THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF AGRICULTURE
NATIONAL IRRIGATION COMMISSION

RESILIENT NATURAL RESOURCES MANAGEMENT FOR TOURISM AND GROWTH PROJECT (REGROW)

DESIGN OF PILOT INVESTIMENT FOR MADIBIRA IRRIGATION SCHEME

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

FINAL REPORT

Environmentak and Social Management Unit
National Irrigation Commission
P. O. Box 6668
Dar es Salaam

July 2019

ACKNOWLEDGEMENT

The development of this Environmental and Social Management Plan (ESMP) has enlisted the assistance, participation and cooperation of various key stakeholders and experts; we would like to acknowledge their efforts and time.

This report has been prepared by the National Irrigation Commission staffs from Environmental and Social Management Unit in collaboration with Planning and Design Division unit. The team was led by Eng. Lait A. Simukanga, in teamwork with Eng. Muyenjwa Maugo, Mr. Marco Ndonde, Eng. Nickson Mashafi, Eng. Jane Marwa, Ms. Christa Mwingira, Mr Daudi Mangu and Ms. Magdalene Diyamett all have contributed substantively to the completion of this report.

Either, we would like to thank all stakeholders that we consulted during preparation of this report including Mbeya Regional Office, Mbarali District Council, Rufiji Water Basin Board, Village Offices, Madibira irrigation scheme office, MAMCOS and all farmers for their proactive commitment to contribute in one way or another in the collection of baseline information and suggestions on the ways of improving water management to reduce water losses thereby by contributing to the objective of REGROW project.

Finally, we thank the World Bank through REGROW project for financing the development of this ESMP for Madibira Irrigation Scheme as a pilot scheme towards achieving the main objective of REGROW.

LIST OF ABBREVIATIONS

BOD	Biochemical Oxygen Demand
BoQs	Bills of Quantities
COD	Chemical Oxygen Demand
Cr	Chromium
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMU	Environmental and Social Management Unit
HIV/AIDS	Human Immuno Virus/Acquired Immune Deficiency Syndrome
KATC	Kilimanjaro Agricultural Training Centre
LGA	Local Government Authority
MAMCOS	Madibira Agricultural and Marketing Cooperative Society
MNRT	Ministry of Natural Resources and Tourism
NEMC	National Environment Management Council
NIRC	National Irrigation Commission
NO_3	Nitrate
OP	Operational Policies
P	Phosphorus
Pb	Lead
PDO	Project Development Objective
PHRD	Policy and Human Resource Development
RBWB	Rufiji Basin Water Board
REGROW	Resilient Natural Resource Management for Tourism and Growth
SACCOS	Savings and Credit Cooperatives Society
SC	Secondary Canal
SO_4	Sulphate
PSP	Professional Service Providers
SRI	System of Rice Intensification
TANRICE	Tanzania Rice Center of Excellence
TANZAM	Tanzania-Zambia Highway
TARURA	Tanzania Rural Road Agency
TSS	Total Suspended Solids

EXECUTIVE SUMMARY

The Ministry of Natural Resources and Tourism is implementing REGROW project in collaboration with other institutions NIRC being one of them. REGROW aims to improve management of natural resources and tourism assets in priority areas of southern Tanzania, and to increase access to livelihood activities for selected communities. In improving the natural resources one of the intervention is to improve irrigation infrastructures. Madibira irrigation scheme was selected as a pilot scheme for improvement of water management and use efficiency activities for increased downstream flow into the Ihefu wetlands for sustainability of great Ruaha River.

Therefore REGROW came up with intervention in Madibira irrigation scheme which minimize water losses through improvement of irrigation infrastructure and crop production techniques that minimizes water losses. The main activities will include lining of part of the main canal, secondary canal 5 (SC5), field leveling, installation of water ,measuring instruments and alteration in water use permit to allow water flow through SC5 back to the River during the dry season.

This Environmental and Social Management Plan (ESMP) for the Madibira Irrigation scheme has been prepared to provide a base for prevention, controlling and minimizing environmental and social impacts that may arise during rehabilitation/improvement and operational activities of Madibira irrigation scheme. The ESMP forms part of the Tender document to be advertised for Contractors to bid. The ESMP has been prepared by the Environmental and Social Management Unit of the National Irrigation Commission in order to comply with the environmental and social safeguards requirement of both the World Bank and Tanzania as stated in the Environmental and Social Management Framework of the REGROW project.

Madibira irrigation scheme lies between latitudes 8º 10' S and 34º 42' E Longitudes at an altitude of 1100 m above mean sea level on an almost flat alluvial plains of Usangu Basin in the South-West parts of Mbeya region. It is owned by small holder farmers with their union called MAMCOS. Madibira irrigation scheme include 3,167ha of potential irrigable land that has been developed for smallholders utilizing the water resource from Ndembera River that discharge its water into Ihefu wetland downstream.

The existing irrigation practice at the scheme is a gravity conveyance system. The scheme have modern irrigation infrastructure which include irrigation and drainage system and farm access roads networks. The scheme has a water use permit number for abstraction of 7.5m^3/sec from Ndembera River at peak period. Generally, Madibira irrigation scheme have a single cropping season. The wet season is from mid-December to early June. The main crop at the scheme is paddy/rice grown as cash crop. The average paddy production at the scheme is 6.0 tons per hectare each season, over 18,000 of paddy are harvested. Madibira irrigation scheme benefiting communities are from two Wards, Madibira and Miyombweni with a total of twelve villages.

Before the implementation of REGROW interventions key stakeholders were consulted including Mbeya Irrigation zone, Regional Administrative Secretary (Mbeya), Mbarali District Council, Ward Executive Officer, villages beneficiaries, MAMCOS and farmers. Stakeholders

raised different issues and proposed mitigation measures. Main issued raised during consultation where sedimentation/ siltation problem, farmers and livestock conflict, illegal fishing activities, illegal establishment of irrigation scheme without water use permits.

The ESMP has identified potential negative and positive impacts and also external impacts that don't relate to REGROW intervention but if they are not minimized they have potential impacts to REGROW intervention. Positive impacts include;

Positive impacts	**Potential negative impacts**	**External potential negative impacts**
i) Increase water use efficiency; ii) Improve irrigation infrastructure to reduce water losses; iii) Improve drainage system to return water downstream; iv) Increase dry season water flow to Ihefu; v) Increase crop production; vi) Increase area under irrigation of about 148 ha through land leveling of highlands within the scheme; and vii) Awareness creation and capacity building for farmers on water management and cropping calendar through Farmer Field Schools (FFS) viii) lining of the main canal by REGROW will support MAMCOS to be able to focus on other water management and maintenance aspects in the coming years	i) soil and water pollution ii) Impact on Air quality iii) Sourcing of construction materials iv) Impact of waste generation v) Community concern and stress vi) Health and safety	i) Weed invasion ii) River bank erosion iii) Sedimentation/siltation iv) Farmers and livestock conflict v) Water ponding in gullies and borrow pits

In order to achieve the objective of REGROW project on efficient water use for increased dry season flow of water to Ihefu, the ESMP recommends implementation of interventions involving a combination of software and hardware investments. The software interventions include the human factor in irrigation water management which is crucial to make the necessary changes happen. The human factor for water management in Madibira irrigation scheme include, water abstraction and allocations, water use permits, paddy growing calendar and operation and maintenance of irrigation infrastructure. The hard ware part in water management include lining of canals, land leveling, sediment removal and installation of water measuring instruments. Others include protection of the River banks upstream of the intake to reduce soil erosion.

The role and responsibilities for implementation of the ESMF is vested under different actors, the Contractor, NIRC, RBWB, MAMCOS and the farming community. Monitoring of water flows has been also emphasized in this ESMP.

TABLE OF CONTENTS

List of Tables

List of Figures

List of Plates

1.0 INTRODUCTION

The Ministry of Natural Resources and Tourism (MNRT) is implementing the Resilient Natural Resource Management for Tourism and Growth (REGROW) Project. The Project Development Objective (PDO) is to improve management of natural resources and tourism assets in priority areas of southern Tanzania, and to increase access to livelihood activities for selected communities. The project is being implemented over a period of five years starting from 2017.

The REGROW project is a multi-sector initiative, targeting protection of natural resources, tourism product and market development, water resources management, livelihoods and poverty alleviation. As such, a number of institutions are involved during project implementation.

In collaboration with the National Irrigation Commission (NIRC), the project is supporting ***Sub-Component 3.2-Improve the irrigation efficiency and water savings in irrigation areas***. This sub-component will focus in the extensive irrigation lands upstream the Ihefu wetlands, promoting water savings through: (i) Farmer's Field Schools to raise awareness and knowledge on the System of Rice Intensification (SRI) as a farming technology for increasing crop yields and reducing water use; (ii) construction of irrigation infrastructure in selected irrigation areas to demonstrate water-efficient technologies (water controlling structures, lining of irrigation and drainage canals); and (iii) revisiting water use permits and assessing incentive mechanisms for controlling excessive use of water or increase of irrigation areas utilizing drainage water.

Therefore, the REGROW project identified Madibira irrigation scheme as a pilot scheme for implementing water use efficient. Rehabilitation/improvement works will be implemented at the scheme, which is part of the Great Ruaha River catchment. Ongoing water abstraction for irrigation purposes and climatic changes results in more frequent drying of the upper reaches of the basin. Just as the seasonal variability presents a challenge to rain-fed agriculture, the periodic drying of surface water is a challenge to building and maintaining irrigation systems, which provide regular access to water for agriculture without threatening the needs of downstream water users. Thus the reasons for choosing the scheme as a pilot area were:

i) Relative location of the scheme close to the Ihefu swamp and any gain in water management can be translated in quick wins for downstream water availability in the Ruaha National Park;
ii) The scheme provides a controlled environment with clear boundaries of the irrigation command area;
iii) It is operated by an irrigator organization that has expressed interest in improving the water management performance;
iv) It is located outside the Ruaha National Park; and
v) It is benefitting smallholder farmers.

The proposed interventions are the kind of typical interventions that will contribute to the objectives of REGROW project and at the same time provide proof of concept and learning opportunities for further replication to other irrigation schemes. The specific type of intervention will be in improving conveyance, drainage and water control, and/or improving monitoring in the irrigated areas.

The National Irrigation Commission therefore, prepared this Environmental and Social Management Plan (ESMP) in order to comply with the environmental and social safeguards of

REGROW project and in guidance of the REGROW ESMF. It provides a basis for acceptable thresholds and mitigation measures for sustainable use of water and land resources in Madibira irrigation scheme.

1.1 Objective

The main objective of this ESMP is to ensure that implementation of the proposed investments for Madibira irrigation scheme are implemented with minimum environmental and social adverse impacts as well as health and safety. The ESMP focuses on avoidance or mitigation of potential impacts associated with the improvement of the scheme. It also provides an outline of environmental and social requirements and provides guidance for the contractor to follow and properly manage environmental impacts during implementation and for the National Irrigation Commission and MAMCOS to make follow up and properly manage environmental impacts during operation and maintenance of the scheme. The ESMP has specified mitigation, monitoring and institutional measures to be taken during implementation and operation phases to eliminate adverse environmental and social impacts, offset them or reduce them to an acceptable levels.

1.2 Scope of the ESMP

The ESMP is specifically designed for Madibira irrigation scheme thus covers the scheme area participating villages, scheme management (MAMCOS), Mbarali District Council, Mbeya Region and Rufiji Basin Water Office. Since this is a pilot irrigation scheme under REGROW the subsequent irrigation schemes will be subjected to ESMP preparation prior to approval for tendering process.

1.3 Approach and methodology for development of the ESMP

The World Bank Environmental and Social Safeguard Policies instituted a requirement for preparation of ESMP prior to rehabilitation works of Madibira irrigation scheme. REGROW will support rehabilitation works at the scheme that are likely to generate some site specific environmental and social impacts. Therefore this ESMP was developed with the guidance of the approved REGROW Environmental and Social Management Framework of 2017.

1.3.1 Overall approach

The approach for the development of this ESMP was as follows:

a) Identification of key issues for ESMP development using activities proposed for improvement of the scheme. The REGROW project will work on improvement of water use efficiency, and not on development of new irrigation schemes;

b) Collection and review of secondary data and information from existing literature, consultations with key stakeholders at Zonal Irrigation Office, Regional Secretariat. District Council and scheme level regarding:

    i) The context under which Madibira pilot irrigation scheme is designed;

ii) Physical field observation to access what is the existing situation in the irrigation scheme area to form the bases for ESMP preparation; and
iii) Identification of potential environmental and social impacts to the environment and community with associated mitigation measures.

c) Consolidating key findings into an Environmental and Social Management Plan, implementation and monitoring arrangements;
d) Stakeholder consultation meeting with Wards Development Council, MAMCOS and selected villages was done from 30/11/2018 – 7/12/2018. (**ANNEX 7.4 - 7.6** for the list of participants and minutes). During the consultations, presentations were made on the design of the pilot Madibira irrigation scheme followed by panels of discussions. The process complies with the World Bank stakeholder consultation in investment operations. Issues/concerns raised by the stakeholders formed the basis for this ESMP document. The ESMP will be part of tender document and will be monitored throughout the implementation period.

1.3.2 **Methodology**

1.3.2.1 Document reviews

Review of relevant literature was undertaken during field visit at Madibira Smallholder Irrigation Scheme office which is under MoA and MAMCOS Offices where various feasibility study reports were reviewed to get the background information of the scheme and continued throughout the preparation of this ESMP. Information sources included

a) Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) July 2017;
b) Design of pilot investment for early implementation, Main text and Annexes - May 2018
c) Feasibility studies reports for Madibira irrigation scheme;
d) REGROW Project Appraisal Document 2017; and
e) Tanzania legislation and the World Bank safeguard policies.

Other documents reviewed are listed under the references section.

1.3.2.2 Physical field observation

The team visited the whole irrigation scheme including area where REGROW will improve irrigation infrastructure. The areas visited include the intake site, upstream and downstream of the intake along Ndembera River, main and secondary canals, primary drains, flood protection bunds, outfall drains and the northern and southern drains. The aim was to observe the existing situation to identify physical and social environmental issues which jeopardize irrigation water management.

1.3.2.3 Consultations with key stakeholders

Consultations were made from 30/11/2018 – 7/12/2018 with different Stakeholders that were consulted are those who will be responsible for implementation and management of Madibira irrigation scheme; they include the National Irrigation Commission, Mbeya Zonal Irrigation Office, Rufiji Basin Water Office, Mbarali District Council and Ward Development Councils

Members. At scheme level the team conducted discussions with farmers and MAMCOS board members, Scheme Irrigation Technician and Environmental Officer. Views of contacted stakeholders were included in the ESMP preparation especially when developing the mitigation measures and responsibilities in implementation of ESMP.
To facilitate meaningful consultations, the scheme layout map was presented indicating the proposed intervention under REGROW related infrastructures, and sources of water. Relevant background information concerning Madibira irrigation scheme was provided to farmers before they raised their concerns. The issues raised were presented to all farmers who participated and discussed, solutions were proposed, responsibilities were assigned and time frame set on implementation of the proposed mitigation/enhancement measures. Stakeholder's consultations were conducted in Kiswahili which is understandable to all stakeholders.

1.3.2.4 Preparation of ESMP

The ESMP was prepared based on the design of pilot investments for Madibira irrigation scheme of May 2018. It includes a set of mitigation, monitoring and institutional measures to be undertaken during implementation of the proposed interventions. The ESMP is a specific plan, which is relevant to the scheme only. The ESMP include the following features:

i) Description of the existing situation of Madibira irrigation scheme;
ii) Description of the proposed interventions under REGORW project;
iii) Stakeholder consultation and views;
iv) Key environmental and social impacts/issues;
v) **Mitigation Plan:** Based on the environmental and social issues identified through field observations, discussion with farmers and presentation of the scheme layout, the mitigation measures were developed in the matrix form; and

vi) **Monitoring Plan:** This ESMP include a monitoring section which is linked to the mitigation measures. Specifically, the monitoring section of this ESMP provide a specific description and technical details of the monitoring method, including the indicators to be measured, how they will be measured and by whom, the sampling locations, the frequency of measurements and the definition of thresholds that will signal the need for corrective actions.

The ESMP also provides specific description of institutional arrangements and responsibility for implementation of mitigation measures. In addition, this ESMP include estimate of the costs of the measures and activities recommended so that each responsible institution/person can budget for implementation of the recommended mitigation measures. The final and approved ESMP shall be included as part of the cleared project design package.

Some of the costs associated with implementation of the ESMP will be covered under the cost of irrigation infrastructure improvement budget. The expenses associated with follow up of scheme environmental and social compliance would be made up of the cost of service allowances of staff etc. to support the efforts of the district and/or the farmer group (MAMCOS). An allowance for these costs will be included and budgeted, in the overall NIRC supervision budget.

2.0 DESCRIPTION OF MADIBIRA IRRIGATION SCHEME

2.1 The Physical Environment

2.1.1 General location

The scheme is located in Mbarali district which lies between latitudes 7° and 9º South of the Equator and between longitude 33º.8´ and 35º East of Greenwich, is bordered by Iringa Rural at North-East, Njombe at South-East, Makete District at South, Mbeya district at the West and Chunya district at the North. Mbarali district council is divided into two divisions namely Ilongo and Rujewa which are also divided into eleven wards namely Rujewa, Ubaruku, Msangaji, Utengule, Usangu, Igurusi, Mahongole, Ruiwa, Chimala, Mapogoro, Mawindi and Madibira

2.1.2 Specific location

Madibira irrigation scheme lies between latitudes 8º 10' S and 34º 42' E Longitudes at an altitude of **1100 m** above mean sea level on an almost flat alluvial plains of Usangu Basin in the South-West parts of Mbeya region. Access to the scheme is possible through all-weather road networks from Mafinga town to Madibira (75km) and from Rujewa-Igawa to Madibira (80km) with minor problems in some portions during heavy rains and both towns being located along the TANZAM highway from Dar- Es-Salaam to the Zambian border**.**

Madibira irrigation scheme include 3,167ha of potential irrigable land that has been developed for smallholders utilizing the water resource from Ndembera River **(Figure 1)**.

