The proposed project is aligned with relevant national technical standards and meets requirements stipulated by Environmental Management Act (Cap.191 of 2004) and Environmental Impact Assessment (EIA) and Environmental Audit (EA) Regulations (G.N. No. 349 of 2005). For example, the Environmental Management Act, 2004 prohibits activities within 60 m from a water body. This project will progress interventions that are in line with this Act. Furthermore, all construction works proposed in this project will observe the EIA standards.

With regard to the Adaptation Fund AF categorization, the project can be categorized as Category B, meaning that it has

potential adverse impacts, but in small number and scale, not widespread and easily mitigated through an ESMP.

PART IIF. Describe if there is duplication of project with other funding sources, if any.

The proposed project and its interventions will avoid any duplication of actions and funding sources. During conceptualization and designing of this project, consultations were made with officers from both BTC and BDC whereby it was clear that no similar interventions exist in the selected wards. Furthermore, during the development of the project proposal, a number of stakeholders including NIE were involved. This ensured that no duplication of project or funding sources is done. However, there are some projects in other wards of BTC and BDC which were proposed or implemented or are implementing some of the aspects of the project. The table below shows some of related projects for climate change adaptation conducted in Zanzibar.

Table 4: Climate change related projects/programs in Babati district

Project/Program	Objectives	Synergy with the proposed project
Transforming Household Resilience in Vulnerable Environment (THRIVE) implemented by World Vision Tanzania for the period October 2017 – October 2021	Overarching project goal is to ensure Improved and Resilient Livelihoods (incomes and assets) of smallholder farmers and agro-pastoralists within Babati and nearby districts.	<p>No duplication. The proposed project compliments the interventions done by World Vision Tanzania (WVT) in Babati district which will end in October 2021. Moreover, the interventions by WVT were conducted in different wards which are not targeted by the proposed project.</p> <p>Furthermore, the project by WVT had no interventions directly related to lake Babati</p>

PART IIG. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The project’s learning and knowledge management component is captured under component 5. It will entail dissemination positive project results and lesson learned. The project will organize and conduct study visits within the project sites to help farmers learn and sharing experience. Study visits to areas with similar project will also be organized to enhance better learning. Communities will actively participate in project activities by learning and practicing climate change adaption technologies and practices. The lessons learnt by few community members are envisaged to diffuse to the wide community through peer training and hence impacting many community members in Babati district . At local level, the project will produce and distribute leaflets and brochures highlights key project achievements and lessons learnt.

Project results and lessons learnt will further be disseminated at national and international levels through conferences, symposia , meetings, workshops, various publications in peer reviewed journals. Furthermore, other means such as radio , TV, newspapers, YouTube, Facebook and video documentaries will be used as well to share and communicate project results, outcomes and lessons learnt. Furthermore, learning and knowledge management will be an integral part of the M& E framework.

PART IIH. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The formulation of this project followed a participatory and iterative process whereby all key project stakeholders were involved from the community level to the highest level of government. The project idea was conceptualized during a meeting held in June 2021 which was organized by the NIE . This led to the formation of project design team which among others identified and visited communities adjacent to lake Babati. While in Babati the project design team visited some of the degradation hotspot areas including the farmlands.

Before visiting the sites, the team held meetings with local government officers and leaders who provided their concerns and insights to the project design process. In particular, officers from Babati town council including the Executive Director and Member of Parliament for Babati Urban Constituency were very instrumental in providing information related to threats for lake Babati. The project design team visited 4 wards adjacent to the lake in Babati town council which included Nangara, Bonga, Singe and Bagara.



Figure 8: Stakeholders consultations

Findings of Stakeholders consultations

Key issues raised

- The project should focus removal of aquatic weeds and hippo-human conflicts
- Deforestation is the underlying factor for siltation of lake Babati
- The project should support farmers to implement soil erosion measures upstream
- Support to establish fish ponds will reduce fishing pressure in the lake
- Finding alternative sites and technology for brick making
- Gender must be mainstreamed in project activities so that all groups in the community benefit from the project. In particular, special attention should be placed to the most vulnerable groups such as widows, people with disability, orphans and the elderly group
- Management of the lake must be improved. It has become an open access resource
- Small scale fishers must be considered in the project

Recommendations /Way Forward

- Fencing of the lake to control hippos and entry of cattle
- Construction of water troughs for livestock
- Supporting the youth with brick making machines
- Construction of earthen dike and charcoal dams to trap sediments
- be encouraged to integrate trees in the farmlands so that they get alternative source of fuelwood instead of using mangroves
- The most vulnerable groups notably widows, orphans, people with disabilities and the elderly group should be given first priority during implementation of livelihood activities

Categories of Stakeholders consulted

a) Sectoral level Stakeholders (MDAs):

- National Environmental Management Council (NEMC)
- Vice President's Office -Division of Environment
- President's Office Regional Administration and Local Governments
- Ministry of Water
- Tanzania Meteorological Authority
- Sokoine University of Agriculture

b) LGAs Level Stakeholders:

- i) Babati Town Council
- ii) Babati District Council
- iii) Ward offices of Nangara, Bonga, Singe and Bagara

Table 6: Stakeholders Analysis

	Description of the Roles
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Potential Stakeholders	
Local government authorities (BTC and BDC)	The authorities have a role to mobilize community to participate in the project activities, monitor project progress, support community natural resources management program including approval of bylaws for safeguarding water resources.
Farmer groups/cooperatives	These are stakeholders that are part of the farmers but established to oversee and advocates farmer's rights in agriculture sector including managing rice fields, water utilization and follow up of access to farming inputs. In this project they will be used to mobilize farmers to actively engage in project activities. They will also receive training on how best to manage community groups, manage irrigation structures and enforcing the bylaws to realize positive projects outputs and outcomes. Members of the farmer's associations are democratically elected, and they are about twenty with leadership structure.
Non-government organisations	These are specialized group of stakeholders that will be engaged by the project to raise community awareness on climate change issues, climate smart agriculture and water resource management. They will work under the guidance of project team and district authority and in close consultation with farmers associations.
Farmers	These are grass root project beneficiaries that will be mobilized through their local institutions to participate in project implementation including climate smart agriculture practices, trainings and awareness raising sessions, water sources protection and community meetings. Farmers are key stakeholders that will be used to provide feedback and lesson learned from project activities as they will practice the interventions on the ground.

PART III I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Funds requested from the Adaptation Fund will be used to support building the capacity of Babati town council and District council and their communities to adapt to the impact of climate change through implementation of practical interventions to produce tangible and sustainable impacts. Without funds from the Adaptation Fund, the communities in will continue to be negatively affected from the impacts and fail to meet the livelihood needs. A more justification for funding can be evaluated by analyzing the project and without project scenarios as described below:

Component 1: Promoting soil erosion and sediment control measures (US \$ 957,000)

Without funds from the Adaptation Fund (AF), no activity will be implemented to address the challenge of siltation of lake Babati. This means eutrophication of the lake will continue until the entire lake is occupied by aquatic weeds. This will lead to disappearance of fish in the lake and consequently the livelihoods of over 5000 young men and women will be in jeopardy.

AF funding to support implementation of soil and water conservation measures upstream, construction of earthen dike and charcoal dams will reduce a significant amount of sediments from entering the lake hence contributing to its sustainability. This kind of investment is not possible under current government financing framework which is very limited to provision of key social services such as health care and schools. Therefore, AF funding is crucial for successful restoration of lake Babati.

Component 2: Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages (US \$ 380,000)

As stated above, without AF funding it is unlikely that the Babati Town Council and the Tanzanian government at large will be able to address the aquatic weeds problem in lake Babati. The mechanical removal of such weeds is the best option of dealing with this problem. The removal of the weeds will facilitate economic activities inside the lake and fish life will improve. Without AF the water hyacinth and water sedge will continue to deteriorate the ecological integrity of the lake . With the removal of the weeds and combined efforts to control soil erosion upstream and sediment inflow to lake, the condition of the lake will improve thus supporting the livelihoods of adjacent communities who are already vulnerability to climate change impacts.

Component 3: Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts (US \$ 590,000)

Without AF funding to construct a barbed wire fence along the buffer area of the lake, land degradation resulting from cattle grazing will continue . Furthermore, the hippo-human conflict may escalate causing unrest in the communities. This will not only affect the social life of the people but also their farm-based livelihood activities. With funding from AF, the buffer area of the lake will be well protected thus contributing to its restoration and hence enabling the lake to support the communities whose livelihoods are climate sensitive

Component 4 : Supporting climate resilient and environment friendly livelihood activities (\$ 1,000,000)

Given the current situation in Babati district whereby the livelihoods of poor communities are vulnerable to climate change impacts, more people are posed to experience shortages of water and food. The current farming practices are not climate resilient causing farmers to experience very low yield. Therefore without AF funding, the communities are more likely to continue suffering from climate change impacts owing to inability to implement climate resilient livelihood activities.

With AF funding it is envisaged that the livelihoods of communities at grassroots will be improved making them vibrant and resilient to climate change shocks.. Activities such as horticulture production require some labor inputs; hence some people will be employed and hence contributing to the economic development of the country. Thus the project will contribute to poverty reduction, economic growth and national climate adaptation efforts.

Component 5: Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning, implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt (\$ 463,000)

At present BTC and BDC s do not have adequate capacity to effectively facilitate implementations of climate change adaptation interventions. Without the AF funding, it is likely that the pace to incorporate climate adaptation related issues into district development plans and implementing adaptation actions on will be slow and may in some instances be impossible. Without AF resources climate change vulnerable communities in Babati are more likely to continue suffering. With AF funding the district will be able to facilitate the implementation of adaptation actions with a possibility to scale up the interventions in other sites found in the district. Furthermore, the district will be able to integrate adaptation costs in district planning a, development and financing mechanisms

PARTIII J. Describe how the sustainability of the project outcomes has been taken into account when designing the project.

Sustainability aspect was taken into consideration during project design. This is demonstrated by BTC and BDC which have legal mandate to oversee development activities in the project sites. The infrastructures to be developed in the

project sites will remain under overall supervision of the BTC and BDC after project termination. Moreover, the project will build the capacity of ward level institutions in managing the infrastructures to be developed. Furthermore, the farmers and livestock keepers will be trained on how to implement various climate smart technologies which can be sustained beyond the project period.

Furthermore, as part of the M & E framework, the project will craft a sustainability/exit plan that will ensure that investments made by the project are sustained beyond the project period. Sustainability aspects have been embedded into the project results framework to make it easier for the project during execution of the exit plan after project termination. In terms of political and policy sustainability of the project, there is a very good political will from local and national political leaders such as District Commissioner, Regional Commissioner and Member of Parliament.. Thus, the project has full support from at all levels. Therefore, the district officers will still provide technical assistance to the communities even after project termination. Besides, following project termination; some of project activities will be incorporated in the district's and town council's Medium Term Expenditure Framework. This will be particularly possible because the district and town council officers will have gained sufficient capacity building sessions under component 5 by the end of the project.

PART III K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project.

Identification and analysis of potential risks that would emanate from the implementation of project activities have been done purposely to ensure there are no/low negative impacts, in which analysis and identification was conducted with amenability of National Environmental Management Act (EMA) 2004.

Compliance with the Law

EMA 2004 explains all requirement to be done during implementation of development projects where as before implementation of this project activities a detailed Environmental and Social Impact assessment (ESIA) will be done. ESIA will set out environmental and social guideline to be followed to minimize the impacts that will be encountered for all activities during implementation of this Project.

Access and Equity

The project is set for the requirement of individuals living in Babati district , their presence and their need is the key factor towards this project. Touching each person and making improvement of livelihood grantee success of this. Participatory method will be used and selection of members for management of project will be done by selecting members from each group/ethnic area.

Every person will be free to access the project following the set rules to ensure no conflict which arises.

Marginalized and Vulnerable Group

All development project are safeguarded with National and local set rules in which no vulnerable group which appears, resources are accessed following laws, human rights in Tanzania are well controlled by government from local government level to national level. Tanzania Development Vision, 2025 enhance opportunity for and protection of vulnerable and disadvantaged groups as orphans, the physical, mentally and psychological disabled, old people with no relatives or other means of support, it extends opportunity to vulnerable groups and disadvantaged groups, assisting individuals, or disabled groups to cope with disability, advocates participatory roles for private enterprises,

people's organization and community in collaboration with the private sector, in skills development and promotion of quality of life of people with disabilities and other disadvantaged groups.

Gender Equity and Women's Empowerment

Tanzania Development Vision, 2025 caters on development of social environment conducive for peace harmony, protection and development for all, whereas empower people of both gender, all ages to full participate in development process, it removes gender bias in access to resource, participation in decision making and ownership of property, ensure equal access to education and employment at all level, improves the position of women in society and it reviews laws regulations to eliminate all forms of gender based discrimination and improves severe penalties for sexual and other offences against women, hence development of this project will ensure compliance with this vision.

Core Labor Rights

During implementation of this project, all workforce will be sourced from Tanzania ranging from specific village to national level, different risk may arise like accidents this will be controlled through implementation of safety culture at workplace by using of personal protective equipment's, inducting and training workforce on proper safe way of performing their work and comprehensive risk assessment at field level but also the company/individual who will be involved in implementation of project will have to be a member of Workers Compensation fund (WCF), Workers will join Trade Union to ensure they know their rights and it will serves as the watchdog for implementation of labor rights.