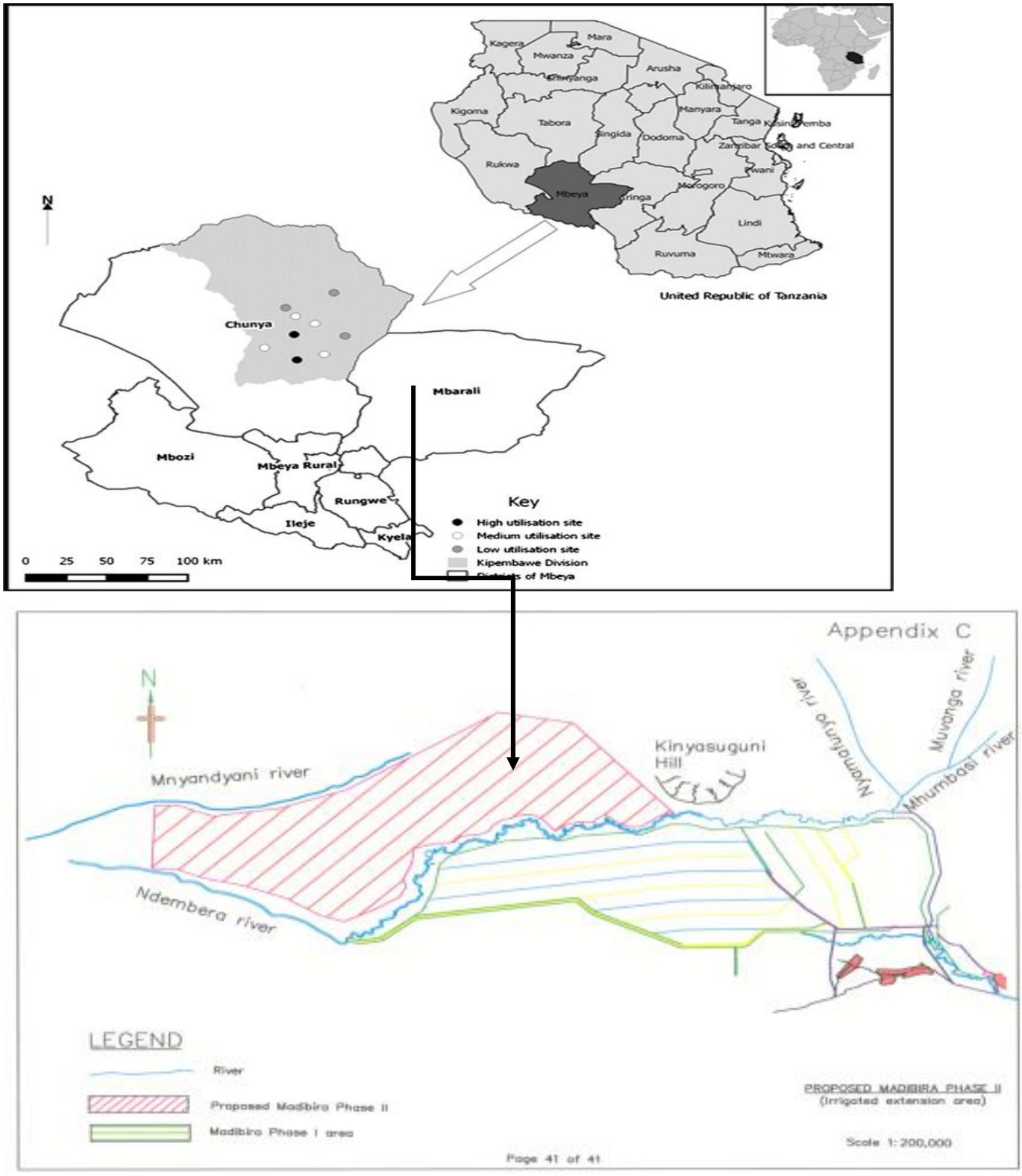


Figure 1: Location map of Madibira irrigation scheme

2.1.3 **Demography Characteristics**

The major Ethnics groups are Sangu, Hehe, Kinga, Bena and Nyakyusa. There are other small ethnics groups including the Sukuma, Wanji, Barbaig and Gogo. Most of these ethnic groups are predominantly Agro-pastoralists who migrated into the Usangu plain from Arusha, Mwanza, Shinyanga, Singida and Dodoma regions.

Madibira irrigation scheme benefits communities from two Wards, Madibira and Miyombweni with a total of twelve villages namely Mkunywa, Ikoga Mpya, Nyakadete, Chalisuku, Mahango, Iheha and Nyamakuyu in Madibira Ward and Miyombweni, Mapogoro, Mlungu, Nyakazombe, and Magigiwe in Miyombweni Ward. The total population from these two wards is **34,515** people. Madibira ward has a total population of **24,742** people of whom **12,103** are male and **12,639** are female and Miyombweni ward has a total population of **9,773** people of whom **4,861** are male and **4,912** are female.

2.1.4 **Climate**

The climate in the area can be classified as tropical wet and dry characterized by moderate to high temperatures, low wind speeds and high humidity of the air. Mean annual precipitation is 684 mm. The rainfall pattern is mono-modal with one rainy season falling mostly between the months of December and April. The mean monthly temperature in the area is between 21.5 ºC in July – 25.6 ºC in November with the mean annual temperature of 22 ºC.

The monthly average Relative Humidity (RH) varies from 46% (October) to 70% (February). The Relative Humidity in the area is rated as moderate to high (only 2 months out of 12 have the mean values below 50% - October and November). Mean wind speed varies from 40 km/day in February/March to a maximum of 145.4 km/day in October. Annual Sunshine Hour data averages 8.8 hrs/day with 10.7 hrs/day in August and 6.3 hrs/day in February.

2.1.5 **Topography**

Madibira Irrigation scheme lies on a flat valley situated in the North-eastern side of the Usangu plains, at an approximately 1050 m above mean sea level. The valley is surrounded by the Mbale Mountains on the North and part of the Sao Hill plateau on the East and South, which consists of a penne plain deeply dissected by a drainage system flowing into the plain, represented by the Ndembera River in the South-eastern corner of the project area. The Ndembera River rerouted itself in 1974 where much of the area is flooded swamp in the wet season, cropping to a minimum in the dry season.

The project area is relatively flat and featureless. Substantial part of its Southern area is swampy, a condition which exists throughout the dry season. At present, the Ndembera River after development of Madibira Irrigation scheme was changed its course by training it to join the Mhumbasi River. The combined flow drains into the Mwima River which eventually flows into the Utengule swamp on the Western limit of the project area.

2.1.6 **Soil**

The soil information given hereunder has been collected through review of past study reports on the Madibira Irrigation Project (Halcrow-ULG Ltd., 1985) and reconnaissance soil survey conducted in July 2006.

The soils of the project area have developed from lacustrine deposits of clay and silt arising from time of the formation of Usangu Plains. Recent deposits on the area are those brought by Mwima / Ndembera River systems. These soils are very hard when dry, friable when moist but quite sticky and plastic in wet condition. Under very dry and wet conditions these soils would have poor workability, thus making it difficult to mechanize farm activities under such soil moisture conditions. The soils are basically uniformly dark grayish in color.

2.1.7 **Hydrology**

The main water source for Madibira irrigation scheme is Ndembera River with mean total annual flow of over 13m^3/s, with 80% dry year flows of 5.82m^3/s. Base flows from August to December are low, ranging between 0.5m3/s and 3.0m3/s depending on the preceding rains. Flows begin to rise in late November when they reach 1-3m^3/s. Mean peak flows of up to 40m3/s are experienced in March/ April period, with a maximum recorded flood of approximately 300m^3/s (Mayes, 2000). In Mid-May flows fall to between 6 and 11m^3/s. For irrigation purposes a total flow of 7.5m^3/s is allowed to flow through the intake, to irrigate 3000ha during the rainy season and a continuous flow of 0.5m^3/s during dry season in the Southern drain to carter for livestock and human use outside the scheme area.

The Ndembera River is perennial, at Madibira. Muhumbasi, Dudumichi / Manyerera and Ihangalalwe are the main tributaries which contribute flows into Ndembera River. These tributaries normally dry up during the period from June to October. The catchment area for Mwima River is estimated at 2460 sq.km whereas that of Ndembera River at Madibira is 1831 sq.km. Catchment areas, mean annual flows and flood peaks at different return periods for the Ndembera River at Madibira.

2.2 Biological Environment

2.2.1 **Flora**

The main vegetation types which are dominant in and adjacent to Madibira irrigation scheme are dominated by scattered *Acacia spp*, mountain on the North West. Other tree species and grasses include *hyperhenia* s*pp, Panicum maximum* and elephant grasses. The area is bordered by hills on the North which are covered with shrubs and scattered trees within the Ruaha National Park on the far North. Downstream the irrigated area comprises of grassland with very few scattered acacia bushes and mainly flooded during rainfall forming part of Ihefu wetlands.

2.2.2 **Fauna**

The project area on the North is bordered by large part of Ruaha National Park of about 10,000 km^2. The National Park premises are so close to the Madibira irrigation scheme, famous known

as Ihefu wetland where wildlife resources like wild animals such as leopards, elephants, buffalos, eland, crocodiles, snakes, tortoises, roan antelope, zebras, waterbucks, impalas, hippos and a variety of birds like quelea quelea and ducks are found in the area.

2.3 Social Economic Environment

2.3.1 **Agriculture**

Irrigation is the most social economic activity in the area. Beside irrigation farming is going on in the surrounding area where rain fed crop production continues in a very subsistence level. Madibira area lies in a semi-arid climate receiving only about 660 mm of rainfall per annum. Besides having a mono-modal distribution regime, the rainfall is inadequate and too erratic to allow for any sustainable crop production. Irrigation is therefore necessary for any reliable crop production endeavor in Madibira.

Outside the Madibira irrigation scheme where paddy is the only crop grown, crops like maize, sorghum, sunflower, groundnuts, beans and vegetables are grown. The yields are 1.5 – 2 ton/ha, 0.9 - 1.2 ton/ha, 0.8 – 1 ton/ha and 1 -1.5 ton/ha for maize, groundnuts, sunflower and beans respectively while yield for paddy is 5 – 6 ton/ha of the Madibira Irrigation scheme.

Most of the farmers prepare the land by using tractors and power tillers which are available in sufficient numbers to replace tedious manual labour related to land preparation and transportation.

2.3.2 **Livestock**

The Sukuma and Maasai, who started to arrive in the 1950s, have now at least in part adopted an essentially sedentary life combining pastoralist and cropping. Even the Sukuma, who now dominate much of the grasslands and its margins, have also indulged in cultivation, partly to feed themselves by cropping within special bomas but also in places on a much larger scale. The current initiatives by the government to remove cattle from Ihefu have greatly reduced the number of pastoralist in the area. Domesticated animals include cattle, goats, sheep, donkey and chicken are kept. The grazing for livestock is not specific, and there are no clear livestock routes to grazing areas and water drinking sites.

2.3.3 **Fishing**

Fishing is practiced in Madibira irrigation scheme by youths who catch fish in irrigation canals, drainage system and ponds within the scheme. Fishing is done by using fish nets and traditional catches. They impound water in drainage canal and apply scoping method to catch fish. This activity damage irrigation infrastructure and accelerate sedimentation in irrigation canals.

2.3.4 **Social amenities**

Madibira being a small center has other amenities to maintain livelihood in Madibira, They include primary schools; secondary schools; dispensaries; health centers, cattle dips, a mosque and churches of different denominations. Other social amenities include private owned

pharmacies, several small shops and markets, beer shops/bars, restaurants, butcheries, milling machines, filling stations, and rest houses for guests.

2.3.5 **Water**

Most of the villages in the study area received piped domestic water supply and few people use hand pump wells in their homestead. The source of domestic water is Ndembera River upstream of the irrigation intake. During the project implementation in 2000 the villages were supplied with piped water supply by the project in five villages. However in some villages an improved access to water has been provided by the greatly expanded irrigation canal network on the Sothern drain.

Relative to the increase in settlement and population, domestic water supplies and the associated question of sanitation raise increasingly problems even in the most settled areas. In addition, improved water supply and sanitation are often non-existent in the more remote villages of the interior.

2.3.6 **Energy**

Fuel wood and rural electricity are dominant sources of energy for domestic consumption, since electricity is available in all villages surrounding the scheme. The main use for fuel wood is for cooking and burning of bricks, this makes wood consumption to be very high in the area. This consumption threatens the status of river line forests since it seemed to exceed the existing forest reserve available. Most of people are using kerosene and electricity for lighting. Normally, kerosene fuel is obtained from small shops around the villages.

Solar energy and generator is also used as alternative source of energy by few people in the project area. There are no accurate data of the number of solar panels available for each village and electricity users, however, it is estimated that at least all houses close to the road are connected to electricity in each village. The village authorities continue encouraging people to use electricity and gas as alternative to fuel wood in order to reduce the pressure on existing river line forest by the local people. With the earmarked development, electricity is required to facilitate running the paddy processing plant and AMCOS office.

2.3.7 **Transport and communications**

2.3.7.1 Roads

The beneficially villages are well served by gravel road transport links with the main road from Mbarali District headquarters and Mafinga town to Madibira irrigation scheme. The tar mark road passes at Mafinga town along TANZAM highway about 75 km from the scheme. The roads are being rehabilitated after every rain season to make it passable throughout the year. On the other hand the roads to the scheme area are generally good.

To ensure smooth communication from the Madibira village to marketing centers, the Government is in a process of improving the access road from Mafinga to Rujewa via Madibira to tarmac level. This will enhance reliable markets to the Madibira and other villages along the road for transportation of inputs and farm produce.

2.3.7.2 Telecommunication network

Mobile phones can be accessed through out the project area, meaning that in all villages surrounding the project area even within the irrigation scheme. The mobile companies operating in the area includes Vodacom, Tigo and Airtel.

2.4 Historical background of the Madibira irrigation scheme

The World Food and Agricultural Organization (FAO) first identified Madibira project in 1960s during the Rufiji Basin Study. In 1976 the African Development Bank (AfDB) in conjunction with FAO mounted an identification mission specifically to the Madibira area. The mission's conclusion was positive about the potential for producing rice on a large scale under irrigation. Since then, a series of developments have been performed which have led to the establishment of the Madibira Smallholder Agricultural Development Project (MSADP).

Following the FAO mission's conclusion in 1976, a detailed engineering report of the Madibira project was prepared. The Project started with a detailed engineering study in 1985. The study recommended irrigation works and infrastructure development for 3,000 ha, out of which 2,000 were to be handed over to the National Agriculture and Food Organization (NAFCO), and the rest to the smallholder farmers. Following the Economic Reform Programme, the Government detached itself completely from direct production activities. Therefore, NAFCO's direct involvement in the project was cancelled because it is a Government parastatal organization. Thereafter, the project was considered under smallholder development.

Two AfDB missions visited Tanzania in November 1992 and in March 1993 to have dialogue with the Government of Tanzania on the technical parameters and policy framework of the Project. Survey work started in 1995 after the establishment of the Project Implementation and Management Unit (PIMU) and construction work started in 1997. The first crop production was in 1998/99 seasons and the project construction work was completed in 2000 except for minor re-grading works in about 300 ha. The total investment of the project was TZS 23bil out of which the irrigation infrastructure amounted to TZS 12.5bil or 54% of the total investment.

Main land uses at the scheme area include agriculture (irrigated and rain fed), grazing and conserved area, (RUNAPA) these are the main land uses. Downstream the scheme there is the Ihefu swamp, which contributes to the flows of the GRR. Irrigated agriculture is the most important economic activity in the area and it employees about 86 percent of the labour force population, minor economic activities include bee keeping and fishing.

2.4.1 **Water source**

The main water source for Madibira irrigation scheme is Ndembera River with mean total annual flow of over 13m^3/s, with 80% dry year flows of 5.82m^3/s. Base flows from August to December are low, ranging between 0.5m^3/s and 3.0m^3/s depending on the preceding rains. Flows begin to rise in late November when they reach 1-3m^3/s. Mean peak flows of up to 40m^3/s are experienced in March/ April period, with a maximum recorded flood of approximately 300m^3/s (Mayes, 2000). In Mid-May flows fall to between 6 and 11m^3/s. For irrigation purposes a total flow of 7.5m^3/s is allowed to flow through the intake, to irrigate 3000ha during the rainy season and a continuous flow of 0.5m^3/s during dry season in the Southern drain to carter for livestock and human use outside the scheme area.

2.4.2 **Irrigation infrastructure and facilities**

The irrigation infrastructure and facilities include an intake at a right hand bend on the left bank of the Ndembera River, a Primary Canal 5800m long of which 2,975 m are lined and 2830m are unlined. The settling basin 15m x100m located in the main canal downstream the intake for sediments and debris to settle. Two control gates installed at the settling basin to flush sediments into the Southern drain. Other associated structures include three check culverts, one drop culvert and a rejection spillway to the existing drain.

From the primary off takes there are six (6) unlined secondary canals, totaling 26.7km in length, together with associated fifty eight (58), checks nine (9) check culverts, four (4) drops, six (6) tail escapes, and over one hundred gated pipes off take structures to irrigate 30ha tertiary blocks each.

The drainage network comprises of the North and West Primary Drains. The Primary Drain number 1 (PD No. 1) is 16.2 km long it collects flows from secondary drains Numbers 1-3 and 7 (34.3 km). The Primary Drains number 2 (PD No.2) is 8.5 km long receives flows from secondary drains number 4-6, before joining PD No.1 and discharge to the outfall drain (1.7 km) in the Mwima River downstream **(Figure 2)**.

Stream flows from the South including the Ihangalawe River which previously discharged into the old course of the Ndembera River, is now diverted into the Mwima River at the Western end of the project area by the Southern drain, which parallels the Southern flood bund.

In line with extensive flooding and erosion of river banks, the settling basin receives huge amount of sediments from the intake. The Settling basin was designed to allow settling of sediments so that they are not carried through the main canal to the fields. Also two flushing gates were installed at the settling basin to open up hydraulically and flush sediments to the Southern drain with the expectation that the high velocity flow will remove the accumulated sediments. Also the flushing gates were installed to be partially open to allow the discharge of $0.5m^3/s$ for maintaining livelihood of livestock keepers and for domestic uses downstream. However, the flushing gates with hydraulic characteristic are no longer effective to flush sediments from the settling basin; Siltation of the drain has resulted in loss of its original levels and damage of the drain embankments. However, MAMCOS is using mechanical and manual flushing as the current practice where sediments are excavated using an excavator and heaps of sediments are unloaded manually since the dimension of the drain are no longer according to design standards. The velocity in the drain no longer allows flushing out of the sediments and it has become another sedimentation area as well. Maintaining the settling basin and the drain will remain a very costly annual expense for MAMCOS **(Plate 1-3**).