Indigenous Peoples

The population of project site includes people of the same tribe though there is less immigrant from different location seeking life opportunity but still they are living by respecting each other and follows legal requirement, for this there is no risk involved.

Table 7: Summary of identified environmental, social and safety issues

Checklist of Environmental and Social Principles	No further assessment required for compliance	Risk and potential impact	Requirement	Management/Measures to Address Risk
<i>Compliance with the Law</i>	Review has to be done annually during implementation of project to ensure compliance with change in law and regulation, also conformity with baseline condition set.	<p>Risk: Low,</p> <p>Potential impact: High</p> <ul style="list-style-type: none"> -Workplace Accidents -Child labor and women empowerment 	<ul style="list-style-type: none"> -Induction training, workplace awareness, provide Personal Protective equipment -Prohibit child labor and Implement laws and regulation specifically Tanzania Vision, 2025 	<ul style="list-style-type: none"> -Conduct a detailed Environmental and Social Impact Assessment (ESIA) before starting of any activity in which EMP and Monitoring plan will be implemented during project Activities -Work closely with NEMC and other regulatory bodies like BAWASA -The full proposal will be compliant with all relevant national laws and regulation including the bylaws set BTC and BDC
<i>Access and Equity</i>	x	<p>Risk: Low</p> <p>Potential impact: Low</p> <ul style="list-style-type: none"> -Misunderstanding can arise during member selection of committee or employment 	<ul style="list-style-type: none"> -Ensure highly motivated, skilled and understanding members and employees are selected from different community where local leaders/government has to be involved 	<ul style="list-style-type: none"> -The project will ensure equitable access to project benefits by all community members. -Involve the local community in decision making

<i>Marginalized and Vulnerable Groups</i>	No change in vulnerable groups observed and were consulted	<p>Risk: Moderate</p> <p>Potential impact: Moderate/High</p> <p>-Misunderstanding and discrimination may arise</p>	-Failure to consult marginalized and vulnerable groups may cause the project to overlook their needs and hence denying them access to project benefits.	<p>-Vulnerable groups have to be considered and be given chance to participate/access the project activities and follow law requirement</p> <p>-Though during concept note development marginalized and vulnerable groups were consulted, more intensive consultations were done during full proposal development</p>
Human Rights	All Rights are under control of National &	Risk: Low	Not envisaged	The project will adhere to national and international human rights standards, policies,

	International Laws	Potential impact: Moderate/High		rules and regulation
<i>Gender Equity and Women's Empowerment</i>	Counting of number of Men and Women involved in the project implementation	<p>Risk: Moderate</p> <p>Potential impact: Moderate/High</p> <p>-Failure to involve women in project implementations and decision making as well</p>	Establish a base/procedure of involving women	-Gender will be mainstreamed in all project components
<i>Core Labor Rights</i>	x	<p>Risk: Low</p> <p>Potential impact: Moderate/High</p> <p>-Recurrence of Incidents & Accidents</p> <p>-Miss understanding between employee and employer</p> <p>-Workplace hazards</p> <p>-Child labor</p>	<p>-Investigate all accident & Incidents and provide protective measure</p> <p>-Make employee to be member of trade union</p> <p>-Provide workplace protective equipment</p> <p>-Stop child labor</p>	<p>-The project will adhere to core labor rights during implementation of the project by involving government and it regulatory bodies like NEMC</p> <p>-Employee a dedicated person to control all risk and accident also to conduct training and awareness during project implementation</p>
<i>Indigenous Peoples</i>	Control for awareness of Immigrants	<p>Risk: Moderate</p> <p>Potential impact: Moderate/High</p> <p>-Destruction of the project due to lack of awareness and involvement, strike and insecurity because they are skipped</p>	-Involve the indigenous people in the project site for project sustainability	-The project main target will be to address the needs of indigenous people for that make sure they understand the positivity of the project

<i>Involuntary Resettlement</i>	Stop settlement in selected project implementation site	Risk: Low Potential impact: High	Not expected	The project design does not require involuntary resettlement.
<i>Protection of Natural</i>	Soil profile study	Risk: Low	Project interventions should not lead	All project interventions will be conducted in a manner that leads to significant threat to natural

<i>Habitats</i>	during ESIA	Potential impact: High	to destruction of natural habitats.	habitats
<i>Conservation of Biological Diversity</i>	Consultation with Tanzania Forest Service Agency (TFS) and Wildlife Management Authority (TAWA)	<p>Risk: Low</p> <p>Potential impact: High</p> <p>-Introduction of trees can alter behavior of microorganisms, reptiles, and birds life adaptation hence lead to loss of biodiversity</p>	<p>-Local tree species has to be planted rather than favoring exotic species</p> <p>-Follow regulatory bodies</p>	The sites for construction of rainwater harvesting reservoirs and dikes will be subjected to baseline assessment to determine existing species and assess any potential risk
<i>Climate Change</i>	Not required	<p>Risk: Low</p> <p>Potential impact: High</p>	Not anticipated	The project will contribute to climate change adaptation. No GHG emissions are anticipated.
<i>Pollution Prevention and Resource Efficiency</i>	Not required	<p>Risk: Low</p> <p>Potential impact: High</p> <p>-Waste generation causing disease eruption</p> <p>-Oil Spills leads to hydrocarbons pollution</p> <p>-</p>	<p>-Follow waste management hierarch and laws in place</p> <p>-Use spill kits and conduct preventive maintenance on all vehicles and machines involved in project implementations</p>	<p>-Adhere to established national and international pollution standards.</p> <p>-Develop plan and Procedures for waste management,</p> <p>-Correct waste and dump in designated areas under government</p>

<i>Public Health</i>	Health Screening for Malaria and STD/STIs	<p>Risk: Low</p> <p>Potential impact: High</p> <ul style="list-style-type: none"> -Emerge of respiratory diseases -Sexititual Transmitted Disease outbreaks -Water born diseases 	<ul style="list-style-type: none"> -Provision of Personal Protective Equipment for people employed in project implementation -STD awareness -Boiling and chlorination of drinking water 	<ul style="list-style-type: none"> -The project design will ensure that public health is not adversely affected by following sanitation procedures -Abide with all requirement for Association of Tanzania for Employers (ATE)
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<i>Physical and Cultural Heritage</i>	X	<p>Risk: Low</p> <p>Potential impact: Moderate/High</p> <p>-Deterioration of archeological site Without thorough and careful site selection especially during construction of water infrastructures</p>	<p>. Conduct ESIA identify all archeological and heritage site</p>	<p>-Involve indigenous people during project implementation and ensure consultations with Archeologists</p> <p>-Stop activities for the area where cultural heritage being identified and inform the authority.</p>
<i>Lands and Soil Conservation</i>	Soil profile study	<p>Risk: Low</p> <p>Potential impact: Moderate/High</p> <p>-Alteration and modification of soil profile and structure</p> <p>-Soil and land pollution/degradation</p>	<p>-Ensure soil leveling at the end of job</p> <p>-Soil grouping respect to structure and profile during striping and or pushing/dozing</p> <p>-Sensitize the use of fertilizer</p>	<p>-The project will promote conservation of soil and land resources</p> <p>- Proper fertilizer applications</p>

PART III: IMPLEMENTATION ARRANGEMENTS

PARTIII A. Describe the arrangements for project implementation.

The Designated National Authority (DNA) for UNFCCC and all climate change projects in Tanzania is the Vice President Office. The DNA oversees all actions and interventions related to climate change and communicate to UNFCCC and its associated Boards or Committees. The project will be implemented by the AF-accredited NIE (NEMC) and will be executed by World Vision Tanzania (WVT) in partnership with Babati Town Council (BTC).

The Project Management Unit (PMU) will be comprised of Project Coordinator, Water/Irrigation Engineer, Project Accountant, Community Development Officer, Agricultural officer, M & E officer and Project driver, all to be seconded to the project. The PMU will be guided by the Project Steering Committee (PSC), which will be constituted by members from the relevant ministries and departments, The PMU shall consist of at least 2 female staff while PSC shall have at least 3 female members.

The project coordinator, community development officer and M & E officers will be employed by WVT while other officers will be provided by BTC. Officers from BTC who will be seconded to the project will receive a modest monthly allowance for their time spent in the project. Other officers from partner institutions and departments will receive some allowance when they get involved in field activities. The M & E officer, apart from monitoring the project progress he/she will also be responsible for coordinating ESMP activities. He/she will also be responsible for documenting and disseminating the project results and lessons learnt to fulfill the knowledge management aspect as stipulated in component 5.

Grievance Management

The executing entity will work towards ensuring that the project direct and indirect beneficiaries are served to the required standards. The PMU will work to ensure that expectations of the communities are met. Therefore, any grievance from the communities will be resolved using the existing governance structures. This project will adopt the Grievance Redress System used by the TASAF¹¹ but with some modifications, whereby all attempts shall be made to settle grievances amicably. The grievance management mechanism is designed with the objective of solving disputes at the earliest possible time, which will be in the interest of all parties concerned and therefore, it implicitly discourages referring such matters to the national level government authorities or national level courts for resolution.

Communicating the Grievance Management System

The Grievance Management system to be used will be communicated to the project stakeholders during project inception workshop. The stakeholders will have the opportunity to discuss it and proposed any necessary changes. Moreover, the project staff will regularly remind the project beneficiaries on the procedures for submitting their grievances

¹¹URT, (2016). TASAF III Vulnerable Groups Planning Framework

PARTIII B. Describe the measures for financial and project risk management

Table 8: Measures for risk management

Risk Type	Risks Category	Risk Level	Mitigation Measure
Financial risk	Late disbursement of funds	Low	Fund requests and project progress reports will be timely prepared, communicated and submitted to the Adaptation Fund and other relevant stakeholders to ensure adequate feedback is provided to speed up fund’s disbursement. The Project Team will follow required standards and templates as provided by the Adaptation Fund to ensure proper reporting and avoid unnecessary delays.
	Financial control risk	Low	Appropriate structures at the ministerial level and local government authorities exist for proper management and control of the public funds. This project will, therefore, follow these structures and international accounting standards (IAS) and to all Generally Acceptable Accounting Principles (GAAP) to meet all accounting requirements related to reporting, control and transparency and auditing.
Project risk	Project performance	Low	Project Team will be carefully constituted based on skills and capacity to manage project on Climate change intervention as well good monitoring tools to facilitate implementation of this project. Detailed work plans will be developed and be approved by both the Project Steering Committee and NEMC.
	Participation of stakeholders	Low	Participation of stakeholders will consider widely involved from early stages of the project design, implementation, monitoring and evaluation during the entire life of project cycle. Involvement of key stakeholders at community level and inclusion of vulnerable to climate change adaptation communities and groups such as youth, women, local leaders, community beneficiaries, and farmers association as well as responsible ministries will facilitate to mitigating any risks related to stakeholders’ involvement.

PARTIII C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

Pursuant to National Environmental Management Act, 2004 (Tanzania mainland) the project was subjected to an environmental and social assessment; and an environmental and social management plan was developed.

The construction of charcoal dams , earthen dike, fish pond and barbed wire fence s is likely to cause some environmental impacts such as loss of biodiversity due to land clearing, oil spill from the equipment leading to the contamination of soil and dust pollution due to excavation. Moreover, dike construction may lead to soil erosion. The population and workers will be sensitized on health risks — and mainly HIV/AIDS-related risks.

Each project activity has been analyzed according to NEMC's and AF's Environmental and Social Policy requirements in order to identify potential risks and appropriate mitigation measures.

Environmental and Social Management Plan (ESMP) is based on those requirements, with the aim to:

- assessing possible measures to avoid minimize and / or mitigate risks identified;
- develop a monitoring plan
- promote a policy for high quality of environmental and social practices.

All the costs related to mitigation measures and monitoring of environmental and social parameters are include in the project budget.

Table 9: Environmental and Social Management Plan

Principle	Environmental and social Risk Category	Requirement	Management/Measures to be taken	Responsible	Cost (USD)
Compliance with Laws	Risk: Low , Potential impact: High -Workplace Accidents -Child labor and women empowerment	-Induction training, workplace awareness, provide Personal Protective equipment -Prohibit child labor and Implement laws and regulations	-Work closely with NEMC and other regulatory bodies like Water basin, BAWASA. -The project will be compliant with all relevant national laws and regulation including the bylaws set BTC and BDC	PMU	1,000
Access and Equity	Risk: Low Potential impact: Low -Misunderstanding can arises during member selectionof committee or employment	-Ensure highly motivated, skilled and understanding members and employees are selected from different community where local leaders/government has to be involved	-The project will ensure equitable access to project benefits by all community members. -Involve the local community in decision making	-PMU	2,000
Marginalized and Vulnerable Groups	Risk: Moderate Potential impact: Moderate/High -Misunderstanding and discriminationmay arises	-Failure to consult marginalized and vulnerable groups may cause the project to overlook their needs and hence denying them access to project benefits.	-Vulnerable groups has to be considered and be given chance to participate/access the project activities	PMU	1,000
Human Rights	Risk: Low Potential impact: Moderate/High	Not envisaged	The project will adhere to national and international human rights standards, policies, rules and regulation	PMU	1,200
Gender	Risk: Moderate	Establish a	-Gender will be mainstreamed in all		2,000

<i>Equity and Women's Empowerment</i>	Potential impact: Moderate/High -Failure to involve women in project implementations and decision making as well	base/procedure of involving women	project components		
<i>Core Labor Rights</i>	Risk: Low Potential impact: Moderate/High -Recurrence of Incidents & Accidents -Miss understanding between employee and employer -Workplace hazards -Child labor	-Investigate all accident & Incidents and provide protective measure -Make employee to be member of trade union -Provide workplace protective equipment -Stop child labor	-The project will adhere to core labor rights during implementation of the project by involving government and its regulatory bodies like NEMC, -Employee a dedicated person to control all risk and accident also to conduct training and awareness during project implementation	PMU	3,000
<i>Indigenous Peoples</i>	Risk: Moderate Potential impact: Moderate/High -Destruction of the project due to lack of awareness and involvement, strike and insecurity because they are skipped	-Involve the indigenous people in the project site for project sustainability	-The project main target is to address the needs of indigenous people	PMU	1,000
<i>Involuntary Resettlement</i>	Risk: Low Potential impact: High	Not expected	The project design does not require involuntary resettlement.	PMU	0
<i>Protection of Natural Habitats</i>	Risk: Low Potential impact: High	Project interventions should not lead to destruction of natural habitats.	All project interventions will be conducted in a manner that does not lead to significant threat to natural habitats	PMU	2,000
<i>Conservation of Biological Diversity</i>	Risk: Low Potential impact: High -Introduction of trees can alter behavior of microorganisms,	-Local tree species has to be planted rather than favoring exotic species -Follow regulatory bodies	The sites for construction of rainwater harvesting reservoirs will be subjected to baseline assessment to determine existing species and assess any potential risk	PMU	1,500

	reptiles, and birds life adaptation hence lead to loss of biodiversity				
<i>Climate Change</i>	Risk: Low Potential impact: High	Not anticipated	The project will contribute to climate change adaptation. No GHG emissions are anticipated.	PMU	0
<i>Pollution Prevention and Resource Efficiency</i>	Risk: Low Potential impact: High -Waste generation causing disease eruption -Oil Spills leads to hydrocarbons pollution -	-Follow waste management hierarch and laws in place -Use spill kits and conduct preventive maintenance on all vehicles and machines involved in project implementations	-Adhere to established national and international pollution standards. -Develop plan and Procedures for waste management, -Correct waste and dump in designated areas under government	PMU	2,000
<i>Public Health</i>	Risk: Low Potential impact: High -Emerge of respiratory diseases -Sexually Transmitted Disease outbreaks (e.g. HIV/AIDS) -Water borne diseases	-Provision of Personal Protective Equipment for people employed in project implementation -HIV/AIDS awareness -Boiling of drinking water	-The project design will ensure that public health is not adversely affected by following sanitation procedures -Abide with all requirement for Association of Tanzania for Employers (ATE)	PMU	2,500
<i>Physical and Cultural</i>	Risk: Low Potential impact: Moderate/High -Deterioration of archeological	. Conduct ESIA identify all archeological and heritage site	-Involve indigenous people during project implementation and ensure consultations with Archeologists -Stop activities for the area where cultural heritage being identified and	PMU	2,000

<i>Heritage</i>	site Without thorough and careful site selection especially during construction of water infrastructures		inform the authority.		
<i>Lands and Soil Conservation</i>	<p>Risk: Low Potential impact: Moderate/High</p> <ul style="list-style-type: none"> -Alteration and modification of soil profile and structure -Soil and land pollution/degradation 	<ul style="list-style-type: none"> -Ensure soil leveling at the end of job -Soil grouping respect to structure and profile during striping and or pushing/dozing -Encouraging use of manures and organic fertilizers 	-The project will promote conservation of soil and land resources	PMU	1,000
Overall Total					22,200

Table 10: Environmental and Social Monitoring Plan

Component	Potential impacts	Monitoring parameters	Monitoring Frequency	Monitoring Area	Measurement Unit /Indicator	Target Level	Responsible	Costs (USD)
Promoting soil erosion and sediment control measures	Loss of biodiversity	Microorganisms, reptiles and rodents loosed	Annually	Project site	Quantity of biodiversity lost	Minimal loss of biodiversity	PMU	1,500
	Dust emission and Air Pollution	NOx, CH4, SOx, particulate matter	Twice in a year	Project site and surrounding areas	ppm, mg/m3, µg/m3	Tanzania Standards	PMU	2,000
	Loss of vegetation	Plants and vegetation loosed	Annually	Project site	Lost vegetation per m ²	Minimal loss of plants/vegetation	PMU	1,000
	Soil erosion	Soil washout	Quarterly	Project site and surrounding areas	Eroded area size (ha)	Minimal soil washout	PMU	1,500
	Potential for occurrence/outbreak of accidents	Number of PPE's available, Injuries and accidents occurring	Weekly	Project Site and supporting areas	Number of safety measures provided. Records, injuries and inspection	Zero or minimal Number of injuries and accidents	PMU	2,000
	Generation of wastes	Quantity of waste generated determined	Once in a month	Project site	Kgs for solid wastes Litters for liquid wastes	No waste is left unattended TBS (for oil content)	PMU	1,100
	Contamination of ground water	Chemical, Biological & Physical	Quarterly and on discharge	Project site	Kgs, ppm	EMA, 2015 Standards Regulations	PMU	1,100
	Generation of wastes	Quantity of waste generated determined	Once in a month	Project site	Kgs for solid wastes Litters for liquid wastes	No waste is left unattended TBS (for oil content)	PMU	1,000

	Occurrence of HIV/AIDS	HIV /AIDS infection	Annually	Project site	Number of individuals infected	No HIV/AIDS infections	PMU	1,500
Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages	Alteration of soil profile	Soil level	Quarterly	Project Site	m	Standards and Regulations	PMU	1,000
	Soil and land pollution/degradation	Contaminant level	Twice a year	Project Site	ppm, mg/m ³	Standards and Regulations	PMU	2,000
	Soil erosion	Soil washout	Quarterly	Project site and surrounding areas	Eroded area size	Minimal soil washout	PMU	1,500
	Dust emission	NOx, CH ₄ , SO _x , particulate matter	Twice in a year	Project site and surrounding areas	ppm, mg/m ³ , μg/m ³	Tanzania Standards	PMU	2,000
	Soil and land pollution/degradation	Contaminant level	Twice a year	Project Site	ppm, mg/m ³	Standards and Regulations	PMU	2,000
Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts	Soil erosion	Soil washout	Quarterly	Project site and surrounding areas	Eroded area size	Minimal soil washout	PMU	1,500
	Dust emission	NOx, CH ₄ , SO _x , particulate matter	Twice in a year	Project site and surrounding areas	ppm, mg/m ³ , μg/m ³	Tanzania Standards	PMU	2,000
	Dust emission during digging of fish ponds	NOx, CH ₄ , SO _x , particulate matter	Twice in a year	Project site and surrounding areas	ppm, mg/m ³ , μg/m ³	Tanzania Standards	PMU	2,000
Supporting climate resilient and	Dust emission during digging of fish ponds	NOx, CH ₄ , SO _x , particulate matter	Twice in a year	Project site and surrounding areas	ppm, mg/m ³ , μg/m ³	Tanzania Standards	PMU	2,000

environment friendly livelihood activities	Water pollution due to agrochemicals from horticulture farming	Heavy metals, Ammonia, Nitrates	Quarterly	Project site and nearby river streams	mg/m ³	Tanzania Standards	PMU	1,000
	Occurrence of HIV/AIDS	HIV /AIDS infection	Annually	Project site	Number of individuals infected	No HIV/AIDS infections	PMU	0
TOTAL COST								26,700

PARTIII D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

The Monitoring and Evaluation framework of the project will be designed according to the procedures set by the NEMC and by the AF. The Results framework gives the performance indicators against which the project will be evaluated and specifies the baseline as well the objectives to be achieved. The M&E plan includes monitoring of environmental parameters to meet the requirements of ESMP. The detailed M&E plan will be prepared and agreed upon within a month after the project starts. Gender targets and indicators will be included in the detailed M&E plan to be developed.

Table 11: Monitoring and Evaluation Framework

Activity	Responsible Person	Budget	Timeframe
Inception	Project Coordinator	5,000	Within 2 months of project starting
Develop a detailed M&E Plan	PMU, NEMC		Within one month of project starting
Baseline study	Consultant	21,000	Within 3 months of project starting
Regular monitoring	Project coordinator and project staff	19,600	Quarterly
Annual progress report	M &E officer/ Project Coordinator/NEMC	2000	Annually
Steering committee meetings	Project coordinator	6000	Semi annual
Final project evaluation	Consultant	6000	Four months before the end of the project
Final project Report	Project coordinator	3000	End of the project
Audit report	External Audit	3000	By the end of the project
Monitoring environmental parameters	M &E officer	22,200	Annually
Total		87,800	

PARTIII E. Include a results framework for the project proposal, including milestones, targets and indicators.

Table 12: Project results framework

Expected Results	Indicators	Baseline	Targets	Means of Verification	Milestones
Project Goal: Restoration of Lake Babati ecosystem for enhanced climate change resilience for communities in Babati Town Council and Babati District Council					
Enhanced resilience to climate change impacts caused by drought and floods	The percentage of community members resilient to climate shocks	To be established during project Inception whereby a baseline study will be conducted	<p>At least 2000 female farmers and at least 1500 male farmers are practicing irrigation agriculture</p> <p>At least 40 % of male farmers and up to 60% female farmers have access to arable land following construction of dikes for preventing saltwater inundation</p> <p>Household income increased by at least 30% by the end of the project</p> <p>Income of women increased by at least 10% by the end of the project</p> <p>Crop yield increased a least by 20%.</p>	<ul style="list-style-type: none"> • Project progress report • Midterm review report • End of project evaluation • Publication in journal articles 	By the end of the project and beyond
Component 1: Promoting Soil erosion and sediment control measures					
Reduced sediment input into the Lake	<ul style="list-style-type: none"> • Farmers practicing soil and water conservation measures • Number of charcoal dams constructed along the lake buffer 	To be established during the baseline survey	<p>At least 30% of farmers are practicing soil and water conservation measures</p> <p>10 charcoal dams constructed</p> <p>4 km length of earthen dike constructed along the lake</p>	<ul style="list-style-type: none"> • Project progress reports • Midterm review report • End of project evaluation • Publication in journal articles 	By the end of Year 3

	<ul style="list-style-type: none"> Length of earthen dike constructed along the lake buffer 		buffer		
Component 2: Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages					
Improved fish, livestock and agriculture production	<ul style="list-style-type: none"> Area of lake with weeds cleared Number of pastoralists using the weeds as forage to feed animals Number of farmers using the compost manure made from water weeds 	To be established during the baseline survey	<p>Crop yield increase by at least 10% in farms using the compost manure from water weeds</p> <p>At least 200 pastoralists use the water weeds as pasture</p> <p>At least 300 farmers use compost manure made from water weeds</p>	<ul style="list-style-type: none"> Project progress reports Midterm review report End of project evaluation Publication in journal articles 	By first half of Year 3
Component 3 : Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts					
Improved protection of the lake and reduced hippo-human conflicts	<ul style="list-style-type: none"> Length of barbed wire fence constructed along the lake buffer Number of reported cases of crop damage by hippos Number of reported cases of human killing by hippo 	To be established during baseline survey	<p>Barbed wire fence with a circumference of 4km constructed along the lake buffer area</p> <p>Zero cases of crop damage</p> <p>Zero cases of human killings</p>	<ul style="list-style-type: none"> Project progress reports Midterm review report End of project evaluation Publication in journal articles 	By last half of Year 3
Component 4 : Supporting climate resilient and environment friendly livelihood activities					
Increased resilience to climate challenges through climate resilient and environment friendly livelihood activities	<ul style="list-style-type: none"> A gender-sensitive number of farmers doing aquaculture 		<p><u>Environment friendly brick making</u></p> <p>50 women and 150 men will be supported on brick making</p>	<ul style="list-style-type: none"> Project progress reports Midterm review report 	By end of Year 2

	<ul style="list-style-type: none"> • A gender-sensitive number of farmers engaged horticulture farming • A gender-sensitive number of youth doing environmental friendly brick making • A gender-sensitive number of farmers engaged in beekeeping 	To be established during the baseline survey	<u>Aquaculture</u> 100 women and 80 men will be supported for their selected aquaculture livelihood activities <u>Beekeeping</u> 88 women and 76 men will be supported <u>Horticulture</u> 250 women, 200 men and 100 youth (55 girls and 45 boys) will be supported to progress horticulture farming	<ul style="list-style-type: none"> • End of project evaluation • Publication in journal articles 	
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Component 5 : Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning, implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.