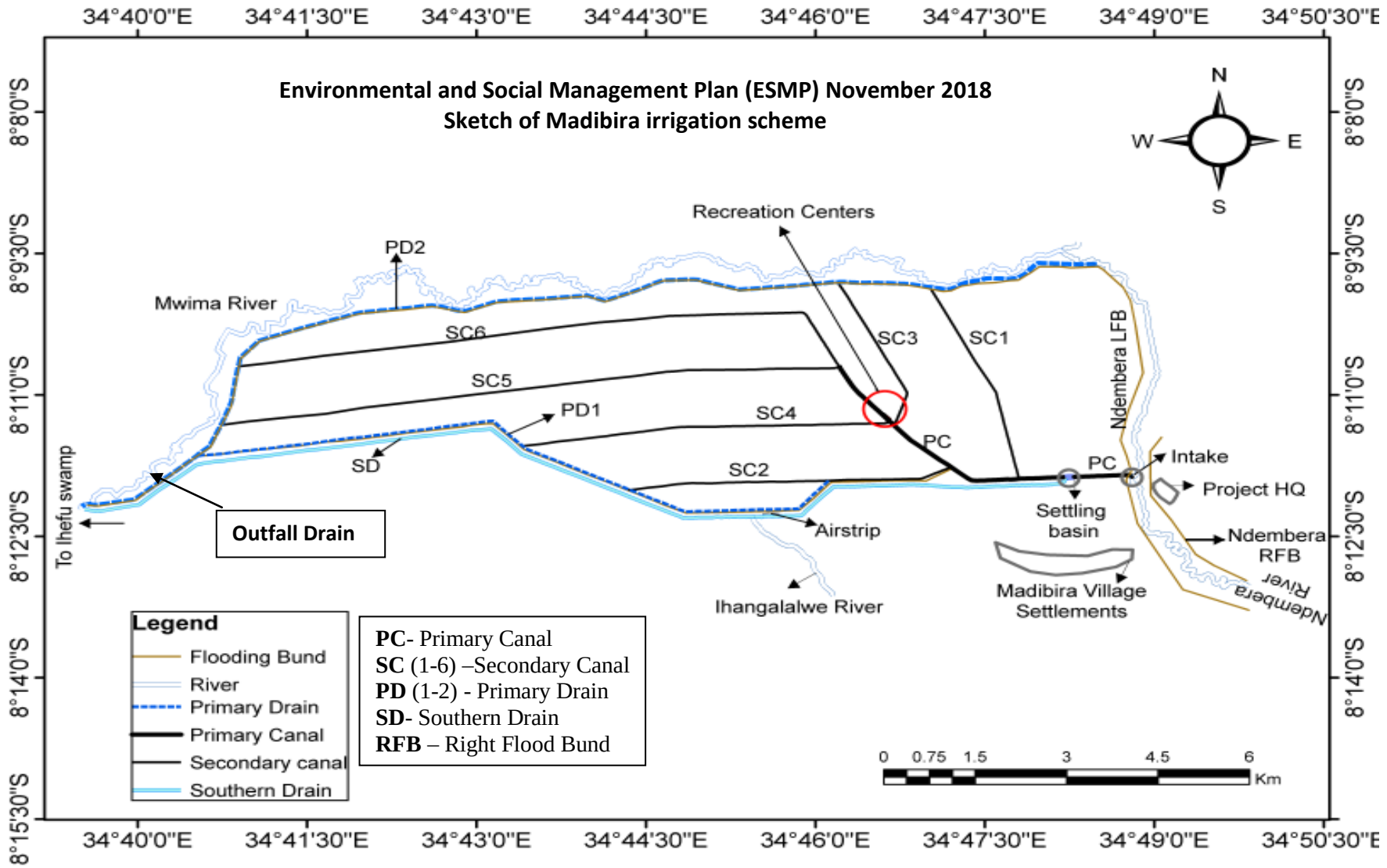


Figure 2: Layout of Madibira irrigation scheme

Plate 1: Sediment removal at settling basin

Plate 2: Main canal downstream of settling basin, completely dry from late June -November

Plate 3: Southern drain indicating water flow 0.5m^3/s throughout the year

2.4.3 **Irrigation practices**

The existing irrigation practice at the scheme is a gravity conveyance system, currently there are 3,167 ha under irrigation which have modern irrigation infrastructure which include the irrigation and drainage system and farm access road networks. The scheme has a water use permit number RBWO 26 issued on 14th November 2000 for abstraction of 7.5m^3/sec from Ndembera River at peak period. This discharge is adequate for irrigating 3,000 ha. From late June to mid November the main canal allow only 0.5m^3/s at the settling basin to continue flowing through the Southern drain.

2.4.4 **Crop production**

Generally, Madibira irrigation scheme have a single cropping season. The wet season is from mid-December to early June. The main crop at the scheme is paddy/rice grown as cash crop. Most of the farmers depend on paddy as their source of income while maize is considered to be major food crop. Other crops grown outside the scheme include beans, groundnuts, sweet potatoes, cassava, sorghum, tomatoes, onions etc. Paddy is grown during rainy season and supplemented with irrigation. Maize is grown both as rain fed and irrigated crop, beans are intercropped with rain fed maize and irrigated in pure stand during the dry season. Tomatoes and sweet potatoes are mainly grown as rain fed crops although they are also grown in small scale in the dry season through irrigation. The average paddy production at the scheme is 6.0 tons per hectare each season, over 18,000 tons of paddies are harvested.

The current cropping calendar leads to mosaic cropping whereby there are different crop stages within the scheme. This makes it difficult to control water use in the scheme, it highly contributes to water loses because most of the time from mid-November to May water flows throughout in the scheme and is poorly managed.

Table 1: The Current Cropping Calendar

S/N	ACTIVITY	MONTH											
		SEP	OCT	NOV	DEC	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG
1	Canal Cleaning												
2	Bush Clearing (Fields)												
3	Ploughing and Harrowing												
4	Nursery Establishment and Management												
5	Puddling and Field Leveling												
6	Transplanting												
7	First Weeding												
8	Fertilizer Application												
9	Pest Control												
10	Second Weeding												
11	Water Management												
12	Bird Scaring												
13	Harvesting												
14	Storage												

2.4.5 **Agrochemical Application**

The most applied agrochemicals are fertilizers (DAP and UREA). Others are herbicides and pesticides. The amount of fertilizers are not very high, it is an average of 6 bags of fertilizers are applied per hectare (2 bags of DAP and 4 bags of UREA). The most important aspects to be observed are time and field conditions during application. With this amount of fertilizer, if each farmer at the scheme applies fertilizer, about 950.1 tons are applied. This amount if not well managed could cause soil and water pollution. To avoid negative effects, application of fertilizers should be done only when: (i) it is not likely to rain after fertilizer application to avoid the fertilizer to be washed by runoff and (ii) fields have enough water to dissolve and make the material available and absorbed by the plants, excess water leads to leaching and accelerates pollution, management of fertilizers should therefore be observed. In other words, fertilizers application should go hand in hand with proper on farm water management, farmers must adhere to irrigation schedules.

2.4.6 **Quele quelea birds**

During growing seasons, a big number of Quele quelea birds invade paddy fields; their control is done by using an air plane whereby queletox pesticide is used. The red-billed quelea (Quelea quelea) is the most important avian pest of small grain crops in semi-arid zones of Africa. Fenthion, an organophosphate, is the main avicide used for controlling the pest but it is highly toxic to non-target organisms. The only available pesticide that could replace fenthion is cyanophos, which is also highly toxic to non-target organisms, although less so than fenthion, but more expensive. Apart from chemical avicides, the only rapid technique to reduce the numbers of quelea substantially is the use of explosives combined with fuel to create fire-bombs but they also have negative effects on the environment, they are dangerous and have associated security issues. The technique is labour intensive and in practice can only be deployed against small (<5ha) colonies and roosts, however, this technique is not applied in Tanzania.

2.4.7 **Beneficiaries, Organization set up and management**

2.4.7.1 Beneficiaries

Madibira irrigation scheme benefits communities from two Wards, Madibira and Miyombweni with a total of twelve villages namely Mkunywa, Ikoga Mpya, Nyakadete, Chalisuku, Mahango, Iheha and Nyamakuyu in Madibira Ward and Miyombweni, Mapogoro, Mlungu, Nyakazombe, and Magigiwe in Miyombweni Ward. The total population from these two wards is **34,515** people. Madibira ward has a total population of **24,742** people of whom **12,103** are male and **12,639** are female and Miyombweni ward has a total population of **9,773** people of whom **4,861** are male and **4,912** are female. The original farm size was **3,000** ha benefiting **3,000** people with a plot size of 1 ha allocated to each farmer. Currently there are about **3,167** ha under irrigation benefitting **3,167** farmers with a plot size of 1 ha allocated to each farmer due to expansion/increase of about **167** ha on the lower part of the scheme. The additional area was put under irrigation after leveling of wasteland (highlands) by farmers themselves.

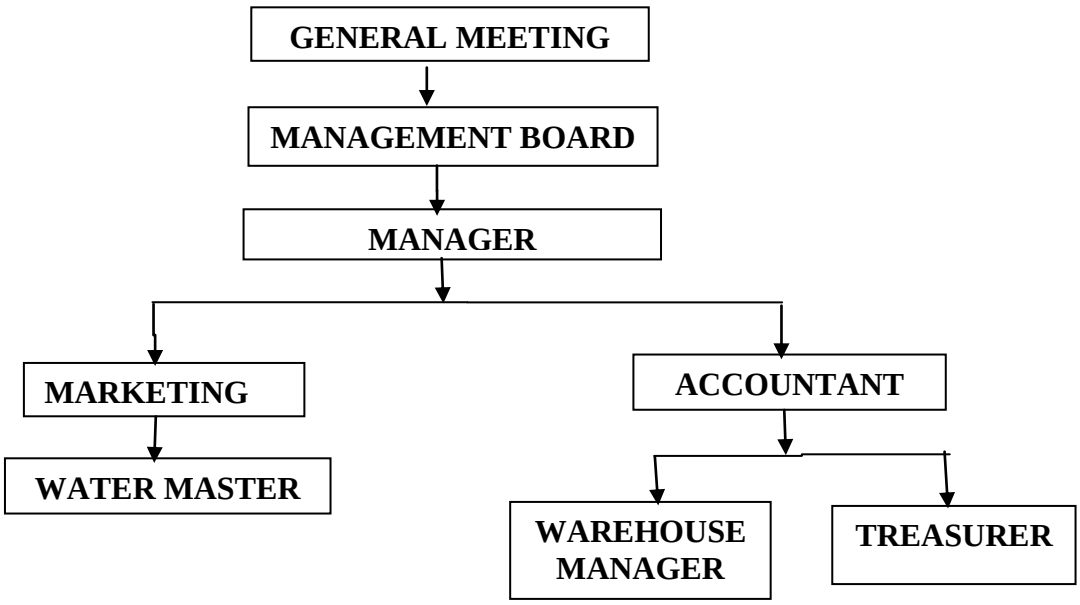
2.4.7.2 Organization set up and scheme management

MAMCOS is the official organization representing all farmers participating in the cultivation of rice in the **3,167** hectares of the Madibira irrigation scheme. The MAMCOS has been

registered as a legal entity since May 1997 and owns the scheme with registration number MBR 407. However, the National Irrigation Act of 2013 and its Regulations of 2015 indicates that all irrigators' organizations should be registered or complies with this Act and its Regulations; therefore MAMCOS complied with the Act in 2017 and was given registration number **035**. At present MAMCOS has a total of **3,167** members of whom **1,864** are male, **1,289** are female and **14** are institutions. The Cooperative management board has nine (**9)** members; out of which seven (7) are male and two (**2)** are female. It has permanent employees who are employed and are paid monthly salary for scheme management they include a Manager, Marketing officer, an Accountant, Warehouse manager, a Cashier and a Storekeeper. Others are Water attendant, Clerk, an Office attendant and a Driver **(Figure 4**).

MAMCOS as an institution vested with the responsibility of handling production and marketing activities of the scheme, still needs more training in cooperative management, community mobilization, simple bookkeeping, skills development in areas such as water management for irrigation, crop production, marketing and post-harvest handling and credit management. The Mbarali district officials as well as officials at the National Irrigation Commission level are fully aware of this need and have assigned a small group of staff to continue with capacity building activities with their main task being advising farmers and their organization on technical issues. The dual responsibility of production and marketing for MAMCOS management proved to be a major challenge as the two functions requires different skills and therefore would need to be handled by different but inter-related institutions. There is a saving and credit cooperative society, known as Madibira Saving and Credit Cooperative Society (M-SACCOS) at the scheme level. This cooperative society is mainly involved with providing financial assistance to farmers in terms of different types of loans.

Figure 3: Organization structure of MAMCOS



2.4.7.3 Operation and maintenance (O&M)

Irrigation canals are cleaned every season before the beginning of the cropping season and during the cropping season canals cleaning continue regularly done by respective plot owners at the vicinity of their plots. Canal cleaning is usually contracted to individuals around the

scheme who in turn employ laborers from the locality. This work is normally done before onset of rain to prepare canals to receive irrigation water for better conveyance. In 2018/19 season the canals were already cleaned at a cost of about Tsh. 85,500,000/=. Silts deposited at the de-silting basin are removed every season using an excavator. The Southern drain which was designed to flush sediments is not functioning properly due to changes in levels of the drain bed, silts accumulation and damage of drain embankments. Ideally de-silting was supposed to be done hydraulically to flush accumulated silts and sand materials brought by the irrigation water at de-silting basin back to Ndembera River.

The main canal has a total length of **5,800m** out of which **1,900m** length of the main canal was lined during the project and Mbarali District Council lined **625**m length. During the field visit in November 2018 lining of the main canal continued to be done by MAMCOS with a target of lining 150 m length per season. The total accumulated length of the main canal lined by MAMCOS up to November 2018 to be **600**m length **(Plate 4)**. Therefore REGROW will supplement the work done by MAMCOS by lining the remaining **2,675**m length of the main canal and the proposed secondary canal No. 5 which is **10,000**m long. On the other hand MAMCOS has initiated construction of the flow measuring structure at the confluence of Primary Drain No.1 and Primary Drain No.2 to measure the total amount of water flowing out of Madibira irrigation scheme.

MAMCOS also undertake periodic maintenance of farm roads every year. During the field visit in November MAMCOS contracted JAFA Business Company Ltd of Rujewa to maintain farm roads with a total length of **4.2 km** under the supervision of Tanzania Rural Roads Agency (TARURA) The Contractor was grading and compacting gravel on the farm roads.

The major challenge faced by the irrigators' organization is low contribution rate for operation and maintenance (O&M) fee which is only Tsh. 155,000 collected per farmer. According to the Comprehensive Guidelines (CGL) of the National Irrigation Commission which is meant for irrigation activities, it is stated that every member of an IO is supposed to contribute at least 5% of the average yield per acre per season for scheme operation and maintenance while schedule 4 of the Irrigation Regulations of 2015 states that every IO should contribute 25% of the collected irrigation service fee to the NIRC as the Irrigation Development Fund and the remaining 75% should go to the particular organization/association for O&M use.

Plate 4: Lining of main canal as part of MAMCOS O&M a length of 150 meters are lined every year

2.5 REGROW Interventions for Madibira irrigation scheme for early implementation

2.5.1 Irrigation Infrastructure Improvement

Madibira irrigation scheme was selected for implementation of irrigation activities that contribute to water management in order to contribute to the objective of the project. The proposed interventions are the kind of typical interventions that contribute to the objectives of the project and at the same time provide proof of concept and learning opportunities for implementers and water users. The specific types of intervention will be in the area of improving conveyance, drainage, water control, and/or improving monitoring in the irrigated areas.

Considering the conveyance and nature of the scheme, the consultant proposed an improvement of the secondary canals (SC5), which will be lined as part of the pilot investments. There are two underlying reasons for suggesting lining of SC5, first it will reduce the conveyance losses in the canal, and thus increase the amount of water available for irrigation, and secondly it is proposed to use the SC5 for channeling all the water from the Ndembera River between July and November through this canal and thus ensuring that the total dry season flow can be, under a "controlled management by the MAMCOS" directly and water be drained towards Ihefu. This will minimize losses either in the southern drain or in the Madibira phase "II" extension.

In the proposed design, both the Southern drain as well as using the route through Madibira "II" was discarded for obvious reasons. The Southern drain is outside of the management and control of the MAMCOS and "illegal" water abstraction take place from this drain. Obstacles put in place by these illegal water users remain in place during the dry season and result in enormous evaporation losses as this water is flooding the land, even if the land is bare in the dry season. A similar effect can be observed in the "Ndembera" river bed that provides water to the "informal" Madibira II.

The proposed investments also include lining of the primary canal, which was partially lined during the construction of the scheme and continued to be lined by Mbarali district council and MAMCOS in portions every season. This will help during the dry season to minimize the conveyance losses of the dry season flows and help farmers to improve the irrigation efficiency. Over the past years MAMCOS initiated yearly lining of small sections, about 150m. The proposed lining of the main canal by REGROW will support MAMCOS to be able to focus on other water management and maintenance aspects in the future years as well as to accept management responsibility for draining the water to Ihefu under their supervision.

By doing so, the design proposes MAMCOS to request a change in the abstraction water use permit that will allow them to channel all the water from the Ndembera through the scheme from July to the end of November.

A final proposal is land leveling in SC 5. An estimated 423 ha of wasteland can be identified in Madibira irrigation scheme. It is estimated that the wasteland in SC 5 is around 148 ha.

2.5.2 **Water control and management**

A major focus in the proposed improvement of Madibira irrigation scheme is on water control, and/or improving monitoring in the irrigated areas. The current irrigation practices applied by the farmers do not conform to the original design of the scheme, which results in inefficient water use. For example the current situation is that some farmers are about to harvest their rice crop in early May, while others continue to need water till the end of June.

As a consequence water demands vary constantly with time, while the design was anticipating a harmonious follow up on the irrigation calendar. A substantial additional amount of water is used to the detriment of flows to downstream Ihefu. For this reason, the consultants proposed water monitoring approach with control sections and measuring efficiencies in various pilot blocks of the Secondary Canal 5 (SC5). A scheme water balance will be monitored, measuring the variation between the amount of water at the intake, and the amount of water that will find its way through the central drain back to the Ndembera River downstream.

2.5.3 **Monitoring of irrigation water use efficiency**

It is proposed to monitor the irrigation efficiency for Madibira irrigation scheme in two phases during the project period.

Phase I

Phase I will be implemented over a period of six month which will be used to make preparation for the monitoring activities such as finalizing the tender documents for the contractor and early construction/installation of water measuring structures in the scheme. The second twelve months of the phase will be devoted to collection of the monitoring data covering both the irrigation season and the dry season. The objective of phase I is to establish the efficiency of water use in the scheme based on current irrigation water management practices. It will involve monitoring of: irrigation inflows into the scheme, crop water use, water losses in the system (conveyance, west land water use) and drainage outflows.

The monitoring will take place at the level of the scheme as well as for the blocks on SC 5. Blocks on SC 5 have been identified for piloting improved water management schedule during phase II. As such, baseline water use efficiency in the blocks will need to be established.

The established baseline situation will be compared with the improved irrigation schedule during the second Phase of the monitoring. The following activities will be conducted by the Contractor and consultant during phase I:

(i) Preparation for the monitoring activities such as finalising designs and the tender documents for the contractor and early construction of water measuring flumes;

(ii) Procurement and installation of water monitoring equipment at the scheme;

(iii) Engagement and training of a data recorder for the monitoring equipment;

(iv) Management of water monitoring data (compilation from data recorder, formatting, data updating) and data analysis;

(v) Assessment of irrigation efficiency and report writing for phase I; and

(vi) Preparation of scheme-wide irrigation rotation adjustment to start introduction of the design irrigation rotation in Block 5 and which continuous flow will have impact on the irrigation in the rest of the scheme which will be agreed upon by MAMCOS and farmers.

Phase II

Phase II is expected to be implemented over a period of two years (2019 to 2021). This phase will capture data on water use in the scheme both during the irrigation and dry season. The objective of the monitoring during the phase will be to implement improved irrigation schedule in secondary canal 5 and determine the water use efficiency under improved management conditions.

During this phase secondary canal 1 and 3 will be monitored in terms of irrigation diversion from primary canal, crop water use, waste land water losses, and drainage, Secondary Drain 3 and Secondary Drain 1 into Primary Drain 1. These blocks will be used as controls for comparison with the measurements in canal 5. Further the monitoring of equipment for scheme level water efficiency will be maintained for the entire period of the second phase. The following activities will be conducted by the Contractor and consultant during the phase.

(i) Construction of drainage outflow measuring flume for SC1 and SC 3 and installation of monitoring equipment at the outlets of SC1 and SC3;
(ii) Collection of data (intake diversion, flows in primary canal and secondary canals 1, 3 and 5, flows in Primary Drains 1 &2, spillage in SC5, tertiary farm block flows and drains in Secondary canal block 5, water use in lysimeters installed in sample farm blocks in Secondary canal block 5, central drain and sedimentation diversion outflows);
(iii) Management of water monitoring data (compilation from data recorder, formatting, data updating) and data analysis;
(iv) Assessment of irrigation efficiency and preparation of reports for phase II (quarterly progress reports, six months report and annual report) and;
(v) Training of National Irrigation Commission staff at Zonal Level, Mbarali District Council and Rufiji Basin Water Board staff on interpretation of satellite images.

In particular REGOW interventions at Madibira irrigation scheme will involve the following

a) Lining of secondary canal 5 which is **10,095 m** long;
b) Lining of the primary canal for the remaining portion of **2,927m** length;
c) Land leveling of about 148 ha of wasteland;
d) Farmers mobilization ;
e) Capacity building to famers through Farmer Field School;
f) Installation of water flow measuring instruments; and
g) Data collection and monitoring on water flows.

3.0 PRINCIPLES GUIDING ESMP : SAFEGUARDS AND LEGISLATION

In the preparation of this ESMP, and in consideration of the type of interventions planned to be implemented and regarding the baseline conditions at potential target area against the requirements of the World Bank and Tanzanian safeguard policies has led to REGROW being assigned Environmental Risk Assessment Category B and thus activates will be implemented following World Bank and Tanzanian safeguard policies.

3.1 World Bank Safeguard Policies

3.1.1 Environmental Assessment (OP/BP 4.01);

The World Bank's safeguard policy OP 4.01 Environmental Assessment requires that all Bank-financed operations are screened for potential environmental and social impacts (a view shared by the Tanzania National EIA procedures and processes) to determine the extent and type of the EA process and thus help ensure that they are environmentally sound and sustainable and thus improve decision making. Thus OP 4.01 safeguard policy is triggered if REGROW project as whole or an intervention to be subsequently financed by the project is screened and found likely to have potential (adverse) social and environmental risks and impacts. The Environmental Assessment (EA) process covers impacts on the natural environment (air, water and land); human health and safety; physical cultural resources; and trans-boundary and global environmental aspects. For the intervention of REGROW to rehabilitate Madibira irrigation scheme NIRC was required to prepare ESMP as the environmental safeguard instrument so as to benefit the nature and scale of potential impacts it may causes.

3.1.2 Natural Habitats (OP/BP 4.04)

This policy recognizes that the conservation of natural habitats is essential for long-term sustainable development. The World Bank, therefore, supports the protection, maintenance, and rehabilitation of natural habitats in its project financing, as well as policy dialogue and analytical work. The World Bank supports, and expects the Borrowers to apply a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development.

In irrigation infrastructures and aquaculture infrastructure for instance invariably are established close to natural water sources especially lakes, rivers, wetlands /swamps. Local concerns with aquaculture in inland waters may include wastes handling, side effects of agrochemicals, competition between farmed and wild-animals and the potential introduction of invasive plants and animal species or foreign pathogens. This Policy is triggered during the implantation of REGROW intervention in ensuring water use efficiency at Madibira thus the water which later be discharge to the Ihefu wetland may contain agrochemicals residues.

3.1.3 Pest Management (OP 4.09)

The WB supports Integrated Pest Management (IPM) and the safe use of agricultural pesticides and ensures that health and environmental hazards associated with pesticides are minimized. The procurement of pesticides in a WB-financed project is contingent on an assessment of the nature and degree of associated risk, taking into account the proposed use and the intended user.

The policy on Pest Management OP 4.09 requires the use of various means to assess pest management in the country including: economic and sector work, sectoral or project - specific environmental assessments, participatory IPM assessments, and adjustment or

investment projects and components aimed specifically at supporting the adoption and use of IPM. The objective of OP 4.09 policy on Pest Management is to promote the use of biological or environmental control methods and to reduce reliance on synthetic chemical pesticides. Bearing in mind the size of Madibira irrigation scheme, agro-chemical utilization is currently high; on average every year about 297 tons of fertilizer (UREA) is used. Also, about 3,970 liters of herbicides (2-4D amine) are sprayed for weed control. Apart from these farm chemicals used every year there is a bird control program for birds which feed on paddy in which Queletox chemical containing two products namely Fenthion -Japan and Bathion-China, is used. These chemicals are very toxic and their toxicity last for 14 days. To ensure that REGROW is properly managed, it is proposed to use the IPM which was prepared and approved for Expanding Rice Production Project (ERPP) in 2014.

3.2 Tanzanian Safeguard Polices

The REGROW interventions will be implemented within the context of National and International legal and regulatory frameworks including development strategies. The following are the Policies and Acts that will be adhered to during implementation of irrigation interventions at Madibira irrigation scheme.

3.2.1 The National Irrigation Policy 2010

The policy ensures sustainable availability of irrigation water and its efficient use for enhanced crop production, productivity and profitability that will contribute to food security and poverty reduction. The policy emphasizes in Article 2.4.8.1 where its advocates for proper utilization of irrigation in the areas where it will help to reduce pressure on the natural resources and provide access to other users.

In compliance to the policy, the project will promote improved technologies in agriculture for water management including farmer field schools and use of SRI; ensure that the proposed rehabilitation of canals in irrigation schemes provide water to downstream users; promote agriculture for high value crops for generation of employment and promote value addition; create awareness on water management. The National Irrigation Commission is responsible in safeguarding the implementation of the policy as guarded in its act.

3.2.2 National Agriculture Policy, 2013

The National Agriculture Policy of 2013 recognizes the importance of environment and proposes several measures to arrest degradation of natural resources. The policy emphasizes intersectoral linkages to ensure integrated sustainable use and management of natural resources in order to conserve and improve standards of living in the rural areas through increased income generation from agricultural and livestock production, processing and marketing.

Specifically, Component 2 for which Article 3.14 of the policy promotes an agricultural value chain and agro processing is of relevance. Component 3 will also benefit from the Policy as Article 3.25.3 emphasizes sustainable agricultural development that is coordinated with relevant ministries, addresses risks and sensitizes the public on environmental conservation. In promoting this the Ministry of Agriculture is accountable for the application of this policy.

3.2.3 National Water Policy, 2002

The objective of the policy for Water Resources Management is to develop a comprehensive framework for promoting the optimal, sustainable and equitable development and use of water resources for the benefit of all Tanzanians, based on a clear set of guiding principles.

Water is a basic natural resource for socio – economic development. It is fundamental for various social-economic development activities such as industrial production, irrigated agriculture, livestock keeping, mineral processing, hydropower production, navigation and recreation and tourism.
Furthermore, the allocation and consumption of water for environmental purposes shall be recognized and given appropriate considerations, in so doing Water basin board offices have the mandate for the water allocation.
For the REGROW project intervention in irrigation schemes will ensure the water used and permitted for irrigation purposes will also reach other users downstream by rehabilitating canals of the irrigation schemes. In implementing interventions will also be observing Article 3.3 which advocates for water sources conservation and assurance of minimal environmental degradation and destruction of water sources. The ministry of Water and Rufiji Water Basin Board has full authorities in the application of this policy.

3.2.4 National Land Policy, 1997

The National Land Policy 1997 promotes and ensures secure land tenure system, to encourage the optimal use of land resources and facilitate broad-base social and economic development without endangering the ecological balance of environment for sustainable development.
It is stated in the land policy Article 4.2.3, that under the present laws, there is no restrictions on access to land for speculative purposes, especially in prime agricultural, industrial, commercial and residential areas. With the adhering to the policy small holder farmers have the right to access the land for agricultural activities. The Ministry of Land, Housing and Human settlement development and the Commissioner of Land are full accountable for the standing of this policy.

3.2.5 The Environmental Management Act No 20 of 2004

The act provides legal and institutional framework for sustainable management of the environment; outlining principles for management, impact and risk assessments, prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide a basis for implementation in Tanzania. The Act serves to ensure that the conservation and management of wildlife and natural resources benefits present and future generations as well as promotes and enhance the development of international instruments of environment. Adhering to the act under its regulation section 6 (1) where in construction of irrigation canals EIA is mandatory, therefore during the rehabilitation of the irrigation canals ESMP is conducted. In insuring this, The Environmental Management council has the full responsibility to ensure all environmental issues are safeguarded in our country.

3.2.6 The Water Resources Management Act No. 11 of 2009

The Act provides institutional and legal framework for sustainable management and development of water resources it outlines principles for water resources management; prevention and control of water pollution; participation of stakeholders and the general public in implementation of the National Water Policy.
The Act is of relevance to REGROW interventions, particularly in the construction of flow management structures and, improvement of priority irrigation systems, catchment conservation initiatives and associated permitting, and stipulates the need for consultation

with the Basin Water Boards in the area. The boards are empowered to approve water permits to water users for different purposes. In adhering to this Madibira irrigation scheme has obtained its water permit for irrigation activities and has the responsibility to ensure water returns back to the river for downstream users. Water Basin Board Offices are the key implementers of this act regarding to the water users.

3.2.7 The National Irrigation Act of 2013

The Act established the National Irrigation Commission to provide for the development, operation and maintenance of irrigation and drainage systems and effectively implement the National Irrigation Policy, and the National Irrigation Development Strategy.
The National Irrigation Commission promotes efficient water use in irrigation systems and ensures compliance with the Integrated Water Resources Management best practice standards and guidelines as a regulatory body.
Compliance with section 44 of the Act for construction of irrigation flow and drainage controls under planned Component 3 is to be adhered to as a list of prohibited activities in the irrigated area is enumerated. The Act provides for regular monitoring and evaluation of performance of irrigation schemes is under section 45 and assurance of environmental health is mandatory under section 50. The NIRC has the mandate to supervise the act accordingly.

3.2.8 Occupational Health and Safety Act No. 5 of 2003

The Act provides for securing the safety, health and welfare of persons at work places. Part VI of the Act, that is to say sections 60, 61 and 63 of the Act provide for safety measures to be taken by each employer in the specified conditions. REGROW addresses how best workers safety will be taken care of during the rehabilitation of the canals and leveling of block 5 whose nature involve safety risk to workers. In adhering to the act, in preparing of the tender documents for hiring contractor, this will be taken into account. In ensuring safety at work place the authority Occupational Safety Healthy Authority (OSHA) will be full responsible to supervise the act.

3.2.9 HIV and AIDS (Prevention and Control) Act of 2008

The Act provides for prevention, treatment, support and care, control of HIV AIDS and support using available resources.
The Project should take in to consideration of section 9 of the Act providing for HIV AIDS education at the work place as the implementation of rehabilitating of the irrigation scheme which will involve hiring labor. Observing rights and obligation of people living with HIV AIDS as provided under section 33 of the Act is pertinent.

4.0 POTENTIAL POSITIVE AND NEGATIVE ENVIRONMENAL AND SOCIAL IMPACTS OF REGROW INTERVENTIONS AND MITIGATION MEASURES

REGROW interventions are intrinsically and intentionally aimed to mitigate existing adverse and detrimental impacts of water losses at Madibira irrigation scheme and the natural resources contained within and around the scheme. To ensure compliance with best environmental and social practices the National Irrigation Commission prepared ESMP documents aimed to ensure that the proposed REGROW interventions at Madibira irrigation scheme are:

- Environmentally and socially responsible in minimizing potential adverse impacts while;
- Promoting inclusive approaches such that effectively informing and involving stakeholders as well as project affected parties and actively facilitating that the improvement of Madibira irrigation scheme benefits not just the farmers but the surrounding communities and environment as well.

In addressing the potential positive and negative impacts that are predicted in the environment during the implementation of REGROW project intervention's, it should be noted that the implementation of REGROW interventions will be done on existing irrigation infrastructure that will include lining of canals, desilting of existing drainage canals and leveling. The activities during rehabilitation will not include clearing of site (deforestation) that means biological condition of the area will not be disturbed.

4.1 POSITIVE IMPACTS OF REGROW INTERVENTIONS

The intervention that REGROW will implement at Madibira irrigation scheme will bring forth the following positive impacts;

i) Improve irrigation infrastructure to reduce water losses;
ii) Increase water use efficiency;
iii) Improve drainage system to return water downstream;
iv) Increase dry season water flow to Ihefu;
v) Increase crop production;
vi) Increase area under irrigation of about 148 ha through land leveling of highlands within the scheme; and
vii) Awareness creation and capacity building for farmers on water management and cropping calendar through Farmer Field Schools (FFS)
viii) lining of the main canal by REGROW will support MAMCOS to be able to focus on other water management and maintenance aspects in the coming years

Other positive impacts include direct and indirect employment and business opportunities for surrounding communities associated with improved irrigation infrastructure. During cropping season people around Madibira and outside Madibira will have the opportunity to get temporary jobs in lining of irrigation canals, preparation of farms, weeding and during harvesting. Due to influx of labor from different areas will create opportunity for businessmen with restaurants, clubs and rest houses at the village and field centers.

4.2 POTENTIAL NEGATIVE IMPACTS

The negative impacts associated with rehabilitation works will include, dust emission, noise and injuries. However the amount of work to be done is relatively small and located far from receptors. Rehabilitation of secondary canal 5 and land leveling on block 5 is located at the far end of the field where dust or noise cannot be felt by the community except the labours. The types of machine to be used are normal excavators and graders. Most of lining works will be done manually using labours in the same manner MAMCOS is doing in lining of the main canal.

4.2.1 Impact on Air quality

Air pollution is envisaged to arise from construction activities (land leveling) and exhaust emissions from heavy trucks, dumper trucks, water bowsers and others. Other activities that may potentially result in air emissions are associated with preparation of ancillary facilities such as through earth stripping and grading on main canal and construction materials stockpile at site.

4.2.2 Sourcing of construction materials

The implementation of the proposed interventions involves vast material requirements. Among others, there will be need for stones, marrum, cement and assortment and associated equipment among others. The sourcing of materials may have mixed impacts. The potential negative effects include increase in exhaust emissions from the material hauling tracks. Given that the material source points such as borrow pits are far away from the sites longer distances to available sources will spread the impact.

4.2.3 Impact of waste generation

All construction activities come with waste which may include concrete waste, stone waste, debris from excavations as well as empty plastic bags, containers and oily rags, and cut-to-spoil materials. If inadequately handled, wastes could create aesthetic problems and environmental degradation.

4.2.4 Community concern and stress

With the onset of rehabilitation works, the community gets concerned on how they will co-exist with works in particular field preparation and growing season. There are issues related to growing season particularly timing of field preparations and nursery preparations.

The irrigation infrastructure improvement will manifest through physical disturbances of the irrigated area and probably the cropping season. This may create tension to farmers on how to cope with the growing season. Thus in order to avoid this, rehabilitation activities should be scheduled during the dry season after harvest. The best period is from late June to early November.

4.2.5 Health and safety

Increased risk of accidents for the local population due to working sites and lack of personal protective gears (use of Personal Protective Equipments such as helmets, dusk mask and safety boots) may lead to accidents and injuries.

4.2.6 Disturbance of local community social dynamics

In the proposed design, both the Southern drain as well as using the route through Madibira "II" was discarded for that the water flow through these routes are not controlled by MAMCOS. This action will disrupt the community who depend on the southern drain water flow for livestock and drinking. This will result into disturbance of local community social dynamics.

The current situation is that certain amount of water continues flowing through the Northern part of Ndembera River. This water is used for irrigation, human consumption and livestock. Farmers have established settlement and other human activities are on-going depending on water flows from the Ndembera River after the intake. The proposed interventions by REGROW to abandoned this flow will have impact to livelihood of people living northward in Madibira phase II who depend on same water for their survival during dry season this will result in conflict between the community and the project.

4.2.7 Water use conflicts

Lining of the main canal and allowing all water to flow through SC5 during dry season may attract farmers to use water for dry season cultivation which may result into water use conflict. The closure of the existing flow on the northern part of the scheme where human settlements, agricultural activates and livestock keeping depend on the water will lead to great community and project conflict.

Water use conflicts are will also be attributed by uncoordinated development by different sectors for example livestock and farmers, between groups of farmers, upstream and downstream users and between institutions and other users. Water use conflicts are also associated with irrigation. Cultivators from the highlands and pastoralists from the North and Central Tanzania, conflicts have risen over abstraction of water for irrigation causing shortages of water downstream mainly in the dry season.

In implementing the REGROW intervention tension will raise between conservation needs, (increase dry season flow of Great Ruaha River), irrigated rice farms farmers and Livestock keepers. Especially during the dry season where water becomes inadequate for farming activities, farmers still need water for seeding and horticultural activities while same water is highly needed by conservation for wildlife in Ruaha National Park and livestock keepers. Thus the water use utilization will be so high and thus conflicts may raise. Madibira irrigation scheme was under developed in terms of infrastructure development for livestock drinking and land leveling which contributes to farmer-livestock conflicts and to poor water use efficiency and on-farm water management.

4.3 EXTERNAL POTENTIAL NEGATIVE IMPACTS

The external impacts that are discussed in this section are not directly linked with REGROW interventions but if they are not addressed will led to malfunctioning of intervention that will be implemented. These include;

4.3.1 Weed invasion

The River channel in the Northern route is highly invaded with aquatic weeds grasses thus making water stagnant. Weed invasion is also high in the outlet drains whereby water that is to be discharged through the outlet to Ihefu fails flowing smoothly and remains stagnant in the river channel. Water weeds also accelerate water losses through evaporation.

Plate 5: Aquatic weeds that clog the Northern part of Ndembera River

4.3.2 River bank erosion

Due to extensive rainfall variation in different years the diverted river Ndembera has formed meanders and soil erosion towards left bank and northern flood bund (Plate 2). In studying river morphology (behavior) diverted river Ndembera tends to erode more towards the left bank which is most vulnerable to erosion since this is the preferential direction down the contours of the alluvial fan and finding its original course towards the southern drain (old Ndembera River channel) (Halcrow, 1981). Great impact of river bank erosion is seen at 1200m from the intake.

During field visit, it was observed that livestock keepers graze livestock upstream of the intake on Ndembera River causing high erosion which put risk for River to change its direction. During the consultation process it was revealed that the village government allocated area for livestock drinking far upstream of the intake on stable river banks. However due to negligence they use the area close to the intake for livestock to drink water. There is bylaws set by MAMCOS for all defaulter to pay 50,000/= per cattle for those who graze and drink water in the scheme. There should be an awareness creation on the importance of protecting the river and irrigation infrastructure for the benefit of the community.

Plate 6: (a) Left River bank erosion of Ndembera River upstream of the intake

Plate 7: Left River bank erosion of Ndembera River upstream of the intake

4.3.3 Ndembera River changing its course upstream of the intake

During the design of Madibira Irrigation scheme Ndembera River was diverted from its course to supply water in the intended irrigation area. A diversion channel 5.75 km long, was designed to redirect the Ndembera River to its original alignment and convey the river flow to the rock fill weir diversion site and downstream to the confluence with the Mwami River to the Northern part of the scheme, (Halcrow, 1990). River Diversion works were designed to close off the existing Ndembera River course. Ndembera Rive to the North of the scheme is used to supply water to Madibira phase II irrigation scheme and also supply water for livestock and people.