Improved capacity of local government authorities and communities in planning and implementing adaption actions	<ul style="list-style-type: none"> • A gender-sensitive number of district officers trained on climate change adaption issues • A gender-sensitive number of ward and village leaders trained • A gender-sensitive number 	To be established during the baseline survey	<ul style="list-style-type: none"> • The capacity building activities of local government officers will include 10 district officers whereby at least 4 shall be women and 20 ward leaders among whom at least 8 shall be women • The capacity building of farmers will involves 200 farmers from various farmers cooperatives whereby 100 farmers will be women and 100 shall be male farmers. • At least 5 different project 	<ul style="list-style-type: none"> • Project progress reports • Midterm review report • End of project evaluation • Publication in journal articles 	By first half of Year 3
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	<p>of farmers from farmers cooperatives trained</p> <ul style="list-style-type: none"> • A gender-sensitive number of project messages disseminated • Number of project documentaries • Number of monthly reflection meetings 		<p>messages disseminated</p> <ul style="list-style-type: none"> • At least 3 project documentaries created • At least 6 news articles about the project appears in national newspapers 		
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F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Table 14: Aligning project components with the Results Framework of the AF

<i>Project Objective(s)</i>	<i>Project Objective Indicator</i>	<i>Fund Outcome</i>	<i>Fund Outcome Indicator</i>	<i>Grant Amount (USD)</i>
1. Promoting Soil erosion and sediment control measures	Number of charcoal dams for trapping sediments constructed Length of earthen dike constructed along the lake buffer area Number of soil and water conservation techniques implemented	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	957,000
2. Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages	Area of lake with aquatic weeds cleared	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	380,000
3. Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts	Length of barbed wire fence constructed Number of reported cases of crop damage by hippos	Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	590,000

<p>4. Supporting climate resilient and environment friendly livelihood activities</p>	<ul style="list-style-type: none"> • Number of farmers doing aquaculture • Number of farmers engaged horticulture farming • Number of farmers engaged in beekeeping • Number of youth engaged in hydraform bricks 	<p>Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas.</p>	<p>6.2 Percentage of targeted population with sustained climate-resilient livelihoods</p>	<p>1,000,000</p>
<p>5. Institutional capacity building of Babati Town Council, Babati District Council and lake adjacent communities in planning, implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.</p>	<ul style="list-style-type: none"> • Number of district officers trained on climate change adaption issues • Number of ward officers trained • Percentage of time and funds allocated for supporting climate change adaption interventions by district councils 	<p>Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level</p>	<p>3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses</p>	<p>463,000</p>
<p>Project Outcome(s)</p>	<p>Project Outcome Indicator(s)</p>	<p>Fund Output</p>	<p>Fund Output Indicator</p>	<p>Grant Amount (USD)</p>

<p>1.Improved restoration of the lake and its ecosystem services</p>	<p>Number of charcoal dams for trapping sediments constructed</p> <p>Length of earthen dike constructed along the lake buffer area</p> <p>Number of soil and water conservation techniques implemented</p>	<p>Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities</p> <p>Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability</p> <p>Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability</p>	<p>4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)</p> <p>4.1.2 Number of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)</p> <p>6.1.1.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community- livelihood strategies</p> <p>6.1.2. Type of income sources for households generated under climate change scenario</p>	<p>957,000</p>
<p>2.Increased restoration of the lake from</p>	<p>Area of lake with aquatic weeds cleared .</p>			<p>380,000</p>

aquatic weeds invasion				
3. Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts	<p>Length of barbed wire fence constructed</p> <p>Number of reported cases of crop damage by hippos</p>	Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	.1.2 Number of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)	590,000
4. Increased income, food security and resilience to climate change impacts	<ul style="list-style-type: none"> • Number of youth engaged in hydraform brick making • Number of farmers doing aquaculture • Number of farmers engaged horticulture farming • Number of farmers engaged in beekeeping 	<p>Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities</p> <p>Output 4: Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability</p> <p>Output 5: Vulnerable ecosystem services and</p>	<p>4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)</p> <p>4.1.2 Number of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)</p> <p>5.1.1 Number of natural resources assets created, maintained or improved to withstand</p>	1,000,000

		<p>natural resource assets strengthened in response to climate change impacts including variability</p> <p>Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability</p> <p>Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities</p> <p>Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts including variability</p>	<p>conditions resulting from climate variability and change (by type and scale)</p> <p>6.1.1. No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community- livelihood strategies</p> <p>6.1.2. Type of income sources for households generated under climate change scenario</p> <p>4.1.1. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type)</p> <p>5.1.1 Number of natural resources assets created ,maintained or improved to withstand</p>	
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		Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	<p>conditions resulting from climate variability and change (by type and scale)</p> <p>6.1.1. No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community- livelihood strategies</p> <p>6.1.2. Type of income sources for households generated under climate change scenario.</p>	
5. Institutional capacity building of Babati Town Council, Babati District Council and lake adjacent communities in planning, implementation of lake Babati restoration measures, climate change adaptation actions and dissemination of project results and lessons learnt.	<ul style="list-style-type: none"> • Number of district officers trained on climate change adaptation issues • Number of ward officers trained • Percentage of time and funds allocated for supporting climate change adaptation interventions by district councils 	<p>Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities</p> <p>Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability</p>	<p>2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events</p> <p>3.1.1 Number and type of risk reduction actions or strategies introduced at local level</p> <p>3.1.2 No. of news outlets in the local press and media that</p>	86,000

			have covered the topic	
			7.2. No. or targeted development strategies with incorporated climate change priorities enforced	

Targets for AF's Core indicators of the project

Table 15: Project indicators and Beneficiaries

Core indicators	Information on the core indicators
Number of Beneficiaries	<p>2500 direct beneficiaries and 500,000 indirect beneficiaries</p> <p><u>Detailed calculation of the direct beneficiaries</u></p> <ul style="list-style-type: none"> - 500 households (2500 persons) - Enhanced capacity of local institutions to mainstream climate change in community develop - Enhanced planning, sustainable natural resources management strategies and to record and communicate the lessons learned of 200 persons (100 by year 2 (half of them women and half of them men) - Informed of local climate change issues and adequate adaptation actions to be implemented for 600 persons (300 adult women, 250 adult men, 50 students (25 girls and 25boys) <p><u>Detailed calculation of the indirect beneficiaries</u></p> <ul style="list-style-type: none"> - All project activities will have an impact on the entire population
Assets produced, developed, improved or strengthened” with the construction of barbed wire fence and earthen dike along the lake buffer area ,	<p>Assets improved or strengthened (in short-term)</p> <ul style="list-style-type: none"> - 4k m of dike - 4km barbed wire fence along the lake buffer area - 500 households - 10 charcoal dams water reservoirs - 4 greenhouses <p>Assets improved or strengthened(long-term)</p> <ul style="list-style-type: none"> - Wards of Nangara, Bonga, Singe and Bagara

<p>“Increased income, or avoided decrease in income”: aquaculture, beekeeping, horticulture, poultry and tree nurseries</p>	<ul style="list-style-type: none"> - The average annual income from horticulture is estimated at US \$ 15,00 from 4th year of the project - The average annual income from sale of honey is estimated at US \$ 10,000 by end of the project
<p>“Natural Assets Protected or Rehabilitated”: reduction of deforestation, improvement of biodiversity,</p>	<ul style="list-style-type: none"> - 50 ha of degraded land planted with trees

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

(a) Summary Budget

Table 16: Budget summary

	Components	Output	Year 1	Year 2	Year 3	Year 4	Total
	<i>Components 1: Promoting soil erosion control measures upstream of the lake catchment</i>						
		1.1	20,000	25,000			
		1.2	204,000	458,000	170,000	80,000	
	Total for component 1		224,000	483,000	170,000	80,000	957,000
	<i>Components 2: Mechanical control of aquatic weeds in the lake and co-generation of compost manures and animal forages</i>						
		2.1	208,000	144,000			
		2.2	21,000	7,000			
	Total for component 2		229,000	151,000			380,000
	<i>Component 3: Securing the Lake Buffer Zone for improved conservation and reduction of hippo-human conflicts</i>						
		3.1		66,000			
		3.2		300,000	224,000		
	Total for component 3			366,000	224,000		590,000
	<i>Component 4: Supporting climate resilient and environment friendly livelihood activities</i>						

		4.1	5,000	275,000	120,000		
		4.2	80,000	50,000			
		4.3	55,000	105,000			
		4.4	90,000	85,000			
		4.5	45,000	75,000	15,000		
	Total for Component 4		275,000	590,000	135,000		1,000,000
	<i>Component 5: . Institutional capacity building of Babati Town Council , Babati District Council and lake adjacent communities in planning , implementation of lake Babati restoration measures, climate change adaption actions and dissemination of project results and lessons learnt.</i>						
		5.1		25,000			
		5.2		25,000			
		5.3	12,000	386,000	7,000	8,000	
	Total for Component 5		12,000	436,000	7,000	8,000	463,000
	Project Execution cost		88,000	81,000	73,000	80,000	322,000
	Total project cost		740,000	1,000,000	1,000,000	650,000	3,390,000
	Management fee		143,288	48,238	48,238	48,236	288,000
	GRAND TOTAL		971,288	1,129,238	1,121,238	778,236	4,000,000

(b) Output Budget

Table 17: Component 1 Budget

Component	Output	Activities	Year 1	Year 2	Year 3	Year 4	Notes
Component 1	1.1	Training of farmers on soil water conservation techniques	10,000				Transport allowance 100 farmers x 6 wards, conference hall costs and allowance for facilitators
		Establishment of demo sites (farmer field schools)	5,000	10,000			labour charges for 5 ha per ward x 6 wards @ \$ 500
		Tree nursery establishment	5,000	15,000			Labour charges and materials for 20 nurseries
		Supply of seedlings for tree planting					Transport costs
Total for Output 1.1			20,000	25,000			

	1.2	Construction of earthen dike along the lake buffer zone	200,000	200,000	50,000		Materials and labour charges for construction of an earthen dike with a circumference of 4 km
		Construction of charcoal dams along the lake buffer zone		250,000	120,000	80,000	labour charges and materials Construction of 10 charcoal dams along lake buffer. Each dam costs \$40,000
		Establishment of water users association (WUA)for lake Babati	4000				DSA, transport costs for awareness raising on importance of WUA
		Training of WUA leaders on good governance, financial management and catchment management		8,000			Costs for facilitators, allowance for participants and conference hall costs
Total for Output 1.2			204,000	458,000	170,000	80,000	

Total for Component 1			224,000	483,000	170,000	80,000
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Table 18: Component 2 Budget

Component 2	2.1	Removal of the aquatic weeds using a harvester machine and other specialized equipment	200,000	142,000		Labour charges and cost for equipment hiring and fuel
		Collection and sorting of the harvested water weeds	8,000	2,000		Labour charges
Total for Output 2.1			208,000	144,000		
	2.2	Using the harvested weeds to feed the livestock	5,000			Labour charges and transport to collection centers
		Production of compost manure from weed residues	8,000	7,000		Labour charges and transport to collection centers
		Training of farmers on compost manure production	8,000			Costs for facilitators, allowance for participants and conference hall costs
Total for Output 2.2			21,000	7,000		
Total for Component 2			229,000	151,000		

Table 19: Component 3 Budget

Component 3	3.1	Baseline assessment to estimate the hippo population		6,000			Consultancy fees
		Cropping the recommended number of hippos		60,000			Cost for capturing and translocating the hippos
Total for output 3.1				66,000			
	3.2	Procurement of materials			200,000	100,000	Purchase of poles and barbed wires for 4 km lake circumference
		Installment of poles and barbed wire			100,000	120,000	Labour charges
		Tree planting along the wire fence				4,000	Labour charges
Total for Output 3.2					300,000	224,000	
Total for component 3					300,000	290,000	

Table 20: Component 4 Budget

Component 4	4.1	Purchase & installation of drip irrigation equipment		55,000			Materials and labour charges
		Purchase & installation of greenhouse units		100,000			Materials and labour charges
		Contribution to Livelihoods Baseline Study	5000				Consultancy fees
		Training of farmers on horticulture production		5,000			Costs for facilitators, allowance for participants and conference hall costs
		Support farmer groups with capital		115,000	120,000		capital for seeds and other farm inputs for horticulture
Total for Output 4.1			5000	275,000	120,000		

	4.2	Contribution to Livelihoods Baseline Study	5000				Consultancy fees
		Construction of water supply system from the lake for watering livestock	30,000				Materials and labour charges
		Construction of water troughs	50,000	50,000			Materials and labour charges
Total for Output 4.2			80,000	50,000			
	4.3	Fish pond construction	34,000	100,000			Materials and labour charges
		Training of farmers	6,000				Costs for facilitators, allowance for participants and conference hall costs
		Contribution to Livelihoods Baseline Study	5,000				Consultancy fees
		Supply of fingerlings	10,000	5,000			
Total for Output 4.3			55,000	105,000			
	4.4	Contribution to Livelihoods Baseline Study	5,000				
		Purchase of hydraform machines	80,000	85,000			Cost for purchase of hydraform machine @10,000
		Training of brick makers on how to use the machines and other topics related to environmental protection	5,000				
Total for Output 4.4			90,000	85,000			
	4.5	Contribution to Livelihoods Baseline Study	5,000				
		Training of beekeepers on apiary management	7,000				Costs for facilitators, allowance for participants and conference hall costs
		Support beehive production	30,000	40,000			Costs for making modern beehives (materials and labir charges)

		Purchase of equipment and protective gears		35,000	15,000		purchase of Honey processing equipment
		Training on honey processing and packaging	8,000				Costs for facilitators, allowance for participants and conference hall costs
Total for output 4.5			45,000	75,000	15,000		
Total for Component 4			275,000	590,000	135,000		