Due to extensive rainfall variation in different years the diverted river Ndembera has formed meanders and soil erosion towards left bank and northern flood bund (Plate 2). In studying

river morphology (behavior) diverted river Ndembera tends to erode more towards the left bank which is most vulnerable to erosion since this is the preferential direction down the contours of the alluvial fan and finding its original course towards the southern drain (old Ndembera River channel) (Halcrow, 1981). Great impact of river bank erosion is seen at 1200m from the intake

Without immediate interventions in the intense recurring river erosion , when heavy rains are received during rainy season in consecutive two to three year the flood bund will be washed out, great impacts will be seen like floods to nearby settlements, destruction of fields and there will be no Madibira irrigation scheme at all. Considering sensitivity of the area during consultation with MAMCOS it was agreed that, they should organize a meeting that will take place at the site for members to observe the sensitivity of the area and for decisions to be made what is to be done to rescue the situation.

4.3.4 Sedimentation/ siltation

Human activities such as farming, bricks making, illegal fishing in canals, livestock grazing near river bank led to soil erosion of the alluvial fan that causes sedimentation/or siltation to the intake, settling basin and to the southern drains that has led to failure in performing according to the original designs. Also the presences of Ihangalawe River that discharge its water into the Southern drain lead to flooding of the nearby airstrip and bare land. Intervention has to be done to the point where Ihangalawe River meets the southern drain in order to avoid flooding to the airstrip and bare land.

4.3.5 Farmers and livestock keepers conflict

Livestock keeper seeks for green pasture for their animal by shifting from one place to the other in search of water and pasture. They don’t have specific area for grazing. In so doing the livestock enter the ending up feeding on some farmers crops resulting into conflicts

4.3.6 Gullies and borrow pits in paddy fields

Madibira irrigation scheme was partially leveled and thus gullies and borrow pits are found in some paddy blocks. These gullies contribute to water losses.

4.4 MITIGATING MEASURES FOR POTENTIAL NEGATIVE IMPACTS

In general, implementation of the proposed REGROW interventions for Madibira irrigation scheme will mitigate most of the current environmental and social impacts affecting Madibira irrigation scheme. The proposed lining of primary canal, Secondary 5, land leveling, drainage improvement, farmer's mobilization and monitoring of water use efficiency will offset most of adverse impact and increase dry season flow days along Great Ruaha River (GRR).

Other environmental and social mitigation measures will be dealt with in order to achieve the objective of REGROW project on efficient water use for increased dry season flow of water to Ihefu. Generally, the plan is the combination of hardware and software interventions where the human factor in irrigation water management is crucial to make the necessary changes happen. Secondly is the improvement in irrigation infrastructure to reduce water losses. The human factor for water management in Madibira irrigation scheme include, water abstraction and allocation, water use permits, paddy growing calendar and operation and maintenance of irrigation infrastructure. The hardware component includes lining of canals, land leveling and installation of water measuring instruments. It was observed that the current irrigation practices applied and hence the efficiency water use is rather poor, which results in sub optimum water use and as a consequence a higher use of the limited water resources.

Thus, this ESMP provides the typical intervention needed to mitigate the impacts that reduce water flows to Ihefu Wetland and downstream to the Ruaha National Park. The proposed mitigation measures will ensure that the environmental and social impacts are mitigated or avoided. The plans also assign responsibility for implementation and follow up to ensure that they contribute to increase down stream flow of water from the scheme.

4.4.1 Irrigation infrastructure improvement

In addition to what it is proposed in the design report, The ESMP team recommends further mitigation measures to be done to minimize water losses as follows:

a) De-silting of the outfall drain canal from the confluence of Primary Drain 1 and 2;
b) De-silting of the Southern Drain;
c) De-silting of secondary drains served by SC 5;
d) Sport improvement of damaged portions on the Southern drain and Primary drain No, 1;
e) Land leveling of the wasteland totaling 142 ha;
f) Filling and leveling depressions and gullies within the scheme as these causes a lot of water losses. They have to be filled before water goes to the field;
g) Assist in River training upstream of Ndembera River;
h) Water quality monitoring; and
i) Rehabilitation of off take structure or and restoration of the sluice gates for Tertiary Canal 12 to 15 of Pilot Block 5 (SC5).

The management of the southern drain falls under the jurisdiction of the Rufiji Basin Water Office because it is outside the area managed by MAMCOS. Therefore de-silting and rehabilitation of the southern drain by REGROW project is the feasible solution for increased downstream flow and maintaining stable flow of $0.5m^3/s$ permitted through the southern drain. Water losses into intermediate swamps will be reduced. The rehabilitation of the southern drain should also consider water measuring structures at the flushing gates and at the confluence with Ndembera/Mwima River on the lower part of the drain. Provide for livestock

drinking troughs at strategic points away from the southern drain would solve the problem of livestock drinking straight from the drain. Continuous checking of drains for blockages and illegal abstraction for irrigation should be enforced. While these represent technical solutions, many of them would form part of a process of negotiating management strategies with Rufiji Basin Water Office and the Community around the southern drain.

Continue allocating a flow of 0.5m^3/s subject to agreed water management bylaws. It may be possible to attach conditions and bylaws to use this flow so that the community agrees to use water as per original plans. As this seems to be difficult to enforce, it is perhaps more realistic to expect the farmers to agree to discuss bylaws on cultivation and irrigation that reduce water demand.

4.4.2 Water flow measurement

Water Flow Measurement will be required in the secondary canals to enable better management of irrigation water day by day.
In order to convert water levels so recorded into discharges the daily data collected shall be analyzed to develop the discharge (Q) - Head (H) (i.e. Q Vs H) relationship that enables discharge calculations. The typical relationship between head and discharge for the broad crested weirs at each outlet to the secondary canal will be given by the following Equation (1):

$$Q = CLH^{3/2} \quad \ldots\ldots (1)$$

Where Q= Discharge in m^3/s

L= Width of weir in meters

H= Head on weir in meters.

C= Coefficient of discharge which is approximately 1.7 for broad crested weirs

Thus,

$$Q = 1.7LH^{3/2} \quad \ldots\ldots (2)$$

4.4.3 Water quality monitoring

Water quality monitoring will be instituted to monitor agrochemical water pollution for drainage water. Baseline data will be established at the start of the project followed by subsequent monitoring during the operation phase. Detail of parameters to be monitored and monitoring frequency is presented in the environmental and social monitoring plan in chapter 6. Parameter to be monitored includes but not limited to the following parameters depending on the type of agrochemicals to be applied; pH, Conductivity, TSS, NO_3, SO_4, Cr, Pb, BOD_5, COD, and Plankton.

The concentration of the parameter (pollutant) in the receiving river will be calculated using mass balance equation (3):

$$C = \frac{C1Q1+C2Q2}{Q1+Q2} \quad \ldots\ldots (3)$$

Where

C= Concentration of the parameter into the receiving water body downstream the discharge point;
C_1= Concentration of the parameter in the river;
Q_1= Quantity of water flow in the river;
C_2= Concentration of the parameter in drained water; and
Q_2= Quality of drained water from irrigated fields.

The matrix of environmental and social management plan is indicated in Table 6 below for easy reference.

The major potential environmental and social impacts identified through physical field observations, stakeholder consultations and review of various feasibility study reports and their mitigation measures are summarized **Table 4** below. They are mainly caused by external factors, passive water users, farming system, livestock grazing and drinking water, illegal fishing and soil erosion.

4.4.4 Human factor mitigation measures on water management

4.4.4.1 Community engagement

Community engagement is critical for effective implementation of mitigation measures. Perceptions of unfair/unrealistic ratios on sharing activities which can be managed by local communities may derail the project intentions and therefore REGROW should share the proposed interventions with the community.

4.4.4.2 Cropping Calendar

Cropping calendar is one of the control measures for water abstractions. Early preparation of crop nurseries and farm field will enable early planting and harvesting during the period when the river flows are high. Late preparations may course late harvesting and therefore abstraction of water during the scarce period. For example, from 15st November to April (this includes the 'do nothing' periods), the gates would be opened, but abstraction would be controlled by adjustments of intakes or adherence to water use permit. For most of secondary canal, irrigators would be able to abstract what they need. During the dry season paddy cultivation would cease, therefore dry season flow through secondary canal 5 would be restricted to flow downstream to maintain the ecological functioning of Ihefu wetlands hence increased flow into Great Ruaha River. (Table 6)

4.4.4.3 Farming system improvement solution

Improving Irrigation Efficiency: This will be done through extension messages to improve efficiency, by technical interventions or by irrigation management transfer. Extension messages will cover a number of demand management measures (e.g. fertilizer, cropping patterns, water use, nursery management, and end of season water delivery and control).

In addition to this the mitigation measures will include improving capacity and enforcing on collection of O&M fees as per the Irrigation Act 2013 and creating awareness among farmers on the importance of their contributions towards operation and maintenance of the irrigation infrastructure. The fee collected will be used to line secondary canals 1-4 and 6.

4.4.4.4 Irrigation practices

In order to have good and efficient water use, it is proposed that the System of Rice Intensification (SRI) to be practiced by all MAMCOS members. Madibira is one of the schemes where farmers have been trained in paddy production aspects by Kilimanjaro Agricultural Training Centre (KATC), TANRICE and Policy and Human Resource Development (PHRD). Paddy production using SRI leads to three major advantages which are using less water, little amount of seeds and more yields. It serves about 50% of water used though the conventional method, only 10kgs of seeds are adequate for 1ha and doubled yield. With SRI the yield can go up to 10 t/ha. The SRI system should start with blocks in secondary canal 5 and later spread to otter remaining blocks.

4.4.4.5 Collective land preparation

Experience shows that the present land preparation systems whereby each irrigator prepares land at his/her own wish leads to the extended cropping calendar. Another factor which contributes to the extended calendar is that each irrigator decides on the variety to grow. Under the proposed collective land preparation, it is also recommended to have one variety grown in the scheme. Collective land preparation will be possible if the funds for land preparation are part of the Irrigation Services Fee and are paid to MAMCOS which will be responsible for making sure that land preparation is done timely as per cropping calendar.

4.4.4.6 Collective nursery preparation and transplanting

In order to effectively apply the SRI, it is proposed to have communal nursery for each block for transplanting simplicity and transportation of seedlings. Nursery preparation for canals 1&3, 2&4 and 5&6 respectively should be done at an interval of 72hrs meaning that after every 72hrs transplanting will be done as proposed. This means that within 9 days (216 hrs) the whole scheme will be transplanted by 9th December and by late March harvesting is complete. The recommended variety to be grown is SARO V which matures after 120 days.

Table 2: The proposed cropping calendar

S/N	Activity	Months																																	
		September				October				November				December				January				February				March				April				May				June			
	ACTIVITY	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Canal Cleaning																																								
2	Bush Clearing (Fields)																																								
3	Ploughing And Harrowing																																								
4	Nursery Establishment And Management																																								
5	Puddling and Field Leveling																																								
6	Transplanting																																								
7	First Weeding																																								
8	Fertilizer Application																																								
9	Pest Control																																								
10	Second Weeding																																								
11	Water Management																																								
12	Bird Scaring																																								
13	Harvesting And Storage																																								

4.4.4.7 Irrigation schedule

After transplanting the proposed irrigation schedule should be as follows: 72hrs for canals 5 and 6 & 48hrs for canals 1&3 and 2 & 4 respectively. Canals 5&6 covers much bigger area of the scheme that's why more time is allocated for irrigation. With the proposed schedule within one week the whole scheme will be irrigated.

4.4.4.8 Crop diversification

After paddy cropping season which is practiced as in the proposed cropping calendar crops which need less water can be grown mostly vegetables. Also, utilization of residual moisture for crop production is highly recommended.

4.4.4.9 Integrated Pest Management

An integrated pest management (IPM) approach is the most environmentally benign strategy but, apart from when circumstances permit cultural control measures, most IPM activities only have realistic chances of succeeding in controlling quelea in small (<10 ha) areas. Amongst available IPM means of lethal control, mass-trapping, which also has the advantage of providing a food source, is recommended when quelea roosts and colonies are less than 5 and 10 hectares in area, respectively, at Madibira the colonies are over 10 ha in area. Nevertheless with both traps and mist nets, care is needed to minimize non-target casualties.

Through IPM, combination of good agricultural practices (GAP) especially practicing the System of Rice Intensification (SRI) leads to high yields which shield the damage of the crop by the invading birds and hence insignificant losses can be experienced. Through SRI paddy can produce up an average of about 90 tillers under good management against an average of 30 to 50 tillers through the traditional and conventional methods of paddy production. The attack of birds under these two methods, the loss is severe under the traditional and conventional methods which result in the use of aerial spraying of avicides for control of the birds.

On the other hand, instituting collective farm operations will mean that the crop in the whole scheme will be at same stage. Therefore, during bird control stage all farms or pieces of land in the scheme will have someone scaring birds, so bird control scaring will be effective and thus there will be no need for the of industrial or synthetic avicides, the control of birds will be effected by scaring only. Frequent scouting in breeding sites in order to monitor the buildup of roots can help in prediction of the sizes of the colonies and thus plans on how to control the birds.

The current cropping calendar in a way support the buildup of the birds' population, the birds migrate to Mbarali district from February every cropping season and bird scaring starts in March to July when the crop is completely harvested. This is a five (5) months period meaning that through this period the birds are assured of availability of food thus their population increases substantially. With adoption of the proposed cropping calendar, the birds will have only two months of assured availability of food, under the calendar bird scaring is done from February to March, it is by end of March the whole crop will be harvested at the scheme. This will deprive the birds of readily available food and thus their population checked; therefore use of avicides will not be required. Another possible means of avoiding the

use of toxic avicides is the adoption of tolerant varieties to attack of birds. There are local varieties which are tolerant to attacks by birds. Currently the use of local varieties is discouraged at Madibira due to the fact that they are low yielding and takes longer time to mature. However, presently at the scheme there are no such varieties grown, this need consultation with the rice breeders on the possibilities of having such a varieties with the traits of high yielding and short maturing time for use at the scheme so that birds attack is controlled through tolerant variety.

Proper farming practices should be adopted to take full advantage of irrigated agriculture and promote the productivity of paddy cultivated based on proper application of farm inputs. This would include the use of certified seeds of high yielding varieties or improved varieties with proper dosage of fertilizer and agro-chemicals under sufficient supporting extension services.

The establishment of proper irrigation distribution systems, the provision of extension messages on the safe handling and safe disposal of agro-chemicals together with the promotion of integrated pest management measures are the key issues for control of agrochemical pollution. The ESMF reviewed the IPMP prepared for ERPP project which is a World Bank funded rice irrigation project and found to be adequate to be adopted. The IPMP is solely for Rice production. During implementation specific pests prevailing at Madibira irrigation scheme will be identified and principles of control be adopted accordingly.

4.4.4.10 Abandon illegal fishing

There is a need to abandon this behavior by first creating awareness and using bylaws to the fishing group which is actually very small group of people compared to the farming community and the value of the irrigation infrastructures. According to MAMCOS by laws fishing is not allowed in the scheme area. Alternatively REGROW can allocate some funds to establish fish ponds around the scheme. The wastelands which are within the scheme can be excavated to create fish ponds as part of the income generating activity so that the fishing activity can be controlled and monitored.

4.4.4.11 Abandon opening of new areas for irrigation

The community should be remained on the original agreement of using the water for people and livestock only. This can be solved by creating awareness and enforcing by laws. Alternatively, they can be trained to grow high value crops which require less water with the introduction of irrigation technologies which use less water. The community around the southern drain should not practice irrigation during dry season in the same way MAMCOS is doing.

Table 3: Environmental and Social Management Plan for REGROW interventions

Project Phase	Project Activity	Potential Negative environmental and social impacts	Proposed Mitigation Measures	Responsible institution	Time frame for implementation	Estimated Cost (USD)
Pre-construction	Physical survey and observation of site before construction	River bank erosion	River Training on 1200m stretch upstream of the intake Declare the area between the Eastern and southern Ndembera flood bunds as a sensitive area for protection of the River and intake Restrict livestock drinking on the stretch of 1200 m upstream the intake Reinstatement of trained river course by planting river line trees and vertical grass to stabilize the area	RBWB NIRC MAMCOS WEO	During Construction	Part of rehabilitation cost
Construction	Excavations. Construction/rehabilitation of drains/canals, diversion structures, access roads etc.	Expose land to soil erosion	Limit construction activities within designated area Temporary control measures, Lining of secondary canals, Planting of grass. Diverting storm water and breaking long slopes to reduce the velocity of runoff	CONTRACTOR	During Construction	Part of rehabilitation cost

		Health Risks/Injuries	Provide appropriate personal protective equipment to the working crew Hiring of competent staff with previous work experience to perform works Follow proper work guidelines Provide fully equipped first aid kit at site. Emergency preparedness plans in place.	CONTRACTOR NIRC MAMCOS	During Construction	Part of rehabilitation cost
		Ambient Air pollution	• Provide Personal protective equipment's (PPE) like masks (helmet, mask, warning flags, reflective jackets. gloves, hard boots etc) • Watering of the site, access roads for dust suppression • Restricted working hours • Used certified equipment's • Regular service of equipments	CONTRACTOR NIRC AMCOS	During Construction	Part of rehabilitation cost
		Noise pollution	• Adopt and maintain moderate vehicle speed and traffic when crossing sensitive areas • Position noisy equipment as far away as possible from sensitive receptors (or provide			

			housing/cover to reduce noise propagation. • Servicing of equipments • Establish mechanisms for recording and responding to public complaints/concerns • Regular service of equipments			
		Solid waste production	• Collection of solid waste for disposal, burial, burning or use for sport improvement of port holes in case of cement remains • Solid wastes will be limited and reused at the maximum to backfilled excavations • Spreading and grading spoil material	CONTRACTOR		
	Refueling of construction equipment and vehicle/mechanical repair of equipment	Soil and water contamination	Repairing/ refueling of vehicles should be done at designated area far from the water source Storage of used oil in drums for use in form works or sell to authorized dealers.	CONTRACTOR	During construction	Part of the rehabilitation cost
	Excavations during rehabilitation works expose	Sedimentation/ siltation due to surface runoff	Rehabilitation of southern drain to continue flushing sediments from the settling basin De-silting of the southern drain to its original levels Technical intervention have to be done to the point where Ihangalawe meets the southern drain to avoid flooding to the airstrip and bare	CONTRACTOR NIRC AMCOS	Part of rehabilitation cost	Part of rehabilitation cost

			land Closing of the new irrigation fields established on the Southern drain			
	Supply of construction material, excavation works	Accumulation of solid waste Land degradation at borrow pit site	Preparation of damp site for disposal of waste Use existing borrow pits in priority and reinstatement after using Use excess construction material for repair of access road/farm roads Present of waste collector at construction site Remove excess construction material from the site	MAMCOS CONTRACTOR	During construction	Part of the rehabilitation cost
	Recruitment of workers	Hiring of children below age of 18 years	Recruitment of workers should require proof of age avoid employing those under age of 18	CONTRACTOR NIRC	During construction	Part of the rehabilitation cost
Operations	Channeling water in the secondary canal 5 during dry season	Disruption of economic and social dynamics of the community on the Southern drain and Northern part of Ndembera River	Abandoned other illegal abstractions from Southern drain and maintain only a flow of 0.5 m3/s which was originally planned for people and livestock drinking Estimate amount of water to continue flowing through Ndembera River on the Northern part. This amount should suffice only domestic, livestock and legal irrigation abstractions in Madibira phase II	RWBO NIRC TANAPA	Before construction	NIL

			Make decision of whether to continue with Madibira phase II or not. Solve the boundary conflict between TANAPA and MAMCOS. Construction of a long term awaited Lugoda Lutali dam upstream to regulate water flows of Ndembera River. Control irrigation activities on the southern drains Construction of cattle troughs to avoid further damage of the Southern drain by livestock			
	Water distribution	Increasing water tension/conflicts related to water utilization	Adhere to cropping calendar Application of System of Rice Intensification (SRI) techniques Comminute engagement Collective land preparation Ensure coordinated efforts in the implementation of the propose interventions, Adhere to restrictions and complement the approved ESMP activities that have an impact on the water resource.	RWBO TANAPA NIRC MAMCOS	Operation phase	1,000

	Application of Agro-chemicals	Water and Soil Pollution	Efficient agro-chemical application technology Application of integrated pest management (IPM) approach Training of farmers on safe handling, use and disposal of agrochemicals. Use cropping calendar	NIRC Ministry of Agriculture	Operation phase	3,000
	Water distribution during dry season	Risk of dry season cultivation	Awareness creation to farmers Close off take gates from SC5 during dry season Installation of water flow measurement instruments Monitoring of dry season water flows	MAMCOS RBWB NIRC	After construction	2,000 Part of rehabilitation cost. FFS and farmers mobilization
		Farmers and livestock keepers conflict	Construction of cattle drinking troughs Enforcement of the land use plan prepared by the villages Enforcement of by-laws made	MAMCOS WEO CONTRACTOR		3,000
	Cultivation season	Increase in incidence of water borne diseases (Human Health Impact)	Health centre at the project site available near MAMCOS Office; Flow velocity of >0.6 m/s in canals help to control diseases vectors Create awareness to the farming community on disease preventive measures; Provide toilets at field centers on	Ministry of health NIRC	During and after construction	2,000 (for awareness campaign) Part of rehabilitation cost (FFS) and farmers mobilization

			each block			
Decommissioning	Removal of temporary structures, installations and equipments from the site	Solid waste generation Excavated earth material	Collection and disposal of dredges, spoilt, demolition materials, formworks and excavated earth materials from the site Shaping and grading	CONTRACTOR	During demobilization phase	Part of rehabilitation cost

5.0 IMPLEMENTATION AND MONITORING

5.1 IMPLEMENTATION

5.1.1 Institutional Arrangements

In order to have an effective ESMP there should be an integration of efforts among various stakeholders. This ESMP therefore specifies roles and responsibilities of various stakeholders during implementation. It is important that all responsible agencies/stakeholders should interact and work towards a common purpose. The important stakeholders identified in this ESMP include, The National Irrigation Commission, the Supervision Consultant, the Contractor, National Environmental Management Council, Mbarali District Council, Ward Executive Officers (Madibira and Miyombweni wards), and MAMCOS. The responsibility of taking environmental and social concerns into account during implementation of the proposed activities rests with the Contractor.