Table 21: Component 5 Budget

Component 5	5.1	Training Needs Assessment		15,000			Consultancy
		Training of District officials		10,000			Costs for facilitators, allowance for participants and conference hall costs
Total for Output 5.1				25,000			
	5.2	Training farmers associations on climate smart agriculture and sustainable and integrated water management practices		10,000			Costs for facilitators, allowance for participants and conference hall costs
		Supporting Community Based Trainers (CBT) in training peer farmers					
		Farmer exchange visit		15,000			
Total for Output 5.2				25,000			
	5.3	Training on enforcement of natural resources laws	7000				Costs for facilitators, allowance for participants and conference hall costs

		Purchase of 3 glass fibre boats to support fisheries management activities for Babati town Council		216,000			
		Purchase of 2 vehicles to facilitate Lake catchment protection activities		163,000			Costs for 2 vehicles
		Maintenance of the boats and vehicles	5000	7000	7000	8000	
Total for Output 5.2			12,000	386,000	7000	8000	
Total for Componen 5			12,000	411,000	32,000	8,000	

(C) Project Execution Cost

Table 21: Project execution budget

Component	Output	Activities	Year 1	Year 2	Year 3	Year 4	Total	Notes
Management fee		Salary for project coordinator	30,000	30,000	30,000	30,000	120,000	Salary top up
		Salary for 2 project officers	24,000	24,000	24,000	24,000	96,000	purchase of vehicle
		computer and office consumables	7,000	2,000	2,000	2,000	13,000	
		Inception Workshop	10,000				10,000	DSAs for participants, transport costs and conference hall charges
		Monitoring visits by Project Steering Committee	5,000	5,000	5,000	5,000	20,000	DSAs and transport costs
		Fuel and vehicle maintance costs	10,000	10,000	10,000	10,000	40,000	

		Mid term review		8,000			8,000	Consultancy
		Final Evaluation				7,000	7,000	Consultancy
		Bank charges	2000	2000	2000	2000	8000	
Total Project Execution cost			88,000	81,000	73,000	80,000	322,000	

(d) Management Fee

Table 22: Project Management Budget for NIE

Component	Output	Activities	Year 1	Year 2	Year 3	Year 4	Total	Notes
Management fee		NEMC staff allowances	18,000	18,000	18,000	18,000	72,000	Salary top up
		Vehicle for monitoring visits	95,000				95,000	purchase of vehicle
		Fuel and vehicle maintenance costs	27,238	27,238	27,238	27,238	108,952	
		Bank charges	3000	3000	3000	3000	12000	
Total Project Management fee			143,238	48,238	48,238	48,238	287,952	

H. Include a disbursement schedule with time-bound milestones.

Table 22: Disbursement schedule

	Upon signature of Agreement	One Year after Project Start	Year 3	Year 4	Total
Scheduled date	August 2022	August 2023	August 2024	August 2025	
Project Funds	828,000	1,081,000	1,073,000	730,000	3,712,000
Implementing Entity Fees	143,288	48,238	48,238	48,236	288,000
Total	971,288	1,129,238	1,121,238	778,236	4,000,000

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

- A. Record of endorsement on behalf of the government¹²** *Provide the name and position of the government official and indicate date of endorsement. The endorsement letter should be attached as an annex to the project proposal.*

Mohammed Khamis Abdulla, Deputy Permanent Secretary, Vice President's Office	Date: 9 th August 2021
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- B. Implementing Entity certification**

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (National Strategy for Growth and Reduction of Poverty 2010-2015; National Climate Change Strategy 2021, Tanzania Vision 2025 and in the National Adaptation Programme of Action (NAPA) 2007) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

⁶. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.



Fredrick F. Mulinda
Implementing Entity Coordinator

Date: 9th August 2021

Tel. and email: Tel. and email: +255 753 240 517,
nieaf@nemc.or.tz / kasigazi.koku@gmail.com

Project Contact Person: Beatrice Mlay

Tel: +255686866483 . Email: beatricemlay44@gmail.com

Annex 1: Endorsement Letter

Letter of Endorsement by Government

UNITED REPUBLIC OF TANZANIA VICE PRESIDENT'S OFFICE

Telegraphic address: "MAKAMU",
Telephone: +255 26 2329006
Fax. No.: +255 26 2329007
E-mail: km@vpo.go.tz



Government City,
Mtumba Area,
Vice President's Office Building,
P. O. Box 2502,
DODOMA.

In reply please quote:
Ref. No: BA.90/201/01/101

9th August, 2021

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Restoration of Lake Babati for enhanced Climate Change Adaptation in Babati District

In my capacity as designated authority for the Adaptation Fund in United Republic of Tanzania, I confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the country.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by National Environment Management Council (NEMC) and executed by World Vision Tanzania in collaboration with Babati Town Council.

Sincerely,



Mohammed Khamis Abdulla
Deputy Permanent Secretary, Vice President's Office

Annex 2 : List of individuals and institutions consulted

STAKEHOLDERS REGISTRATION FORM DURING SITE VISIT FOR COLLECTION OF PROJECT FORMULATION INFORMATION IN BABATI TOWN COUNCIL

S/N	NAME	TITLE/OCCUPATION	MOBILE NUMBER
1.	HON.PAULINE GEKUI	MP-BABATI URBAN	0784470669
2.	HAMISI M. BURA	WEO-NANGARA	0784960909
3.	KESIA S. MSHASHI	MEO-N/ZIWANI	0784744323
4.	MOHAMED R. MOHAMED	MEMBER-STREET	0748496425
5.	PASKAL BWINJIRE	MEMBER-STREET	0786311515
6.	HUSSEIN RASSUU HUSSEIN	CHAIR-STREET	0785286423
7.	IDDI A. AMMA	CHAIR-MANAGHAT VILLAGE	0686126221
8.	EDMUND J. BURA	VEO-MANAGHAT	0787488410
9.	ERNEST MARTIN	CHAIR-DANDARI	0784479907
10.	ROSINA B MRAMBOA	MEMEBER	0782434756
11.	PHABIAN MADA	CHAIR-AYAAAYNG	0692469229
12.	RASHIDI IMBISHA	MEMBER	0684646587
13.	FABIOLA A. KIJUU	MEMBER	0789359615
14.	ANDREW Y. MRAMBOA	MEMBER	0718713344
15.	MARY K. BABUKA	MEMBER	0682696909
16.	HULDA P. MDUMA	MEMBER	0787088075
17.	KRISTINA ABEL	MEMBER	0684203337
18.	VALERIANI ANDREA	MEMBER	0710207161
19.	IDDI DUKTA	MEMBER	0687310249
20.	RAYMOND A. MLAY	MEMBER	0789026513
21.	MWAJUMA ISSAKA	MEMBER	0745113955

STAKEHOLDERS WORKING SESSION FOR FORMULATION OF CLIMATE CHANGE ADAPTATION PROJECT CONCEPT NOTES; NSSF HALL, MOROGORO: 28TH JUNE TO 2ND JULY, 2021

S/N	NAME	INSITUTION
1.	DR. MENAN JANGU	NEMC
2.	DR. SARAH OSIMA	TMA
3.	DR.DOMINICO B. KILEMO	SUA
4.	DR. DINO WOISO	SUA
5.	DR. FADHILA H. ALI	CONSULTANT
6.	ENG.BENJAMIN J. MCHAMPAKA	NEMC
7.	DR. LUCY SSENDI	CONSULTANT
8.	PROSPER U. MOHAMEDI	MOA
9.	ENG.BONIPHACE P. GUNI	NEMC
10.	NASSIR TAHIR ALI	DOE-ZANZIBAR
11.	SANFORD KWAY	PORALG
12.	FREDRICK MULINDA	NEMC
13.	AINE MUSHI	UNCDF
14.	ENG.KISSINA SIMLIZY	MOW
15.	JONAS TULUHUNGWA	NEMC

**STAKEHOLDERS REGISTRATION FORM DURING SITE VISIT FOR COLLECTION OF PROJECT
FORMULATION INFORMATION IN BABATI TOWN COUNCIL**

S/N	NAME	TITLE/OCCUPATION	MOBILE NUMBER
1.	FWEMA H F	TD	0762508050
2.	MONICA MUHOCHI	EO	0686866483
3.	GIFT G. NGATUNGA	WEO-SINGE	0786215718
4.	YAHAYA H. CHOBBU	AEK-BONGA	0784408894
5.	RAPHAEL DAWIDO	MEMBER	0786165566
6.	SIKUU SEREA	MEMBER	0784378242
7.	STEPHANO HERMAN	MEMBER	0742362259
8.	GABRIELNM.MANDA	TEACHER-NAKWA SEC	0693227768
9.	PETER BARAN	CHAIR-KANTU	0785284917
10.	SELINA HOMA	MEMBER	0692208023
11.	JOHN INGI	MEMBER	0683709078
12.	SELEMANI OMARI	MEMBER	0762663319
13.	HIIT LAGWEN	MEMBER	0788518123
14.	STEWARD GIDEME	MEMBER	0693022769
15.	SEFU H. BARAN	MEMBER	0683337527
16.	PAULO ALLY	MEMBER	0784744287
17.	JOSEPH SAFARI	CHAIR-NAKWA	0688000665
18.	KHALFANI I. SAIDI	VEO-NAKWA	0784893444
19.	BEATRICE MLAY	DEMO	0712310011

**STAKEHOLDERS REGISTRATION FORM DURING SITE VISIT FOR COLLECTION OF PROJECT
FORMULATION INFORMATION IN BABATI TOWN COUNCIL**

S/N	NAME	TITLE/OCCUPATION	MOBILE NUMBER
1.	HALFANI A. MATIPULA	DAS-BABATI	0685349533
2.	C.MAKONGORO	RC-MANYARA	0755383877
3.	ABDALLAH MAULIDI	CHAIR-HIMIT VILLAGE	0620227731
4.	SAMWEL MATHIAS	VEO-HIMITI VILLAGE	0787234627
5.	OMARY Y. MAKENGA	VOLUNTEER/VEO	0693096355
6.	PASKALI MANDOO	MEMBER	0785929546
7.	IDDI H. MASAMBA	CHAIR-AMBALAKU	0788399215
8.	MUSA RAMADHANI	MEMBER	0627615009
9.	YUSUFU S. DARA	MEMBER	0682099890
10.	ELIAS T. KEYA	MEMBER	0783496467
11.	EXAUDI G. LAUO	MEMBER	0783063931
12.	ANASTASIA HAIMA	MEMBER	0762935202
13.	FATUMA HAMISI	MEMBER	0759772680
14.	MUSTAPHA M. DAMBADU	MEMBER	0789207525
15.	JUMANNE HASSANI MOHAMEDI	MEMBER	0623700590
16.	ABUBAKARI DARA	MEMBER	0789221200
17.	BURA WIRASI	MEMBER	0684730709

Annex 3: Vulnerability assessment of Lake Babati



VULNERABILITY ASSESSMENT OF LAKE BABATI IN BABATI DISTRICT. MANYARA REGION

Prepared by:

The National Environment Management Council (NEMC)
Directorate of Environmental Research and Management (DERM)
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**VULNERABILITY ASSESSMENT OF LAKE BABATI IN BABATI
DISTRICT, MANYARA REGION**

EXECUTIVE SUMMARY

Lake Babati is within the East African Rift valley in Manyara region in Tanzania and it is a fresh water lake in semi-arid environment. Lake Babati basin covers approximately 18 km² whose water is collected from internal springs and surrounding hills of its catchment's areas.

In recent years, lake Babati has been experienced enormous spread of aquatic weeds, submerged in water with high growth rates. These aquatic weeds have rooted in the shallow water spreading towards the deep part of the lakes. The growth of these aquatic weeds is threatening other uses of the lake such as fishing and navigation activities. If no initiatives will be taken into consideration, there is a possibility that the surface area of the lake will be reduced rapidly. On this basis, Babati Town Council requested a support from National Environmental Management Council (NEMC) to uproot the aquatic weeds and propose the measures to reduce or eliminate these Aquatic weeds completely.

NEMC therefore, composed a team of experts from NEMC, UDSM, RS and BTC to assess at what extent the aquatic weeds affect the lake and the surrounding community. Specifically, the experts were requested to (i) identify anthropogenic activities associated with the increase of aquatic weeds in the lake, (ii) visit the lake and observe the aquatic plants and its coverage around and within the lake, and (iii) discuss with different stakeholders about ongoing activities/projects and measures to be taken to protect the lake.

The composed team visited the lake and collected the information for Four days from 8th -12nd June 2021. The information was collected through (i) Literature review (ii) Stakeholder consultations (iii) Physical field visits (iv) Field observation.

According to the group discussion with villagers, most of the activities that threaten the Lake include the poor farming upstream and around the lakes, over grazing, bricks making, illegal fishing, poor solid waste managements, Domestic uses (e.g., washing clothes around the lake and Car wash). The poor farming is the sources of nutrients input into Lake Babati. This nutrient which are in a form manure and fertilizers enter lakes through runoff. Both siltation and nutrients are the sources of the Aquatic weeds observed in the lake.

The aquatic weeds have been covering the large area around and, in the lake, Babati. The covered area with aquatic weeds starts from the shore spreading up to the depth of 3m of the lake. For the moment, the aquatic weeds are limited to around the depth of 3meters although there is a possibility of aquatic weeds spreading towards the deeper part of the lake. The growth and the spreading of these aquatic weeds has seriously affected about 760 fishers which relying on the fishing activities. The fishes hide into these submerged weeds and become difficulty to be trapped.

Without taking initiatives, the current situation shows the lake Babati is heading towards dying and disappearing. This situation will cause significant economic impact because a higher percentage of their communities are engaged and depends on fisheries, livestock, agriculture and small entrepreneurship. In this regards, the lake's disappearance will significantly affect their living conditions and the economy as a whole. To ensure effective and sustainable management of Lake Babati, the study team recommends, to review the lake Boundaries including reestablishment of adequate buffer zones (60 meters). The team also recommends that the local communities adjacent to Lake Babati and other relevant stakeholders should be well informed on the noted land use changes and the associated impacts to the Lake resources. This can be done through awareness creation and capacity building in terms of both technical and financial capacity among local communities and district officials on how to ensure sustainable management of the Lake and its resources. It also recommended that the current mitigation measures in particular law enforcement should be reviewed and emphasized to be participatory so as to develop sense of ownership among all Lake Stakeholders including local communities who are main users of the Lake and its resources.

ACKNOWLEDGEMENT

The success of this work is due to the efforts of many people. It is not possible for a single individual to cover all the aspects that has made this assessment study into being and the National Environment Management Council (NEMC), I therefore deeply grateful to all those who have, with such good grace given their time and energy to supply valuable opinions, facts or even moral support.

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May God bless you all.

LIST OF ABBREVIATION

NEMC	National Environment Management Council
RAS	Regional Administrative Secretary
GDP	Gross Domestic Product
UN	United Nation
EMA	Environmental Management Act
URT	United Republic of Tanzania
BTC	Babati Town Council
VEOs	Village Executive Officers
WEOs	Ward Executive Officers
RS	Regional Secretariat
UDSM	University of Dar es Salaam
FGD	Focus Group Discussion
BMUs	Beach management Units
DO	Dissolved Oxygen

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
ACKNOWLEDGEMENT	iv
LIST OF ABBREVIATION	v
TABLE OF CONTENTS	vi
LIST OF FIGURES	ix
LIST OF PLATES	ix
1.0 INTRODUCTION	10
1.1 General Introduction	10
1.2 Objectives of the Assignment	11
1.3 Overview of Babati Town Council	11
1.3.1 Location, Boundaries and Geographical Setting	11
1.3.2 Climatic conditions and Vegetation	11
1.3.3 Population	12
1.3.4 Economic Activities	12
1.4 Literature Reviews	12
1.4.1 Importance of Lakes	12
1.4.2 Description of Lake Babati	13
1.4.3 Anthropogenic Pressure on the Lake Babati	14
1.5 Aquatic Weeds	15
1.5.1 Causes of Aquatic Weeds in Lakes	16
1.5.2 Effects of Aquatic Weeds in Lakes	16
1.5.3 Controlling of Aquatic Weeds in Lakes	17
2.0 METHODS	18
2.1 Introduction	18
3.0 RESULTS AND DISCUSSION	20
3.1 Anthropogenic activities associated with the increase of Aquatic Weeds	20
3.1.1 Poor Farming Practice	20
3.1.2 Overgrazing	21
3.1.3 Fishing Activities	22
3.1.4 Bricks Making Activities	22
3.1.5 Domestic Uses	23

3.2	Aquatic Weeds and its Coverage at Lake Babati	23
3.2.1	The Magnitude of Effects of Aquatic Weeds to Lake Babati	26
3.3	Ongoing Management of Lake Babati	26
3.3	Proposed measure for controlling Aquatic Weeds at Babati	27
4.0	SUMMARY, CONCLUSION AND RECOMMENDATIONS	28
4.1	Introduction	28
4.2	Summary of the Study	28
4.3	Conclusion	28
4.4	Recommendations	29

LIST OF FIGURES

Figure 1.1: Google map showing the lake Babati	13
Figure 1.2: Different Aquatic weeds in the lake	16
Figure 3.1: The coverage area of aquatic weeds in Babati Lake.....	24

LIST OF PLATES

Plate 2.1: Stakeholders Consultation meetings at Nangara Ziwani and Majengo Mtaa.....	18
Plates 3.2: Livestock activities along Nangara Ziwani.....	21
Plates 3.4: Bricks making activities and environmental degradation at Himiti village.....	22
Plate 3.5: Cutting of trees for bricks making at lake buffer zone	23
Plate 3.6: Lake water use for washing clothes.....	23

1.0 INTRODUCTION

1.1 General Introduction

The freshwater Lakes of Tanzania including Victoria, Nyasa and Lake Tanganyika (URT,2013), and Babati, are undergoing successive dramatic changes. Intensive non-selective fisheries, extreme changes in the drainage basin vegetation, industrialization, agricultural developments dams and the introduction and invasion of exotic species are among the factors that have led to the destruction of the native and endemic components of the Lakes (Nonga, 2012). The lakes have been loaded with nutrients which accelerate the growth of Aquatic weeds.

Aquatic weeds are those unabated plants which grow and complete their life cycle in water and cause harm to aquatic environment directly and to related eco-environment relatively. Aquatic weeds often reduce the effectiveness of water bodies for fish production. They can assimilate large quantities of nutrients from the water reducing their availability for planktonic algae (Lancar and Krake, 2002).

Aquatic weeds interfere also with navigation and recreation. They may also cause reduction in oxygen levels and present gaseous exchange with water resulting in adverse fish production. Although excessive weed growth may provide protective cover in water for small fish growth it may also interfere with fish harvesting. Dense growth of aquatic weeds may provide ideal habitat for the development of mosquitoes causing malaria, encephalopathy filarasis. These weeds may also serve as vectors for disease causing organisms and can greatly reduce the aesthetic value of water bodies from a recreational point of view (Lancar and Krake, 2002).

Free-floating plants (e.g., water hyacinth) attract attention because their often-massive infestations are so obvious. They move with wind and floods, and some have stopped river or lake navigation. They float free and never root in soil. Submersed plants (e.g., hydrilla) complete their life cycle beneath the water. Emersed aquatic weeds (e.g., common cattail) grow with their root system anchored in bottom mud and have leaves and stems that float on water or stand above it. They grow in shallow water, but all can impede flow, block boat movement, clog intakes of electric power plants and irrigation systems, and hasten eutrophication (Lancar and Krake, 2002).

In Tanzania the aquatic weeds especially water hyacinth was observed in 1955 in river Sigi (LVEMP, 1999). Since its first appearance in the Lake Victoria in 1987 waterhyacinth has continued to invade water bodies and wetlands in most of Tanzania lakes (Ndunguru et al., 2001). Aquatic weeds have currently spreading in small lakes and lake Babati is not exception. They are progressively increasing in lake Babati due to ongoing siltation process. In late 1990s, Babati Lake was surrounded with Acacia trees and emersed aquatic plants such as cattils/Typha (Katonge, 2018), the submerged plants were not common. In recent years, lake Babati has been experienced enormous spread of aquatic

weeds, submerged in water with high growth rates. These aquatic weeds have rooted in the shallow water spreading towards the deep part of the lakes. The growth of these aquatic weeds is threatening other uses of the lake such as fishing and navigation activities. Also, if no initiative will be taken into consideration, there is a possibility that the surface area of the lake will be reduced rapidly. On this basis, Babati Town Council requested a support from National Environmental Management Council (NEMC) to uproot the aquatic weeds and propose the measures to reduce or eliminate these Aquatic weeds completely.

1.2 Objectives of the Assignment

NEMC therefore, composed a team of experts to assess at what extent the aquatic weeds affect the lake and the surrounding community. Specifically, the experts were requested to do the following:

- i. To identify anthropogenic activities associated with the increase of aquatic weeds in the lake.
- ii. To visit the lake and observe the aquatic plants and its coverage around and within the lake.
- iii. To discuss with different stakeholders about ongoing activities/projects and measures to be taken to protect the lake.

The team composed of experts from NEMC, UDSM, RS and BTC visited the lake and collected the information for Four days from 8th -12nd June 2021.

1.3 Overview of Babati Town Council

1.3.1 Location, Boundaries and Geographical Setting

Babati is a small town in Babati District of Manyara Region of Tanzania. It is the administrative capital of the district and also the administrative capital of Manyara Region. The new status boosted the town into rapid growth. Since Babati town received the role as district and regional capital, the urbanization process and economical activities increased. Babati town is accessible from the main road between the larger cities Arusha and Dodoma, which enable the food supply, marketing and retailing of processed and readymade foods from outside to Babati town (Lyding, 2009, Katonge 2018).

1.3.2 Climatic conditions and Vegetation

Babati receives an average rainfall between 450mm and 1,200mm per year, with two rainy seasons. The short rain begins in October and ends in December while the long rainy season starts in January with dry spell during February and ends in May. Also, the region has an average temperature ranging from 13⁰C to 33⁰C depending on altitude and season. The region is usually cool during June through September and warm from October to April. Some areas along the rift valley experience subtemperate type climate as a result of agroecological zone's influence.

1.3.3 Population

According to the 2002 population census, Babati town has a population of 31,077 people of which 28,000 equivalent to 90% of the total population live in the town proper, covering the areas of Babati, Maisaka, and Bagara. 3,077 people, equivalent to 10% live in the peri - urban area of Nangara village. The town's population Growth Rate is estimated at 3.8% annually (URT, 2003). Since 2002 Babati was promoted and become headquarter of Manyara Regional, many people from other regions immigrate into the town for business, work and looking for other opportunities. By 2009, population in Babati Town was estimated to be 74,000 of which 40,000 live in town proper and 34,000 in peri-urban (URT, 2003). According to the national population census of 2012, the Council had a population of 93,108.

1.3.4 Economic Activities

Main economic activities in Babati Township include agriculture, fisheries, livestock, small-scale industries and commercial activities. Agricultural and livestock keeping are the main economic activities carried out within the council at an average of 80% of total population. The main crops cultivated around Lake Babati are maize, beans sorghum, groundnuts, castor oil, pigeon peas and cotton. Agriculture is the major source of income in the area and maize is the main food crop. The vegetables most commonly cultivated are tomatoes, and cabbages which are grown around the lake and the horticultural crops cultivated are bananas, pawpaw, oranges, lemons, and guavas. A small amount of Robusta coffee and sugarcane is grown around the lake as cash crops; all these activities accelerate degradation of lake shores. Cattle are the dominant species of livestock kept around lake and other are goats and sheep (Waggoner, 2006; Gwandu, 2013).

1.4 Literature Reviews

1.4.1 Importance of Lakes

The importance of Lakes is not only accounted for their being highly productive, biologically rich and providing many ecological services, but also their support to both biodiversity and the economy (McCartney et al., 2004). They are natural assets which make significant contributions to the national economies (Munishi et al., 2003; McCartney et al., 2004; URT, 2007). Despite their large size, Lakes are sensitive to the effects of a broad range of environmental pollutants from anthropogenic activities such as agricultural and urban runoff, industrial and municipal facilities, spills and hazardous waste sites (Sunil and Chippa, 2013). Urbanization, accompanied by industrial growth, brings an increase in the number of municipal water and sewage treatment facilities and industrial plants that discharge effluents into the Lakes (Safari et al., 2012).

1.4.2 Description of Lake Babati

Lake Babati is within the East African Rift valley in Manyara region in Tanzania and it is a fresh water lake in semi-arid environment. Lake Babati basin covers approximately 18 km² whose water is collected from internal springs and surrounding hills of its catchment's areas. On the Northern East part of the lake there was mount Kwaraa and Ufyomi forest. However, the ecosystem of Lake Babati has been under pressure due to over exploitation of its resources mainly arable land, water resources, as well as fodder and its grazing land potential (Gwandu, 2013).

The Lake Babati is located in Babati town ship at a junction of equal distance from Arusha, Singida and Dodoma regions, which is about 168 km from Arusha, and 700 km from Dar es Salaam city and 650 km from Mwanza City. It is an approximate average attitude of 1300m above sea level. Lake Babati is located along longitude 35° 45'E and latitude 4° 15'S and 4° 18'S and 35° 42'E. The study was carried among local communities of five village namely: (i) Nangara Ziwani (ii) Nakwa (iii) Himiti (iv) Ngarenaro and (v) Majengo in Babati town ship.



Figure 1.1: Google map showing the lake Babati

1.4.3 Anthropogenic Pressure on the Lake Babati

Lake Babati biodiversity is under stress from a number of factors. For example, in the Lake Babati watershed, invasive species, habitat loss, degradation and fragmentation, rapid residential growth and infrastructure development, unsustainable agriculture practices, pollution of tributaries and open waters, altered hydrology, mining and harvest of fish and forests (Anon, 2006; Gwandu, 2013).

The most anthropogenic activities carried out within and outside the area surrounding the lake include uncontrolled grazing, cultivation, extraction of building minerals (sand and stone), tree clearing, use of fishing gears and other human activities. This means that, any degrading factor due to outside activities has great influence inside the Lake on water purity, ecosystem performance and reduce water level (Anon, 2006; Gwandu, 2013).

1.4.3.1 Land use Changes

There are dramatic land use changes in Babati Town especially in the catchment area of Lake Babati in the period 1990 –2010 and these changes have negative impacts in terms of loss of natural habitats for both flora and fauna, causing negative impacts to both aquatic species and people (Lyding, 2009; Hariohay, 2013). Conservation educations, land use planning, family planning to reduce rate of natural population growth and income generating projects should be emphasized in the conservation of the lake Babati environment (Hariohay, 2013).