5.1.2 Farmers mobilization

For successful implementation of this ESMF measures related to human behaviorand farmer's mobilization is crucial. The following are the advantages of farmer mobilization in management of water resources.

i) Have a common understanding on planting Rice seedlings in a joint nursery;
ii) farming activities in the pilot block to start at once;
iii) Easy to facilitate them with farm inputs, particularly seeds through MAMCOs and the leaders of the block. Other inputs such as fertilisers, pesticides and herbicides can be also accessed easily;
iv) easy for an extension officer to closely support the farmers through advisory provision on good agronomic and farming practices; and
v) Easy to adopt single rice variety by all farmers in the pilot Block. SARO 5 rice variety is proposed and it is already used by farmers in the scheme. The variety requires about 120 – 125days to maturity.

5.2 MONITORING

5.2.1 Monitoring responsibilities and reporting

Monitoring is one of the important elements of this ESMP and serves a number of functions. It is the instrument that will determine whether the environmental mitigation measures are fulfilling their intended purpose.

The Environmental monitoring will help to provide the basis for rational decision making regarding impact control. The information that will be collected during the monitoring exercise will help to improve environmental management plans by adapting measures to ensure that the identified environmental and social issues are mitigated. If environmental

monitoring identifies some environmental concerns during scheme improvement then the activities will be modified or adjusted, accordingly.

The objectives of this environmental monitoring plan are:

- To ensure that mitigation and benefit enhancement measures have been adopted and are effective;
- To identify any unforeseen negative impacts during ESMP preparation stage and propose appropriate mitigation measures; and
- To provide information on the actual nature and extent of key impacts and effectiveness of mitigation and benefit enhancement measures, which through feedback mechanism will improve the planning and execution of future , similar irrigation schemes to be improved by REGROW.

The basic form of monitoring: for Madibira irrigation scheme will involve physical measurement of selected parameters or the execution of surveys to establish the nature and extent of induced changes.

The environmental monitoring plan outlined below indicates key issues that will be monitored during improvement and operation of the scheme. The monitoring plan also includes the type of monitoring indicators, frequency of monitoring and responsibility for each monitoring activity.

5.2.2 Monitoring responsibilities and reporting

NIRC will be involved in construction supervision to oversee the implementation of the environmental monitoring plan through the environmental and management unit. The Contractor will be responsible for implementation of environmental and social mitigation measures under the Supervision of NIRC and MAMCOS. The contractor will be responsible in reporting to NIRC about environmental conditions with the help of Scheme environmental officer. Reporting will be done on quarterly bases.

5.2.3 Monitoring during rehabilitation

The Contractor's Site Engineer will monitor environmental conditions and compliance continuously, and the Environmental Officer representing NIRC shall monitor environmental conditions and compliance whenever they occur on site. The National Environmental Management Council shall conduct spot monitoring as the case may be.

The purpose of the construction phase monitoring is to verify that good environmental practices are applied by the Contractor and that environmental and social requirements included in the contract are being met.

The main tools to be used by the Contractor to undertake monitoring activities will be, at minimum, checklists, visual examinations and quantitative measurements of environmental effects monitoring parameters. Written records shall be kept detailing the dates that monitoring took place and the findings of these visits. Site inspections during site meetings will take place with emphasis on early identification of any environmental problems and the initiation of suitable remedial action. Where remedial actions have been required on the part of the Contractor, further checks will be needed by NIRC to make sure that these are actually being implemented to the agreed schedule and in the required form.
In addition to visual observation there shall be informal consultation with farmers and the local communities and their leaders within the surrounding villages.

5.2.4 Monitoring during operational phase

After the rehabilitation activities demobilized, Scheme Environmental officer in cooperation with MAMCOS will be the overseer of the daily environmental supervision of activities, in additional NIRC Environmental and Social unit will be quarterly follow up environmental condition of the scheme.

During operation of the scheme after the rehabilitation, MAMCOS will be responsible in reporting the measurements of water quality and quantity, turbidity etc.

Table 4: Matrix of Environmental and Social Monitoring Plan

No	Actual mitigation measures	Environmental and social issue/Parameter to be Monitored	Frequency	Location	Indicators	Means of verification	Responsibility	Cost Estimate (US$)
1	Rehabilitation of the drains	Water flow	Twice a year during wet and dry season	Entire scheme and in particular SC 5	Flow (m^3/s)	Observation	RBWB NEMC MAMCOS	2,000
2	Control over use of pesticides and herbicides in the scheme	Water Quality	Twice per year in dry and wet season	At the intake site Outlet discharge points for drained water	pH, Conductivity, TSS, N, SO_4, Cr, BOD_5,, COD NO_3 P	Monitoring Inspection Reports	RBWB NIRC NEMC	3,000
3	Proper management of drainage canals	Water Quantity	Quarterly	At the intake site Outlet discharge points for drained water	Flow (m^3/s)	Flow Records	RBWB NIRC MAMCOS	2,000
4	By-laws enforcements that avoids illegal fishing in drainage canals	Illegal fishing	weekly	Irrigation and drainage canals	Water impoundment in irrigation and drainage canals	Physical observation	MAMCOS	500
5	Construction of cattle troughs and site specification for livestock grazing	Livestock grazing and drinking water	Daily	Paddy blocks Irrigation and drainage canals Southern Drain	Damaged irrigation infrastructure	Observations	MAMCOS	-
6	Efficient agro-chemical application technology	Crop pests and diseases	Monthly	Paddy fields	Crop Pests Crop Diseases Damaged crops	Observations	MAMCOS	NIL

6.0 ROLES AND RESPONSIBILITIES FOR IMPLEMENTATION OF THE ESMP

6.1 Institution arrangement

This chapter consolidates the main institutions with key responsibilities for implementation of environmental and social management plan, presents their capacities to deliver on assigned responsibilities and proposes measures to build their capacity as relevant.

6.1.1 National Level

6.1.1.1 Environmental and Social Management Unit

NIRC Environmental and Social Management Unit (ESMU) role will be to ensure that the requirements of the ESMP are implemented. The ESMU will work in close collaboration with REGROW PMU as well as the Rufiji Basin Water Board (RBWB) and AMCOS.

ESMU shall be responsible for the implementation and distribution of any approved amendments to the ESMP during the construction phase. Regular reviews will be undertaken to monitor the progress of the implementation of the measures identified in the ESMP. The reviews will be undertaken annually that will culminate in an annual review report, which will document the review methodology, summaries the results, and provide practical recommendations. The reviews will broadly aim to address the ESMP performance and assessment of possible cumulative impacts.

6.1.1.2 National Environment Management Council (NEMC)

The overall role of NEMC will be to provide periodic and oversights monitoring to ensure no adverse cumulative impacts from the rehabilitation activities of Madibira irrigation scheme are occurring at the national level and will provide oversight and technical assistance to the zonal level when required. Since NEMC has decentralized structure in the Southern Highlands Office in Mbeya Region the ground monitoring of implementation of the mitigation measures, regular and intrusive monitoring would be carried out at the zonal level with NEMC Headquarter providing only monitoring oversight.

In particular the Southern Highlands NEMC zone will perform one critical important and significant role as follows:

- Monitoring oversight by undertaking periodic monitoring through reviewing and compiling monitoring reports from ESMU and Region for direct reporting on this to NEMC Headquarters.

6.1.1.3 Rufiji Basin Water Board

The River Basin Water Board is responsible for issuing and managing water use permits. They will issue water use permit when AMCOS review and apply for a new water use permit to allow all water flow through SC5 during dry season.

6.1.2 Local Government Authorities Level

Local Government Authority (LGA) Environmental Officers and Community Development Officer will be responsible for supporting implementers of ESMP assisted by scheme extension officers facilitate the compliance with the requirement of this ESMP and any directive that may be issued from time to time from the ESMU, NEMC and RBWB linked to implementation of ESMP. They will monitor and report of irrigation scheme level environmental and social management activities and review and approve monitoring reports.

6.1.3 Community Level/Farmers level

At the community/farmers level the PSP will assist them in implementing the ESMP. PSPs will support and ensure that the implementers of ESMP i.e. AMCOS and the farming community (i) comply with all national environment and social laws and triggered World Bank Safeguards policies, (ii) implement their activities according to and consistent with the provisions of this ESMP, implementing, inter alia, all appropriate mitigation measures identified in the ESMP (iii) comply with these mitigation measures during construction and post construction (i.e. operations) stages of their activities, by self-monitoring of their activities and by periodically reporting to their respective LGA and (iv) maintain an adequate budget to implement the appropriate maintenance activities and practices for their operations to ensure relevant mitigation measures identified in the ESMP are implemented and sustained in their operations and (vi) to comply with any directives that may be issued from time to time from the LGAs and ESMU.

6.2 Assessment of Existing Institutional Capacity

A rapid assessment of the existing institutional capacity of the stakeholders to implement the ESMP focused on the institutions linkages and Resources for environmental and social management.

6.2.1 Institution linkages

Institutional overlap of sector responsibilities is a contentious issue as there is no clear interagency coordination to resolve environmental and social issues that arise in situations where several authorities have legal rights of use and / or management of one resource (i.e. a river) by LGAs / Regional authorities, water and River Basin Boards, National Parks and Wildlife Conservation authorities, Water Users Associations, Irrigators Associations, Irrigators etc. This weakness will be addressed through a workshop to be organized where roles and responsibilities for every stakeholder will be presented and agreement made on the commitment to implement the ESMP

Weaknesses in monitoring adherence to water use permit by Irrigators Organization, and enforcement of water use permit by Basin Water Boards are still apparent in many irrigation schemes. REGROW ESMF noted this weakness and will address them through installation of water measuring gauges and monitoring water abstractions which is one of the main activities under REGROW intervention at Madibira irrigation scheme.

6.2.2 Human Resource Capacity

The experience and capacity for environmental and social management supervision exist at NIRC (Environmental and Social Management Unit) augmented by the links NIRC has established with National Environmental Management Council, the Vice President's Office, Division of Environment and the Ministry of Lands Housing and Human Settlements. Similarly, capacity exist among some of the key technical staff at Mbarali District Council (Environmental Management Officers) to enforce requirements of this ESMP through experience and implementation of other past and ongoing projects especially World Bank financed projects.

6.2.3 Capacity building and training

Under the ESMP the following training topics are proposed to build capacity of implementing authorities:

- Impart skills to LGA environment management officers and community development officers to have the capacity to assist Irrigators Organizations in implementation of environmental and social mitigation measures.
- Facilitate Professional Service Providers to provide technical support (including environmental and social impacts awareness) to Irrigators Organization and local management teams.

Farmers at Madibira irrigation scheme mostly need practical training on scheme management, operation and maintenance, financial management, cropping calendar, farmers feed schools and exchange visits/study tours. The PSP provider who will be recruited is expected to cover the following training topics which are relevant to the farmers depending on the observed/identified challenges. They should be trained on:

i) Their roles and responsibilities stipulated in this ESMP;
ii) Existing environmental bylaws and compliance;
iii) Preparation of farmer field school plot and tree nurseries;
iv) water serving technology such as System of Rice Intensification (SRI);
v) Training on field preparation and leveling before water application;
vi) River bank protection;
vii) Training of farmers on safe application, handling and disposal of agrochemicals; and
viii) Training of Farmers on Health and Safety issues including prevention of water related diseases in irrigated agriculture;

6.3 Budgetary Resources Constraint

Lack of or little budgetary resources to support the staff to implement environmental and social issues are the main cause of low enforcement and implementation of

environmental and social mitigation measures for many irrigation schemes. A special window by REGROW to support environmental and social management capacities by costing and including safeguard measures in Bills of Quantities (BoQs) of rehabilitation works is a good practice that will ensure irrigation scheme sustainability.

6.3.1 Budget for ESMP Implementation

The costs estimate for implementation of this ESMP is summarized in the Table below:

Table 5: Summary of Budget Estimates for ESMF Implementation

ACTIVITY	PARTICULARS		USD
INSTITUTIONAL DEVELOPMENT	ESMP Coordination (NIRC)		4,000
TRAINING	Dissemination of ESMP to implementing stakeholders (NIRC-ESMU)	ESMP Training and sensitization workshop	15,000
		Disclosure of ESMP	2,000
		Training of farmers on safe application, handling and disposal of agrochemicals;	6,000
		Training of Farmers on Health and Safety issues including prevention of water related diseases in irrigated agriculture	6,000
MONITORING	NIRC-ESMU		10,000
	NEMC		8,000
		TOTAL	**51,000**

6.4 Disclosure of ESMP

After completion of the final ESMP, it will be disclosed both at NIRC website, REGROW website and at the World Bank inforshop. After disclosure NIRC will disseminate the ESMP to Mbeya Zonal Irrigation Office, Rufiji Basin Water Board, Mbarali District Council, Ward Development Council and MAMCOS.

Table 6: Implementation Schedule of ESMP

ESMP IMPLEMENTATION SCHEDULE																											
		2019						**2020**												**2021**							
S/N	**Activity**	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Marc	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Marc	Apr	May	Jun	July	
1	Dissemination of ESMP to Madibira irrigation scheme (MAMCOS, WDC, ZIU, RAS-MBY and Mbarali DC																										
2	Preparation of IPM																										
3	Farmer mobilization																										
4	Training of famers																										
5	Review of water use permit																										
6	Water flow monitoring																										
7	Water quality monitoring																										
8	Construction/Rehabilitation activities																										

7.0 ANNEXES

7.1 References

Ministry of Natural Resources and Tourism-REGROW PROJECT (June 2017). P150523-PPA-C-07 ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK (ESMF)

Ministry of Natural Resources and Tourism-REGROW PROJECT (June 2017). P150523-PPA-C-07 RESETTLEMENT POLICY FRAMEWORK (RPF)

Ministry of Natural Resources and Tourism-REGROW PROJECT (May 2018) Design of pilot investment for early implementation of Madibira irrigation scheme.

Frizzone, J.A, Coelho R.D, Dourado D. and Soliani R (1997). Linear Programming Model to Optimize the Water Resources Use in Irrigation Projects an application to the Senator Nilo Coelho Project. (*Paper publisher by Sci. agriculture, Piracicaba SP- Brazil. pg.136-148 junho1997).*

Loucks, Daniel P. Stedinger, Jery R. Haith Douglas A. (1981). Water Resources System Planning and Analysis. (*Chapter 3, 4 &8. Published by Prentice-Hall, Inc. Englewood Cliffs, New Jersey 07632).*

Mayers G B – Danagro Adviser a/s (2000). Operation and Maintenance Manual for irrigation and Drainage Irrigation and Drainage Consultant. (*Chapt. 1 &2. Published by the Ministry of Agriculture and Cooperatives.*

Ministry of Water (2001). Sustainable Management of the Usangu Wetlands and its Catchment (SMUWC). Sub-Catchment Resources Management Programme. (*Chapter1-6).*

Ministry of Water (2002)**.** The National Water Policy *Section.1.1*

Sheng-Feng Kuo and Chen- Wuing Liu (2003). Simulation and optimization model for irrigation planning and management. (*Paper published online Aug. 2003. Wiley Inter-Science).*

Sir William Halcrow & Partners Ltd (1997). Planning and Design Report- Madibira Smallholder Agricultural Development Project. *(Chapt.2,3&4. Published by the Ministry of Agriculture and Cooperatives).*

Sir William Halcrow & Partners Ltd (1997). Hydrology and Irrigation Requirement *(pg 1-17 published by the Ministry of Agriculture and Cooperatives.*
Sokoine University of Agriculture and the Overseas Development Group (2006). *RIPAWING project Annex F: Wetlands and Environmental Flows.*

COMMENT RESPONSE FORM

S/N	General Comments:	Response
1.	Executive summary: please update the executive summary to reflect the recent changes, and make sure you always refer to 'potential negative or adverse impacts' instead of 'negative impacts'	The executive summary has been changed. Negative impacts is now referred to potential or adverse impacts
2	Section 4 – This section is much clearer now. Sections 4.1 – 4.3 describe potential negative impacts, external impacts, and those potentially occurring after REGROW interventions are completed. Section 4.4 then describes the proposed mitigation measures in form of Table 4.	Section 4 has been rearranged properly such that subsection 4.1 describes the positive impacts; sub-section 4.2 explains potential negative effect. In sub-section 4.3 explains the potential external factors that have effects on the scheme despite of the interventions to be done
	However, Sections 4.5 and 4.6 are still unclear. Are those mitigation measures in addition to those presented in the Table 4? If so, could you include in the table in section 4.4? Sometimes, these sections also talk about the actual impacts again (e.g., illegal fishing) and mitigation measures, which, however, should rather be presented in Sections 4.1 – 4.3, where you describe the potential negative impacts, and Section 4.3/4.4 where you describe all mitigation measures. Keep a simple structure as it gets confusing otherwise.	Sub-sections 4.4 now include all mitigation measures including human factor mitigation measures that increase water use efficiency. We have decided to keep decryption of some mitigation measures for easy reference and understanding but also included in Table 3 (Original Table 4)
4	Please avoid sentences such as "the REGROW project should consider…" The ESMP is a binding document, which should firmly lay out the potential adverse impacts and respective mitigation measures. It should not make suggestions.	Document revised to firmly lay out potential negative impacts and measures. suggestion omitted
6	Section 5 Table 7: This table is good, but please add a first column showing the actual mitigation measures the parameters, frequency etc. are linked to..	The first column for actual mitigation measures has been added with mitigations for each parameters. Table 7 is now Table…….