1.4.3.2 Population Expansion around Lake Babati

Babati is a fast-growing town. Since it became Town Council and Head Quarter for Manyara Region in 2002, more people have moved to the town looking for work and a lot of bureaucrats have also been transferred there. There are many challenges to a growing town. Housing, transport and working opportunities are the main concerns. But solid and liquid waste management is also a challenge (URT, 2003).

1.4.3.3 Overgrazing

Overgrazing around Lake Babati shore reduces lakeside vegetation and eliminating food for aquatic and wildlife (Obando, 2008). This causes the reduction of vegetation and exposing the lake shores into a risk of erosion. Sedimentation as a result of erosion tends to reduce the lake capacity, resulting in decreased water supply, flood control, water quality, and impairment of aquatic life and wetland habitat (Kent, 1994). The depletion of vegetation from lake shores areas causes increase erosion and gully formation. The cattle are dominant species of the animals kept around Lake Babati. The cattle are important sources of income and traditionally are sources of pride and status among the pastoralists. The impacts of heavy grazing of cattle are often readily apparent along the lake shores that affected water bodies (Moore et al., 1984; Glenney et al., 1987; de Winton et al., 1992). Livestock usage of lake margins is disproportionately high, particularly in

seasonally hot dry climates, because they provide access to drinking water and source of succulent vegetation. Cattle directly affect marginal vegetation (Ellison, 1960; Reinoldii et al., 1975; Platts, 1978; Belsky, 1986). Pastoralists such as the Maasai of East Africa adapted life in arid lands by designating wet and dry season grazing areas (Berger, 1993). Their use of the rangelands was based on mobility, splitting and dispersing livestock over the landscape during wet and dry seasons (Oba et al., 2000) to ensure limited dry concentrated continuous grazing around the wetland and degraded lake shore. The sphere of the Maasai in Kenya and Tanzania is continually experiencing dramatic changes in land tenure and land use, with broad consequences on the rangeland dynamics (Campbell et al., 2000) through the establishment of wildlife protection areas (Western and Wright, 1994). In Kenya, the Maasai land was transformed from communal into group ranches in the 1960s (Graham, 1989).

1.4.3.4 Illegal Fishing

The detrimental impact of illegal fishing in all its forms deplete fish stocks in Lake Babati, damaging fish ecosystems and disrupting the livelihood of lawful fishers (Agnew and Barnes, 2004). Fish are an unconfined resource and up until recently, exposed to uncontrolled exploitation. Most of illegal fishing practices in lake Babati are undersized fishing nets like mosquito net, kokoro (sein net), nets of timber. Others are katuli, chicken wire mesh and poisonous plants, which are illegal and harm surrounding habitat.

This exploitation has been exacerbated over the course of the twentieth century and into the current century through the use of large-haul, highly destructive fishing methods (e.g., Use of undersized nets, chicken wire mesh and mosquitos' nets), an indiscriminate approach from many fishing nations as to where, how and what they fished and soaring market prices (Balton, 2004). Some fishing techniques also may cause habitat destruction. Poisoning i.e., use Ichthyotoxic plants (*Utupa*) in fishing, which are illegal.

1.5 Aquatic Weeds

The simplest definition of a weed is a plant that is a nuisance. Thus, an aquatic weed is an aquatic plant which interferes with the use of water, or in some other way constitutes a nuisance to man or hazard to human welfare. However, in contrast with single purpose systems such as an agricultural crop in which weeds are readily identified as such, water bodies frequently have more than one use, and assessment of the weediness of a plant may be confused when it interferes with one use. such as navigation, while promoting another, such as fish production (Balton, 2004).

Submersed plants are rooted in the bottom sediments and grow up through the water. Flowers or flowering spikes sometimes emerge above the water surface. The main criteria for identification are leaf arrangement and leaf shape.

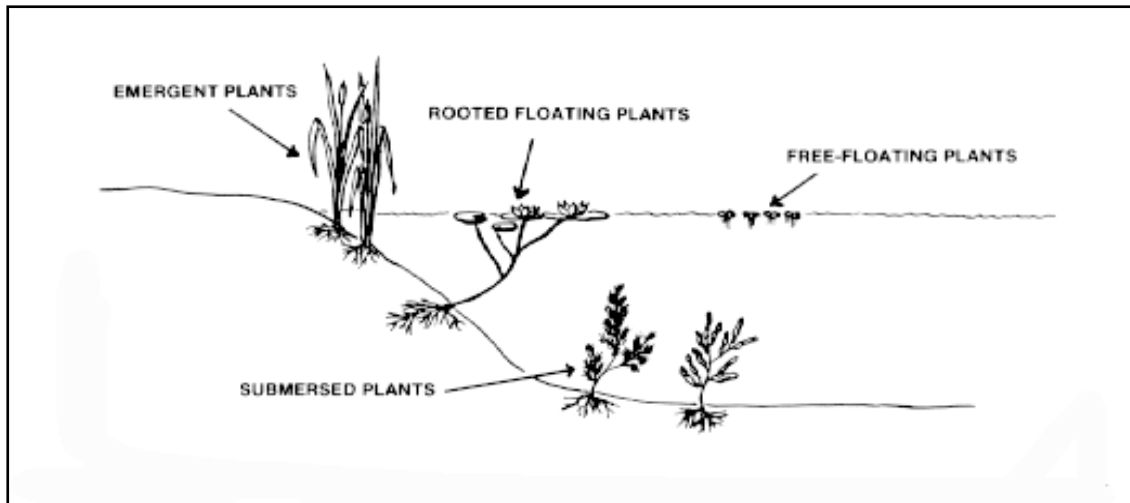


Figure 1.2: Different Aquatic weeds in the lake

1.5.1 Causes of Aquatic Weeds in Lakes

Many aquatic weeds or their seeds are carried into a lake by wind birds, fish introduction, fishermen, etc. These weeds infest a lake only if the water conditions are just right. This usually means that nutrients are entering the lake from runoff or stream inflow.

1.5.2 Effects of Aquatic Weeds in Lakes

Aquatic weeds can assimilate large quantities of nutrients from the water reducing their availability for planktonic algae. They may also cause reduction in oxygen levels and present gaseous exchange with water resulting in adverse fish production

Aquatic weeds cause a variety of problems in water bodies all over the world. They interfere with water flow in and out of the lakes; impede the movement of boats for transport, fishing and recreation; interfere with various methods of catching fish; degrade water quality by adding taints and odours to the water and by decreasing dissolved oxygen content; alter the flora and fauna of aquatic ecosystems by providing new habitats, removing others and by affecting light penetration in the water; and increasing water loss through evapotranspiration (Mitchell, 1985; Aloo *et al.*, 2013; Bansal *et al.*, 2019).

Apart from the negative effects, aquatic weeds form an important element of the aquatic environment as they provide food and shelter for insects, fish and various forms of wildlife. Other uses of aquatic weeds include: food for livestock; as compost manure, mulch or other forms of soil additives; for treatment of wastewaters; for pulp, paper and fibre production for building and weaving; and for energy either for burning directly or for generation of biogas and alcohol (Michell, 1985; National Research Council, 2002).

1.5.3 Controlling of Aquatic Weeds in Lakes

1.5.3.1 Mechanical Control

Manual and mechanical methods such as cutting and dredging are potential ways to deal with excessive growth of aquatic weeds in lakes. Mechanical devices such as dragline excavators, hydraulic back-actors, backhoes as well as small designed tools may be used to remove aquatic weeds (Lishawa *et al.*, 2017; Bansal *et al.*, 2019). However, parts of the weeds left in the water after cutting will decay and generate a considerable demand for oxygen. This can adversely affect aquatic life, for example, fish kills, may occur when a large amount of vegetation has been cut in a small water body. For this reason, this technique should combine both a system for cutting and harvesting/collection of the cut plants. This not only reduces the risk of oxygen deficits but also makes it possible to make use of the harvested material (Samiei and Mabaraki, 2019).

1.5.3.2 Water Level Manipulation

Water level manipulation is used in different parts of the world to control emergent aquatic weeds such as *Typha species* and *Cyperus species* through flooding and desiccating substrates (Asamoah and Bork, 2010; Bansal *et al.*, 2019). However, this method becomes most effective when combined with other management techniques for example burning and cutting. Also, the technique, needs to be carefully done as in some wetlands, especially those with organic soils, extensive desiccation increases inorganic nutrients which may exacerbate re-invasion of aquatic weeds (Bansal *et al.*, 2019).

1.5.3.3 Chemical Control

There are specific herbicides that are used to control aquatic weeds in lakes such as imazomox and imazapyr (Bansal *et al.*, 2019). These herbicides are classified as systemic (absorbed and translocated throughout the plant) and are considered non-selective (kill or damage all plants). Applications of these herbicides are typically carried out as foliar treatments by ground applicators using tank sprayers, but large treatments can be performed using aircraft. However, Herbicide treatment efficacy is reportedly season-dependent and needs to be selectively done to avoid damage of untargeted plants (Samiei and Mobaraki, 2019).

2.0 METHODS

2.1 Introduction

Methods used to collect data for this study were information obtained from literature; Stakeholder and key informant interviews; as well as Physical field visits. Details for each method used are given hereunder.

Literature review: Relevant documents were collected and reviewed, which included among others, relevant policies, legislation, study reports, District environmental, socio-economic and investment profiles.

Stakeholder consultations: Consultations with key stakeholders were done to offices of Regional Commissioner, Town Director, Environment and Fisheries Departments Respective Mtaa and Villages as well as individuals to get their views and perceptions on the causes and effects of aquatic weeds and the ecosystems surrounding Lake Babati area. Also, possible management actions that could be taken to ensure sustainable socio-economic development and environmental conservation were suggested.



Plate2.1: Stakeholders Consultation meetings at Nangara Ziwani and Majengo Mtaa

Physical field visits: Site visits were undertaken in specific areas to identify the extent/level of aquatic weed coverage, land degradation and pollution, human encroachment and siltation. Where necessary photographs were taken (See Plate 2.1). This method also assisted the team to compare the existing land uses with those provided by the key informants/stakeholders and to obtain reliable data of the study area.

Field observation: The field excursions were conducted in those specific areas for fact finding and to observe the current state of the environment and socio-economic activities in specific lake ecosystems. Key areas of focus in the assessment were: observe different types of activities undertaken by community members such as crop farming, livestock grazing, fishing, grasses and trees cutting and unplanned settlements. Also, the researcher observed different effects caused by human activities which found in the study

area. Field observation was used to collect data, specifically around the lake and agricultural principles employed in the villages surrounding Lake Babati.

3.0 RESULTS AND DISCUSSION

3.1 Anthropogenic activities associated with the increase of Aquatic Weeds

Through the stakeholder's consultation it was realized that various anthropogenic activities are prevailing in the study areas which include cultivation, fishing, livestock keeping, brick making and beekeeping. Regarding Lake Sustainability, numerous negative impacts due to anthropogenic activities (See Plates 3.1) were cited to threaten the Lake. Respondents in all villages revealed encroachment (See Plates 3.2). No environmental impact assessment was done before construction and deforestation as the major impacts to the Lake. These results could be because, communities have cultivated within the buffer zone leading to loss of pastures for hippo. Thus, degradation of riparian zones not only affects the riparian area but also the surface and ground water resources and the aquatic fauna and flora; and the terrestrial ecosystem (Roger, 2001). Himiti, Nakwa and Nangara Ziwani respondents on the other hand were having concern on soil erosion and siltation in which brick making was taking place at alarming rate leaving large gullies in the buffer zones. The ecological implication of such erosion could be the deposition of eroded sediments in the Lake hence damaging the spawning grounds of fish. Siltation process suggests the ongoing decrease of Lake Babati depth as it is documented by BTC (2007) that, it has changed from 8 to 5 meters between 2004 and 2011.

On the other hand, aquatic weeds both submerged and emergent need a substrate for their roots. Therefore, all activities that promote the increase of siltation in the lake also accelerate the increase of Aquatic Weeds in the lake. Siltation is associated with the decrease of the lake depth, and hence provide a right condition for aquatic weed especially submerged and emerged plants. The sediments that brought into the river from upstream, they are carrying nutrients into the lake which promote the growth of aquatic weeds. According to the group discussion with villagers, these activities; the poor farming upstream and around the lakes, over grazing, bricks making, illegal fishing, poor solid waste managements, Domestic uses (e.g., washing clothes around the lake and Car wash)

3.1.1 Poor Farming Practice

Poor farming practices around lake Babati strongly influences the presence of chemicals in water such as pesticides, herbicides and fungicides just to mention a few which on the other hand impacts the quality of water in the aquatic systems as these chemicals are carried by surface flowing water into the lakes. The cultivation along the lake also influences the presence of plant organic matter in rivers and lakes which results into a reduced amount of Dissolved Oxygen (DO) in water as this is the case the for presence of aquatic animals is also affected as these animals cannot survive at low level of DO. Therefore, the cultivation of crops along the lake should be strongly avoided, not just

because it influences the decreased amount of dissolved oxygen and loading of organic matter but the practice also encourages the siltation of rivers leading to the decrease of the depth of the lake.

Nutrients from manure and fertilizers enter lakes through runoff and soil erosion from upstream through big gully from Nakwa Village, Riroda, Hoshan, Bonga and Himiti. This runoff may contain a high level of these dissolved nutrients, increasing the risk of contaminating lakes. This facilitates aquatic weed in lake Babati.



Plates 3.1: Farming activities along Nangara Ziواني

3.1.2 Overgrazing

Most livestock keepers around lake Babati use green belt as grazing area with large number of livestock. Overgrazing reduces ground cover, enabling erosion and compaction of the land by wind and rain, which reduces the ability for plants to grow and water to penetrate soil which harms soil microbes and results in serious erosion of the land. This facilitates aquatic weed and reduce water quality.



Plates 3.2: Livestock activities along Nangara Ziواني

3.1.3 Fishing Activities

Fishing is among the important income generating activity of the local communities in Babati District. The lake Babati has the area of 18 km and depth of 5.9. The dominant fish species of the lake are Tilapia *Oreochromis esculentus* and African catfish *clarius gariepinus*. Others are Haplochromes and freshwater shrimps which mostly of the fishermen used them as fishing bait. Most fishing vessels used in the lake are traditional craft of dugout canouns made up of trees propelled by paddles. There are about 131 registered fishermen in the lake until March 2021. The mostly fishing gears used are monofilament, gillnets, hand line, castnets and chicken wire.



Plate 3.3: Fishing activities at Nangara and illegal fishing gears used

3.1.4 Bricks Making Activities

Most of these activities are conducted outside the lake area at Himiti and Managhat Village but has direct impact on land, bricks making leave land with holes making it not suitable for Agriculture and also contribute degradation of land and aquatic environment.



Plates 3.4: Bricks making activities and environmental degradation at Himiti village



Plate 3.5: Cutting of trees as a source of Energy for bricks making at lake buffer zone

3.1.5 Domestic Uses

Domestic activities such as washing clothes near the lake increases amount of Phosphate which is the nutrient requirement for aquatic weeds growth. Based on the observation, communities around use lake water directly for drinking, cooking, bathing and washing clothes (Plate 3.6).



Plate 3.6: Lake water use for washing clothes

3.2 Aquatic Weeds and its Coverage at Lake Babati

Aquatic weeds cover the large area around and within the lake Babati. The covered area with aquatic weeds starts from the shore spreading up to the depth of 3m of the lake. For the moment, the aquatic weeds are limited to around the depth of 3meters although there is a possibility of aquatic weeds spreading towards the deeper part of the Lake (Figure 3.1).

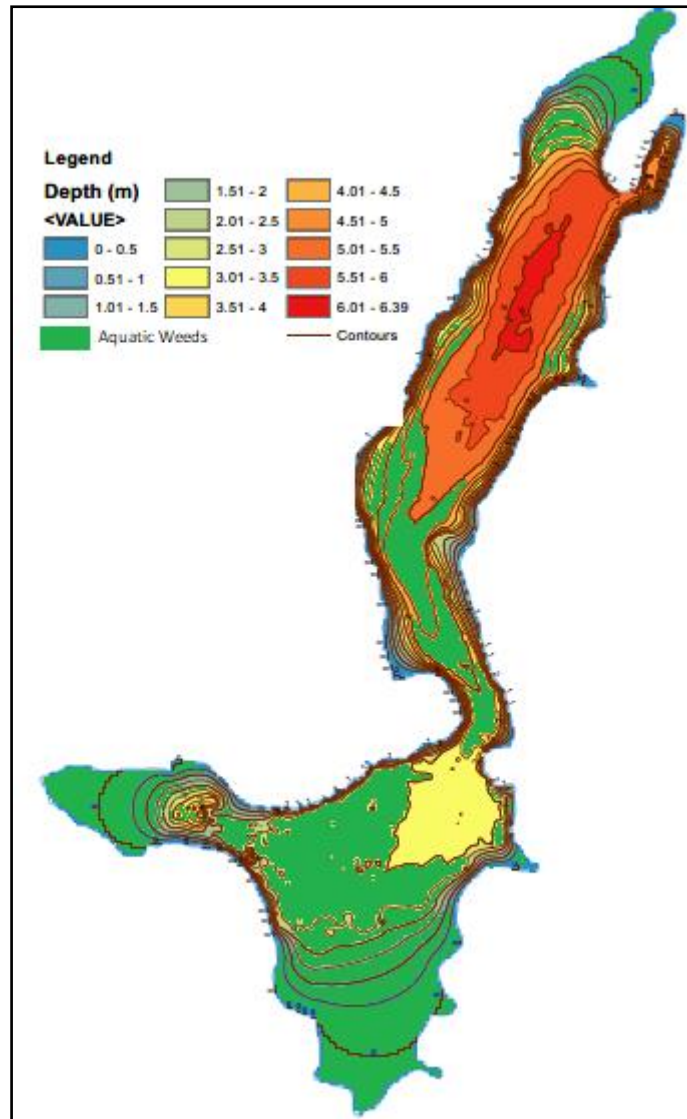


Figure 3.1: The coverage area of aquatic weeds in Babati Lake.

Based on the stakeholder meetings from the villages around the lake, the Local Government including experienced fishers explained that during 1990s, the lake had neither aquatic weeds nor mud. The lake was only surrounded by emergent aquatic weeds (*Typha* species) which were used for construction especially roofing their houses. The submerged and floating aquatic weeds was observed first after the El' Nino, in 1998. During this time, the lake invaded by new weeds which locally is known as "*Maranda*". This is the kind of aquatic weeds that grow and spread within the water without appearing at the surface water (Plate 3.7).

By then, the growth rate and spreading of "*Maranda*" (submerged weeds) was not significant due to the limit of nutrients, high-water level and low siltation of the lake. Approximately five years after the El 'Nino, the *Maranda* spread widely into the lake and

started to interfere with the fishing activities. The *Maranda* weeds have now grown massively creating a very serious problem in Lake Babati (Plate 3.7)



Plates 3.7: The extent and effects of aquatic weeds in Lake Babati

From the discussion with stakeholder and other scientific studies, we concluded that, the rapidly increase of aquatic weeds on the lake have been accelerated by anthropogenic activities including:

- (i) Agricultural activities contribute to lake damage because of the non-compliance of the 60-metre law along with water sources (Refer to Sub-section 3.1.1).
- (ii) Animal husbandry contributes to pollution in lake due to many livestock deployed directly to the lake for pasture hence causing muddying (Refer to sub-section 3.1.2).
- (iii) Fishing activities especially illegal fishing contributes to the pollution of the lake where local fishers are currently the main victims of such damage as well as the large increase in weeds in the lake (Refer to sub-section 3.1.3)

3.2.1 The Magnitude of Effects of Aquatic Weeds to Lake Babati

The growth and the spreading of Aquatic weeds into the Lake has seriously affected about 760 fishers which relying on the fishing activities. The fishes hide into these submerged weeds and become difficulty to traps them.

Other effect of aquatic weeds includes reduction of the lake size because they spread and cover the large area of water that hinder fishing activities and providing the escaping route for illegal fishermen. The aquatic weeds also deteriorate water quality of the lake due to their decomposition after dying contributing to mud, thus reduce the lake depth and hinder navigation activities. Availability of dense aquatic weeds attracts some local brew to hide themselves during the process of making *Gongo*.

Without taking initiatives, the current situation shows the lake Babati is heading towards dying and disappearing. This situation will cause significant economic impact because a higher percentage of their communities are engaged and depends on fisheries, livestock, agriculture and small entrepreneurship. In this regards, the lake's disappearance will significantly affect their living conditions and the economy as a whole.

3.3 Ongoing Management of Lake Babati

The Babati Town Council in collaboration with locals manages Lake Babati communities adjacent to the Lake. Harvesting process of the Lake resources mainly fish is under license in which fishermen should acquire licenses from the Local Government prior to fishing. The study revealed some strength for the ongoing Lake management that could ensure the enhanced conservation of the Lake and its resources. These include forest conservation along the riparian zone, law enforcement and environmental education.

Provision of environmental education to local communities bordering the Lake was another strength noted by the study. Local people are educated on the negative impacts associated with their anthropogenic activities to the Lake. The local communities through FGD revealed to know the consequences of their illegal activities within and around the Lake but they were constrained by the rampant poverty which made them to continue harvest the Lake resources irrespective the negative ecological impacts likely to happen.

Despite the noted management strengths in ensuring sustainable conservation of Lake Babati, some weaknesses are likely to undermine the conservation efforts were revealed to include the village government through VEOs and WEOs revealed to lack support from Town Government Officials as there were some officials who are deliberately engaging in illegal fishing. However, the Town Council Fisheries Officer asserted shortage of skilled staff coupled with inadequate conservation fund to be the reason for not conducting regular patrols. The study revealed illegal fishing in the Lake even during the period when Lake was closed for sustainable management to ensure effective breeding of fish. Absence

of area for grazing away from the Lake was another weakness associated with poor Land Use Plan. Since Babati District is among the Tanzanian Districts with many livestock about 55, 110 livestock (BTC, 2011) there is a need to have grazing area for proper management of the Lake and avoiding unnecessary land use conflicts.

For proper conservation of the Lake resources and reduce illegal fishing. Similarly, for better results on conservation of the Lake Babati, the study revealed that community should participate in decision making, implementation stage, monitoring and evaluation of the Lake resources rather than remain as the mere beneficiaries. Host communities are valuable asset which must be carefully incorporated into management strategies for successful conservation programme of Lake Babati. Despite good laws for protection of the Lake environment, they were not effectively enforced. There is a lack of coordination among different law enforcement agencies.

3.3 Proposed measure for controlling Aquatic Weeds at Babati

There several methods for controlling the aquatic weeds at lake Babati that can be categorized in three groups. The first group is related to controlling the siltation of the lake by planting of trees for clear boundary demarcation and using contour ploughing, the second group is related to controlling the nutrients and the third category is to raise awareness and establish by laws. This will include, provision of environmental education, review the existing Land Use Plan, draft amendment of the by- laws, closing the Lake during breeding season, enforcement of the fishery and Environment Regulation.

4.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

4.1 Introduction

This chapter summarizes the study and provides a conclusion discussion basing on the findings and related literatures. It also highlights recommendations in relation to the objectives of the study. It further points out the areas for future studies.

4.2 Summary of the Study

This study aimed at assessing the causes and effects of aquatic weeds in Lake Babati. Specifically, the study analyzed and evaluated the negative impacts due to anthropogenic activities to the Lake.

Study results indicate that, negative impacts to the Lake due to anthropogenic activities prevailing in the study area were mainly illegal fishing practices, soil erosion and siltation. Land use changes have occurred in all study villages for all zones such as cultivation, grazing and residence. On average, cultivation and residence zones increased by 3.1% and 4.9% respectively in the study area between 2000 and 2011 while grazing zone decreased by 5.3% in the study area during those years. All these activities increase siltation and substrate in the growth of aquatic weeds.

The major strengths of Lake Babati management are forest conservation along the riparian zone, law enforcement and provision of environmental education. The main weaknesses undermining the ongoing conservation strategies for the sustainable Management of Lake Babati were poor community participation and lack of proper land use plan that should allocate appropriate area for each land use category in particular grazing and cultivation.

4.3 Conclusion

The study concludes that, negative impacts to the Lake due to anthropogenic activities leads to siltation and eutrophication of the lake that accelerate the growth of weeds. The growth and the coverage rate of weeds are high and they spread from the shore towards the deep part of the lake. mainly illegal fishing activities, soil erosion and siltation. To large extent, land use changes have occurred in the study area for all zones such that cultivation and residence areas have increased while grazing area has decreased between 2000 and 2011. The noted land use changes have mainly resulted due to high rate of immigration into the area because of water availability and fertile soil that favor fishing and cultivation. High population in the urban areas leads to decrease in grazing land hence put much pressure on lake resources. However, it is possible to reverse the existing

situation in land use changes and its impacts to the lake if appropriate measures will be applied.

4.4 Recommendations

To ensure effective and sustainable management of Lake Babati, the study team recommends the following;

- i) There should be review of Lake Boundaries including reestablishment of adequate buffer zones (60 meters). This should be done through community participation so as to ensure effective settlements reallocation and placement of clear and apparent boundary marks to avoid unnecessary encroachment.
- ii) Local communities adjacent to Lake Babati and other relevant stakeholders should be well informed on the noted land use changes and the associated impacts to the Lake resources. This can be done through awareness creation and capacity building in terms of both technical and financial capacity among local communities and district officials on how to ensure sustainable management of the Lake and its resources.
- iii) The current mitigation measures in particular law enforcement should be reviewed and emphasized to be participatory so as to develop sense of ownership among all Lake Stakeholders including local communities who are main users of the Lake and its resources.
- iv) To create community awareness on the conservation of the lake including control aquatic weeds and siltation.
- v) To upgrade the lake Babati as the Protected area
- vi) To conduct several researches about the lake resources like TAFIRI, TAWIRI
- vii) To establish land use management plan around the lake
- viii) To facilitate environmental committee and beach management unit (BMUs) to manage the lake resources
- ix) Enforcement the law concerning to conservation of the lake.
- x) To support the community in alternative economic activities.
- xi) To identify the opportunities found in the lake in the future
- xii) VPOs to provide support and awareness about conservation of the lake and to enforce 60 meters law

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