Annex 7.2 Matrix of stakeholders consultations views

S/N	Stakeholders Consulted	Issue Raised	Proposed Mitigation Measures
1	Mbeya Zonal Irrigation Unit	• They are aware of the REGROW Project • Unclear responsibilities for NIRC and Cooperative Commission for the supervision of Madibira irrigation scheme	• The ESMP should put clear responsibilities of NIRC and Cooperative Commission for supervision of Madibira irrigation scheme
2	Mbeya Regional Administrative Secretary (RAS)	• Sedimentation and siltation has been a great problem in many schemes in Usangu basin • Water Pollution due to high use of agrochemicals • Expansion of population in catchment areas • Poor management of by-products after harvest • Traditional fishing systems • Conflicts between farmers and livestock keepers due to Overgrazing • Illegal establishment of traditional irrigation schemes which led to blockage of water for downstream users • Water loses during rainfall due to surface runoff Environmental degradation	• Silt traps (construction of silt traps infrastructures or planting plants in catchment areas avoiding siltation downstream) • Water quality monitoring in schemes should be done regularly • Enforcement of laws that avoid activities to be done in catchment areas • Closing up of traditional schemes so as to allow flow of water. • Enhancement of land use plan for specifying areas for farmers and pasture • Construction of reservoir dam for rain water harvesting so as to be used during dry season for irrigation • Alternative source of water for irrigation, the usage of groundwater for irrigation • Awareness creation and capacity building to farmers on environmental management issues • Before doing rehabilitation in schemes Memorandum of Understanding (MoU) should be signed between financier/donor and the farmers in order to make farmers full accountable on the mismanagement of the infrastructures. • Alternative source of water for irrigation, the use of groundwater.

S/N	Stakeholders Consulted	Issue Raised	Proposed Mitigation Measures
			• Investments made for irrigation should consider needs and priorities of people rather than building infrastructures that will not be useful.
3	Mbarali District Executive Director (DED)	• Siltation of the Southern drain in Madibira irrigation scheme has caused opening up of new farm fields • Poor/incomplete irrigation infrastructures lead to water looses • Lack of irrigation demarcation areas	• Unloading of silt in the southern drain will help to meet REGROW objective. • Priority should be set for the selection of irrigation infrastructures so as to be completed due to available fund • For sustainable irrigation development in Usangu plain, the areas for irrigation development should be demarcated
4	Mbarali District Commissioner Office	In designing of irrigation infrastructure they lack cattle trough for livestock	Construction of irrigation schemes should also include livestock drinking troughs
5	Rufiji Basin Water Board	• Fishing activity by closing inlet and outlet of canals is a problem • Water use efficiency should be the main aim in Madibira • Water flow monitoring (water entering the intake and water leaving the field after use) • Rain water harvesting as alternative source of water • Provision of water permits collating with irrigable land	• Prohibition of fishing activities in drains • Rufiji Basin Water Board advised REGROW project to proceed with its activities but at the end of the day should have the notion of how much water is served to continue flowing downstream • Construction of water measuring devises (gauges) to measure water flow • Bores holes should be drilled along scheme area in order to harvest rainwater for domestic purpose and livestock to reduce the water users to Ndembera River
6	MAMCOS Board Members	• Adequate number of trenches in field make long ponding water in field and cause water loss • Siltation of southern drain that has led to establishment of new irrigation fields • Unspecified areas for cattle herders • Nature of Ndembera river tends to shift	• Leveling off the field to avoid water ponding • Retaining of the southern drain to its original levels • Cattle troughs should be constructed along the southern so as to avoid soil erosion • MAMCOS will organize a meeting with Ward executive offices, Ward Councilors and village government staff at the site so that they can

S/N	Stakeholders Consulted	Issue Raised	Proposed Mitigation Measures
		finding soft rock that forms meanders and now its eroding towards the left bund nearly leaving the diverted channel • Brick making is done close to the River bank which is dangerous for the life of Ndembera river	come up will solutions to rescue the situation
7	Miyombweni Ward Development Council	• Siltation of Southern drain that led to Water losses • Continuous water flowing in the southern drain has led to opening up of new irrigation farms causing water loss • Livestock intrusion in farm area seeking for pasture leading to conflicts • Illegal fishing activities in drains • Trenches in paddy fields that allow water ponding in field	• Rehabilitate damaged portion of the southern drain which cause water losses including flooding of the air strip • Prohibit water abstraction from Southern drain for new irrigating fields • Closure of new field along the southern drain • Enforcement of by-laws • Construction of cattle drinking troughs outside the southern drain • Prohibit fishing activities on the southern drain where people block the southern drain for fishing activates • Levelling of paddy fields • Maintain uniformity in raising paddy seedling and transplanting
8	Mkunywa and Nyakadete Villages	• Sedimentation and siltation of the outlet drain that channels water back to the river • Presence of depressions and gullies in blocks leading to water ponding • Livestock intrusion in farm area seeking for pasture and drinking water	• De-silt of the outlet drain that will enable water flowing to the river downstream and finally reaching the Ihefu • Field levelling • Construction of cattle trough for livestock drinking
9	Mkunywa and Ikoga villages	• Livestock intrusion in farm area seeking for pasture and drinking water • They requested training on proper use of agrochemicals inputs including pesticides	• Construction of cattle trough for livestock drinking • Awareness creation and capacity building to farmers on environmental management issues

S/N	Stakeholders Consulted	Issue Raised	Proposed Mitigation Measures
		and herbicides to minimize negative environmental effects as well as water contamination	
10	Mkunywa and Ikoga villages	• Livestock intrusion in farm area seeking for pasture and drinking water • They requested training on proper use of agrochemicals inputs including pesticides and herbicides to minimize negative environmental effects as well as water contamination.	• Construction of cattle trough for livestock drinking • Awareness creation and capacity building to farmers on environmental management issues
11	Iheha, Mahango and Chalisuka villages	• Livestock and farmers conflicts Presence of field unlined canals that are easily eroded by water	• Construction of cattle trough for livestock drinking • Collection fee of 5% of the average production per ha for Operation and maintenance should be introduced in order it can be used for maintaining the scheme for sustainable use
12	Nyakazombe, Miyombweni, Mapogoro and Magigwe villages	• Livestock which graze and drink water from Ndembera River cause environment degradation, Sediment problems. • Illegal fishing activities in drains • Water ponding in drains due to erosion	• Environmental awareness on river conservations • Prohibit fishing activities on the southern drain where people block the southern drain for fishing activates • Rehabilitation damaged parts of drains

b) Comments on the design of pilot investment at Madibira irrigation scheme

S/N	Design proposal Phase I	Reason for proposal	Stakeholders Comments
1	Lining of Secondary Canal 5, (SC5)	To reduce the conveyance losses in the canal, and thus increase the amount of water available for irrigation, To use the SC5 for channeling all the water from the Ndembera River between July and November to reduce the distance to Ihefu swamp if the water is to flow through its route and also reduce loses which occur while flowing through its natural course.	Lining of secondary SC5 is acceptable as a pilot activity. However consider lining all secondary canals for the entire scheme because water losses also occur in the remaining secondary canals Maintain the original design where $0.5m^3/s$ should continue flowing through the Southern drain to provide water for people and livestock outside the scheme. Restrict abstraction of Water from the Southern drain for irrigation purposes. Repair damaged sections of the Southern drain where water spills/overflow to bare land including the air strip. De-silt the Sothern drain downstream the intersection with Ihangalawe River in order to continue flushing sediments from the settling basin and Ihangalawe River.
2	Lining of the remaining part of primary canal	To limit conveyance losses of the dry season flows and help farmers to improve the irrigation efficiency	The idea is good. It will relieve MAMCOS from canal lining burden. MAMCOS will be able to direct its resources on other activities of high concern.
3	Use the SC5 for conveying all the water from the Ndembera River between July and November through this irrigation canal	To ensure that the total dry season flow is, under a "controlled management of MAMCOS" directly and water is drained towards Ihefu swamp	Maintain the original design where a discharge of $0.5m^3/s$ continue flowing through the Southern drain to provide water for people and livestock outside the scheme Restrict abstraction of water from the Southern drain for irrigation purposes. Provide livestock drinking troughs away from the Southern drain banks Repair damaged sections of the Southern drain where

S/N	Design proposal Phase I	Reason for proposal	Stakeholders Comments
			water spills/overflow to bare land including the air strip. De-silt the Sothern drain downstream the intersection with Ihangalawe River in order to continue flushing sediments from settling basin and Ihangalawe River
4	Land leveling in SC5. It is estimated that the wasteland in SC 5 is around 148 ha.	To improve water management To increase area under irrigation	Brilliant idea as the famers have been struggling to level the wasteland without success More land will be irrigated
5	Discard the Southern drain for conveyance of $0.5m^3/s$ discharge	The southern drain is outside of the management and control of MAMCOS and "illegal" water abstraction take place from this drain	Request a change in the abstraction water use permit that will allow MAMCOS to channel all the water from the Ndembera River through SC 5 from July to the end of November may not be accepted by RBWO.. Maintain the original design where a discharge of $0.5m^3/s$ continue flowing through the Southern drain to provide water for people and livestock outside the scheme A final proposal is the land leveling in SC 5.
6	Discard Ndembera River current route through Madibira "II" was for obvious reasons	High water loss occurs in the route through Madibira phase II Enormous evaporation losses through this route as this water floods the land.	There are water users along the current Ndembera River route through the proposed Madibira phase II. They have the provision water use permit on the condition that when Madibara phase II became effective, then the water use permits will cease. Examples of water use permits on this route are No. RBWB0205 Umoja wa Mfereji wa Mlonga, No. RBWB0464 Emanuel Mlambya, No. RBWB0687 Andrew Kimanga. Determine the water requirement to sustain lively hood along this route and channel the rest through secondary canal 5 to Ihefu swamp

S/N	Design proposal Phase II	Reason for proposal	Comments
1	Construction of drainage outflow measuring flume for SC1 and SC 3 and installation of monitoring equipment at the outlets of SC1 and SC3	Monitoring water use efficiency and amount of water flowing to Ihefu swamp	This could be a motivation factor to farmers to use water efficiently
2	Management of water monitoring data Assessment of irrigation efficiency and preparation of reports; Training of National Irrigation Commission staff at Zonal Level, Mbarali District Council and Rufiji Basin Water Office staff on interpretation of satellite images	Improved irrigation schedule in secondary canal 5 and determine the water use efficiency under improved management conditions. Capacity building on data collection and management for irrigation purpose	This will lead to adopting water saving technology in paddy production e.g. SRI It can help in foreseeing what can be anticipated to happen in the future bearing in mind the climate changes which are happening.

Appendix 9.6 : Grievance Redress Mechanisms

Grievance redress mechanisms are essential tools for facilitating Project Affected People to voice their concerns about the project as they arise and, if necessary, for corrective action to be taken promptly. Such mechanisms are fundamental to achieving transparency in handling grievance issues.
The grievance redress mechanisms 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 implicitly discourages referring such matters to the Tribunal /law courts for resolution which would otherwise take a considerably longer time.

In practice, grievances and disputes that are most likely during the implementation of REGROW intervention in Madibira irrigation scheme are as follows:

a) Disputes over which block should be used as a modal block for the SRI ;
b) Dispute over delays on payment of wages to casual labours; and
c) disputes over handing over of work due to delays.

The overall process of grievance handling will be as follows:

a) The MAMCOS, Mbarali District Council, Mbeya zonal irrigation Office and the Ward Executive Officer, Community around the project area will be given copies of grievance procedures as a guide on how to handle grievances;
b) The process of grievance redress will start with registration of the grievances to be addressed for reference, and to enable progress updates of the cases;
c) Collection of the grievances will be done by submitting into suggestion boxes and appointed leaders/ staffs for submitting grievances;
d) NIRC will form the grievance handling committees which will include MAMCOS, scheme technician and representatives of the community in the project area;
e) The project will use local mechanism, which includes scheme extension officers, MAMCOS and Ward Executive Officers in the project area. These will ensure equity across cases; they will eliminate nuisance claims and satisfy legitimate claimants; and
f) The response time will depend on the issue to be addressed but it should be addressed with efficiency;

9.6.1 Grievance management

The Grievance Redress Committee shall be established and operationalized by NIRC. NIRC will be receiving complainants through the scheme irrigation technician in collaboration with MAMCOS. The Contractor shall have a mechanism for resolving complaints that are directly within their jurisdiction; otherwise the Zonal irrigation Engineer, District Executive Officer, scheme technicians in close collaboration with NIRC Safeguards team shall be in-charge of grievance management as guided in the ESMP

All attempts would be made to settle grievances. Those seeking redress and wishing to state grievances would do so by notifying their scheme technician and MAMCOS leaders as scheme overseer, MAMCOS will inform and consult with the Contractor to determine claims validity. If

valid, the scheme technician and MAMCOS leaders will notify the complainant and the matter will be settled. If the complainants' claim is rejected, then the matter will be brought before the NIRC who is the Client for settlement. The decision of NIRC would be final and all such decisions shall be reached within seven (7) days after the complaint is lodged.

If MAMCOS have complainant over the contractor, then the complains are to be directly communicated to NIRC. NIRC will notify the complainant and the matter will be settled.
A complaints and queries register shall be kept on site and managed by the Contractor's Environmental and Social Managers. The contractor shall appoint staff who will be responsible for collection and reporting any complaints from the labours. Complainants will be contacted to ascertain the nature, time, frequency and severity of the problem. The Contractors' staff will ensure that each complaint is investigated to determine the likely source of the problems. Following completion of the investigation, each complainant shall be advised of the findings, and any remedial actions taken to minimize the likelihood of a reoccurrence. All complaints shall be informed to the Supervising Engineer (Consultant) the same day of receipt. If a complaint is outside the scope of the Contract, the details shall be noted in a complaints log Form and the complaint forwarded to the Supervising Engineer within 8-12 hours.

9.6.2 Method statements

Before the rehabilitation activates commencement, the contractor shall submit a method statement to the zonal irrigation engineer, District irrigation engineer and scheme technician for approval of the commencement of work. The method statement shall be accompanied by a job safety analysis (JSA). The JSA will identify most vulnerable parts and sensitive areas and thus closely observations are required.
The Contractor shall restrict all his activities, materials, equipment and personnel to within the area specified. The Contractor shall ensure that the approved construction area will be adequate to cover the project without the requirement for further space adjustments at a later date.

9.6.3 General Aesthetics

The Contractor shall not paint, damage or mark any natural feature situated on or around the site for surveyor any other purposes unless agreed beforehand with the Supervisor. Any features affected by the Contractor in contravention of this clause shall be restored / rehabilitated to the satisfaction of the supervising engineer. All construction areas shall be kept neat and tidy at all times. Different materials and equipment shall be kept in designated areas and storing / stockpiling shall be kept orderly.

MAHUDHURIO YA WAJUMBE WA VIJIJI VYA IHEHA, MAHANGO NA CHALISUKA KWENYE KIKAO CHA KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 07 NOVEMBA 2018

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	LEMAD. CHAKA	M/KITI - MTONGOJI	0742349854	
2.	SAULO [illegible]	MJUMBE	0758741509	
3.	NAKOLI E. KULANGA	AFISA KILIMO KATA	0756619611	
4.	EDIROZA . K. KCHAILO	MJUMBE	0768016134	E. ngailo
5.	AIHUMANI MAJUMLA	MZEE MARUF	0752481082	A. MAJUMLA
6.	VALENC NSUNYANO	MZEE		V SUNYANO
7.	LUCAS JANDILA	MZEE		JANDILA
8.	BENEDICT JOSSY	MJUMBE	0766096922	BJ JOSSY
9.	ZUBERI J. MBONAGA	MZEE	0755319645	
10.	MAIKO RUNGWA	MZEE	0759177060	
11.	KUHANI MSHINDI KASUDI	MJUMBE	0757897566	
12.	JOHN MWAMASIKA	MZEE	0767787511	

	JINA	CHEO	SIMU	SAHIHI
13.	SAMWEL NDELEMBE	M/KITONGOJI	0755118868	[illegible]
14.	DAMAS SILWIMBA	MJUMBE	0764168880	[illegible]
15.	Mika Nzilile	MKITONGOJI	0765792528	[illegible]
16.	PAULO MLIGO	MJUMBE	0766441885	Pmligo
17.	ADAMU NDUNYANO	MJUMBE	0757742414	[illegible]
18	ALLY MATUMLA	MJUMBE	0758 1010 83	[illegible]
19.	ELISHA MASANJA	MJUMBE	0764 533992	[illegible]
20.	ALPHONCE MWINUKA	MJUMBE	0757944306	[illegible]
21.	MUSA MTULUVA	MJUMBE	076 9292145	[illegible]
22.	SOPHIA KOMBA	MJUMBE	0753537146	[illegible]
23.	AMILLY MKUNJILWA	MKULIMA	0759589678	[illegible]
24.	ALI MWANYASILE	MKULIMA	0753072245	[illegible]
25.	OLIVA.A.CHALAMILA	MJUMBE	0763384786	O.Chalamila
26.	MARIA G.MWANGE	MJUMBE	0769386401	[illegible]
27.	E ERASTO NDEME	MJUMBE	0752-241301	[illegible]

28.	EVARISTO MALIDA	MJUMBE	0753-630901	EMALIDA
29.	ANICETH MGIMBILA	MJUMBE	0768-225978	
30.	KALUMEL ZIHO	MJUMBE	0748602471	
31.	MZUBADI MWAMBASI	MJUMBE	0752801194	
32.	DINO KISANGA	MJUMBE	0753321390	
33.	JUMA MBAMBUS	MJUMBE	0757766474	
34.	ALI. KITWA.	MJUMBE	0758309375	
35.	SADRO MWENDA	MJUMBE	0762 691119	
36.	PHILIPO P. ZACHARIA	VEO	0757612010	
37.	SAIBI LUKENKE	Mjumbe	0755386228	
38.	ALI. Z. AKIKI.	MCHUNGAJI	0754852992	
39.	ALEX MBILIKILA	MJUMBE	0755219562	
40.	RAPHAEL JAPHET	VEO	0765474656	
41.	RENATA OTAO	VEO	0743120292	
42.	FAINES MZIKU	MJUMBE	0755850765	F. MZIKU

43.	MUSSA GONJEWA	Mgumbe	0762873208	
44.	MARKO deiGo	MKULIMA	0766004795	
45.	CONSOLATA MKALIMOKA	MKULIMA	0755320423	
46.	VICENT THANGE	MKULIMA	0758 73 22 21	
47.	GERALD MHELELA	MKULIMA	0766 48 6041	
48.	FRANCIS MWAFOZE	MCHUNGAJI	0768101721	
49.	PAUL MATHIAS	Mlitongoji	0765316864	
50.	HAGAI CHISUNGA	A/KULIMA	0765299957	
51.				
52.				
53.				
54.				
55.				
56.				
57.				

MAHUDHURIO YA WAJUMBE WA VIJIJI VYA MKUNYWA NA IKOGA KWENYE KIKAO CHA KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 06 NOVEMBA 2018

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	~~ALLY H. GIANGA~~	~~KAIMU~~		
2.	VITALIA C. KIPINGA	M/K/K MKUNYWA	0753107216	
3.	ANJELINA J. KIGINA	VEO-IKOGAMPYA	0753971435	
4.	PASCALINA E. NGUNGULU	DIWANI-V.MAALUM	0759675450	
5.	SALUMU MATINYA	MWALIKWA-IKOGA	0756866446	
6.	SIMON M. NGUNGULU	MJUMBE-IKOGA	0755541003	
7.		MJUMBE	0787309822	
8.	DUTU MAHAHILA	MWALIKWA	0765717280	
9.	LUYAKA MAKUNGA	MWALIKWA	0767440351	
10.	COSTA DAITI	MWALIKWA	0764707189	
11.	CLEMENSIA MWAGALLA	MJUMBE IKOGA	0754029420	
12.	SHUKURU KIMLENGA	MJUMBE IKOGA	0754845912	

13.	ALOISI BABANGA	MWALIKWA	0762634704	[illegible]
14.	SHABAAN N'J [illegible]	MWALIKWA	0764774410	[illegible]
15.	CARLOS MTOVE	"	0757215295	[illegible]
16.	HAMIS M. MTEGO	A.F.O	0714 666090	[illegible]
17.	EMILYO .A. MWENDA	MWALIKWA	0753983120	E.mwenda
18	ANTELO MBONAWA.	"	0762997001	[illegible]
19.	BHAHA GOMBO	MWALIKWA	0769055996	Gombo
20.	YOHANA NGOVANO	MWALIKWA	0753572330.	Y. Ngovano.
21.	MELKIOR LUBANTU	MWALIKWA	0768589210	Mlubantu
22.	MARIO MWAMBA	MWALIKWA	0769804520	[illegible]
23.	WILBART CHATHEDA	MKULIMA	0763772616	[illegible]
24.	IMANI S. MBOLELA	WOD-MADIBIRA	0755683162	[illegible]
25.	OLIVO .KIBUDA	"	0767918374	O.KI
26.	JOHNAS SL SHAPGWA	VEO	0763102566	[illegible]
27.	MATHIAS SAMILA	MKULIMA	0764734912	[illegible]

MAHUDHURIO YA WAJUMBE WA VIJIJI VYA NYAKAZOMBE, MIYOMBWENI, MAPOGORO NA MAGIGIWE KWENYE KIKAO CHA KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 07 NOVEMBA 2018

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	PENDO CHOTAMGANGA	KAIMU-WEO	0755 104326	[signature]
2.	SADICKI CHAYANGA	MKULIMA	0742580230	Y.
3.	JOSEPHATI MPEMBELA	MKULIMA	〃	J. mpembela
4.	ERICKO MANYANGA	MKULIMA		E.M
5.	NESTORY NGIMBA	〃 〃	0759717186	Ngimba
6.	ALEX L. NJOBORO	MKULIMA	0758370050	[signature]
7.	FIBENISI P. KIPONBA	Mkulima	0766837666	[signature]
8.	JOHN A. MGOWOLE	Mkiti CCM KATA	0753387547-	[signature]
9.	FAKISON CHAMBALO	myombani	0764707087	F. Chambalo
10.	NESITO LUSUVA	myombani	0763 922613	[signature]
11.	SHAIBU S. MPEMBELA	MKULIMA MAPOGORO	0763-494904	S. [signature]
12.	YOTAMU E. MGOWOLE	MKULIMA	0769-621978	Y. Mgowole

13.	LUKA M. MFUMBILWA	MKITI	0768014153	HMfumbilwa
14.	PAULO myinga	MKITI SOCCO	0769201482	Myinga
15.	JIMMY S-MPEMBELA	MKULIMA	0755177915	Mpembela
16.	JUSTINE MC NIMA	MKULIMA	0764080106	[signature]
17.	MILTON F. MRAM	BWIMITI	0759 275894	Mram.
18	ERASTHO KIHOMBO	MKULIMA	0764774583	E. Kihombo
19.	OMARY T. LUMATO	MKULIMA	0757058508	[signature]
20.	VICTORY B. NONGE	MKITI KIJIJI	0758337959	[signature]
21.	RASHID MWACHINO	A/KILIMO	0762978334	[signature]
22.				
23.				
24.				
25.				
26.				
27.				

MAHUDHURIO YA WAJUMBE KWENYE KIKAO CHA KAMAKA – MIYOMBWENI KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 05 NOVEMBA 2018 – MIYOMBWENI

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	MSTAHKO Y. SANZALA	MH. DIWANI	0752540426	
2.	IBRAHIM D. MWAKISOPILE	WEO	0767 405067	
3.	JOHN A. MGOWOLE	MWKITI CCM KATA	0753387547	
4.	MATHAYO MSAKAMASI	KATIBU CCM KATA	0752107943	
5.	MAHAMUDU SAIDI	MJUMBE	0762543436	
6.	PENDO W. CHOTAMGANGA	CDO - MIYOMBWENI	0755 104326	
7.	MUSA MIRAJI MOHAMED	VLEO	0753-087663	
8.	MZEE M. KANEHE	AEK	0766612737	
9.	JOSEPH M. CHAMBI	VAEO	0762058211	
10.	THOBIAS S. MSIMINYUNGA	VEO	0764774470	
11.	MILTON MRAM	BWIMIN	0759275894	
12.	AMATORY MBALWA	VLEO	0756743111	

13.	RASHID MMAEHIMO	WAEO	0762978334	[signature]
14.	JUSTINE M. NINDE	VEO	0764080106	[signature]
15.	Christopher Ngemungi	Afisa Mazingira	0766205051	[signature]
16.	ANGELINA S. MILOGVE	VEO	0744025121	[signature]
17.	VICTORY B. NINAE	M/Kiti	0758337959	[signature]
18	LUKA M. MFUMBILWA	M/Kiti	0768014153	[signature]
19.	GODI D. MABENA	Mw/Kiti	0677835274	[signature]
20.	MARTIN. MSIMINSUNGU	Mw/Kiti	0764225970	[signature]
21.	BAZIL Nhwatgolwa	VEO	0767322184	[signature]
22.	ACOYCE KARUM	AE	0753880053	[signature]
23.	NICKSON MASHAPI	AE	0655170211	[signature]
24.				
25.				
26.				
27.				

MAHUDHURIO YA WAJUMBE KWENYE KIKAO CHA MAMCOS LTD KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 06 NOVEMBA 2018

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	STANFORD. A. KISSINGA	MIKITI MAMCOS	0758-656297	[signature]
2.	REHEMA .O. GADAU	MK MWEKAHAZINI	0757203845	[signature]
3.	CASTO "P" MPEMBEZA	Mjumbe	0768225828	[signature]
4.	DAMASI T. YOLLE	Mjumbe Mamcos	0754935754	[signature]
5.	SHABANI M. KIHAULE	MJUMBE	0765631591	[signature]
6.	RICHARD B LIHWECELI	MJUMBE BODI	0764774422	[signature]
7.	MICHAEL K. MJOLA	MJUMBE B/MAMCOS	0758-074515	[signature]
8.	VAILETH KIWINGE	MJUMBE	0767984275	[signature]
9.	JOHN E MKAMBIA	MJUMBE	0767-705000	[signature]
10.	BARTAZAR W. LUSIGI	MTENDAJI-MAMCOS	076643556	[signature]
11.	ESTURIDA. A. MWVUKA	MTGUDAJI-MAMCOS	0754,812131	[signature]
12.	CHRISTOPHER NGAMUNDA	Afisa Mazingira	0744309393	[signature]

13.	ROBERT BISWARO	K/MOJEGA SKIMA	0754362748	
14.	ALOYCE WARUM	MWANDISI	0752880056	
15.	STEPHEN T. BITTA	AFISA M/JAMII-MDC	0755565629	
16.				
17.				
18				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF AGRICULTURE
NATIONAL IRRIGATION COMMISSION
Tel: 022 2450838/40-41 Fax: 022 245033426 Email: info@nirc.go.tz

REGROW PROJECT: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

CONSULTATION ATTENDANCE: MADIBIRA IRRIGATION SCHEME

SN	NAME	ORGANIZATION	Email/ Phone Number	SIGNATURE
	EZEKIA J. KILEMILE	DAS - MBARALI	das.mbarali@mbeya.go.tz 0756785978	
	Abisai Chilunda	Rufiji basin Rujewa office	0768357515	
	IDRIS A. NKUYA	RBWB	0754025930	
	CHARLES M. MENGO	RBWB	0754012605	
	Fredy .I. Hamla	RBWB	0758-258605	
	Anitha Aloya	RBWB	0754-462960	

MAHUDHURIO YA WAJUMBE KWENYE KIKAO CHA KAMAKA – MADIBIRA KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA – SKIMU YA MADIBIRA TAREHE 05 NOVEMBA 2018 – MADIBIRA

NA.	JINA	CHEO	NAMBA YA SIMU	SAHIHI
1.	ERICK M. NGELEJA	DIWANI	0753537186	
2.	PASCALINA ENGUNGULU	DIWANI V. MAALUM	0759675450	
3.	IMANI S. MBOGELA	WEO - MADIBIRA	0756683162	
4.	ZUNDA GABRIEL	OCS MADIBIRA	0767063465	
5.	VITALIA KIPINGA	MHASIBU MKUU	0753107216	
6.	RAPHAEL JAPHET	VEO	0754746560	
7.	PHILIPO P. ZACHARIA	VEO	0757612010	
8.	HEAVEN NGOWI	CDO	0757821820	
9.	RENATA SIMON CHAND	VEO - MATINGO	0743120292	
10.	SAID M. MBWILINGE	MKUU BARABARA	0765316869	
11.	RUTH E. KASOMOZI	VEO - NYAMAKUYU	0755212023	
12.	EVANCE H. MAMBA	AEX - MADIBIRA	0755703091	

13.	YUSTIN A. MBARI	WANYAMAPORI	0764830179	Mbali
14.	ESTERINA NDEME	M/KITI JUWA BONDECHI	0758588347	Ndeme
15.	MAGRETH - R MONGO	A. MIFUGO	0743755298	[illegible]
16.	ANJELINA J. KIGINA	VEO-IKOGAMPYA	0753971435	[illegible]
17.	LUKASI KILLAMAGULU	MIKITI KIJIJI	0767466230	LUKASI
18	JOAKIM MTASI	M/KITI	0766441738	Mtasi
19.	AUGUSTINO J. CHALAMILA	M/KITI-IHEHA	0766441888	Chalamila
20.	MICHAEL J. MYALA	M/KITI - NYAKADETE	0769344696	Mam
21.	GRASIANO.N. NGELIAMA	KATIBU KATA CCM	0743474341	Ngeliama
22.	NICHOLAUSY KALINGA	M/KITI CCM KATA	~~0743347~~ 0755869687	Kalinga
23.	JOHNAS S/o SHANGWA	VEO-MKUNYWA	0763102566	[illegible]
24.	WENDELINI S/o MFJAGWA	M/KITI/S/K	0742560324	[illegible]
25.	CECILIUS P. HAULE	K/CCM-MADIBIRA	0766774435	[illegible]
26.	MARONO MUN-IEGWA	MJUMBE	0752309822	[illegible]
27.	BERNARD J. ALBERT	WEO-MADIBIRA	0754401673	[illegible]

MUHTASARI WA KIKAO CHA KAMATI YA MAENDELEO YA KATA (KAMAKA) KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA SKIMU YA MADIBIRA TAREHE 05/11/18 MIYOMBWENI

AGENDA ZA KIKAO

1. KUFUNGUA KIKAO
2. UTAMBULISHO
3. UMWAGILIAJI
4. KUFUNGA KIKAO

AGENDA NA 01: 05/11/2018. KUFUNGUA KIKAO

M/Kiti aliwakaribisha wageni mbali mbali waliofika kutoka wizara ya maji na mkoa, wilaya na kata kwa ujumla alisema kwa ~~ajili~~ wajumbe waliofika kikao kina kuwa halali alifungua kikao muda wa saa 3.20 Asubuhi

AGENDA NA 02: 05/11/2018 UTAMBULISHO

ulifanyika utambulisho kwa makundi mbalimbali yaliyofika katika kikao.

AGENDA 01. 05/11/2018: UMWAGILIAJI.

Mtaalamu toka tume ya umwagiliaji alieleza madhumuni ya ziara kuwa ni kilimo katika utalii katika nchi yetu ya Tanzania. Mtajua kuwa wakati wa ujumla maji yalikuwa yanatiririka mwaka mzima na kufanya yafike kwenye bwawa linalo zalisha umeme. Tume ya umwagiliaji ni mdau kwa hiyo limeambiwa kuangalia skimu zote za umwagiliaji zilizopo ili kuona miundo mbinu. Kwa kuboresha mradi wa umwagiliaji kwenye shamba la madibira

II) Suala la ~~nafasi~~ kulima kwa wakati moja kuna tofauti ya mitaji na maji hivyo ya zamani mwanzo mwa msimu.

- Majibu alisema suala hili ni mwanzo itatolewa elimu namna ya jinsi ya kulima kwa wakati moja na katika kuendeleza jambo hili.

- Kulima kwa pamoja inawezekana kwa kulima ~~Cha pa~~ kwa pamoja ikiwa MAMCOS LTD atachukua jukumu la kila mkulima alipe fedha zote za kilimo na MAMCO kuweka utaratibu wa kulima

III) Shamba la umwagiliaji kwa sasa ni dogo kwa wakulima wanaolima kunaya sungura na mlonga wanahitaji maji kungetengenezwa miundo mbinu.

IV) Matoleo zote zinapoteza maji kwa ku fukua ili yaweze kufinsho maji kwa uwalishi zaidi

V) Shamba la nje ni kubwa kuliko shamba la ndani ikiwa ndani hekta 3000 nje hekta 36. kwa sasa kutakuwa na mashamba darasa kila block kwa kupata wakulima wa mfano

VI) Suala la ukarabati wa miundo mbinu. Serikali ichukue hatua kutoa magunzi ya 5% kwa mwaka.
kwa viwango vya kusimamia viwango vya uchagaji

VII) Kuna eneo ambalo lina visugu likifanyiwa levoling litasaidia kuongeza hekta na kuongeza wakulima.

VIII) Kuna watu walio na mashamba zaidi lakini kwa kuwa mashamba zaidi siyo sababu.

Kwa kujenga mfereji wa matoleo wa
Kanali ili kufanya maji yatembee na
kufanya levo ya mashambas na kilimo
Kilimo cha shadidi kinachotumia maji
machache. Kwa hiyo itakuwa ni shamba
darasa. Kwa hiyo kazi hii itafanywa na
mkandarasi. Kabla ya kuanza kazi tumeona
tukutane na viongozi ili kusaidiana na
katika shughuli hii.
Mtaalamu mwingine alisema kuwa tunatakiwa kuona hali halisi ya madibira
katika mto wa NDEMBERA alionyesha
mfano wa shamba la MAMLOS LTD
kwa mfumo wa mifereji. Yaani mifereji
mikuu na mifereji ya umwagiliashasi maji
Pia kuna mifereji ya umwagilia na mifereji
inayo ingiza maji shambani na kuna
matoleo yanayo safirisha maji kurudi
mtoni. Maeneo ya kutolea mchanga
kupeja ambapo hawezi kusafisha mchanga
na kuna mto wa Ikangalato inaingiza
na kujaza mchanga. Ukitoka kwenye
daraja la kwanza kwenda mwinyue mita
1000 mto unakula kingo za mto.
mto unatafuta eneo la mkondo Kwa halisia
wa zamani. Kitakachotokea ni
bu makazi na unacha shamba.
Kwa mfumo wa shamba la umwagilia
uwa linatakiwa kulimwa kwa wakati moja
yaani shughuli zote bila kuachana.
MAONI/MASWALI NA USHAURI.
Usikala la kujenga mto mmefikia ndio juu
ya wafugaji ili wasiweze kuharibu.

TUNAFANYA NINI KUTUNZA MAZINGIRA

- Kuna mifugo inayo ingia kunywa maji.
- Bodi kuanda eneo la kunyweshea mifugo
- ~~Kutenga eneo~~ !
- Kuanda utaratibu wa kutunza eneo hilo
- Kuwa na eneo la kunyweshe kwa kuchepusha maji na kuanda ~~eneo~~ birika la kunywesha mifugo.
- Kuna eneo tunatakiwa kupanda miti na matete ili kuzuia mmomonyoko na uharibifu wa mfereji
- Wanalima kando kando wasiendelee kulima ~~Kulima~~ Eneo la Kata ya Miyombweni kuna Shamba ambalo halina mwenyewe kuna serikali ingeona umuhimu wa kuweka mbunu ili kuongeza mtiririko wa maji kwenda Mto ndembela.

AGENDA NA 4: 05/11/2018: KUFUNGA KIKAO.

Mw/kiti aliwashukuru wataalamu toka ugazi zote na wajumbe kwa ushiriki na kuomba kila kijiji kuteua wajumbe watano alifunga kikao muda wa saa 4:54 Asubuhi

Umethibitishwa.

Sahihi ya mwKiti — Sahihi ya Katibu

[signature] — [signature]

AFISA MTENDAJI
KATA YA MIYOMBWENI
MBARALI

Mstaafu Y. Sanzalo — Ibrahim D. Mwakasopile

MUHTASARI WA KIKAO CHA KAMATI YA MAENDELEO YA KATA (KAMAKA) KUJADILI UJANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA - SKIMU YA MADIBIRA TAREHE 05/11/18 - MADIBIRA

UTANGULIZI.

Kabla ya Kikao Kufunguliwa, Liliamza zoezi la Kujitambulisha washiriki' wote wa Kikao.

UFUNGUZI WA KIKAO.

Mh. Mwenyekiti' alimtaka wajumbe wote wa kikao Kuwa watulivu na makini' Kwa wakati' wote wa Kikao.

Kikao kilifunguliwa saa 9.25 alasiri'

KUUTAMBULISHA MRADI.

Katika Kuutambulisha Mradi' wa Ukarabati wa Miundombinu ya Shamba la MAMCOS, Watalaam toka TUME YA UMWAGILIAJI TAIFA Walielezea Kuwa Mradi' umefadhiliwa na BENKI YA DUNIA

Na Lengo' Kubwa zitakazofanyika ni' pamoja na Kusakafia mifereji na Kusawazisha Shamba.

Lengo ni' Kuboresha SKIMU pia na maji yasipotee ovyo 'ili' mwishowe maji hayo yatumike mpaka MTEFU.

Pia watalaam watakuja Kuwa na zoezi la Kutoa elimu Kwa wakulima na Kutakuwa na mashamba darasa Kwa Kila BLOCK.

Baada ya maelezo hayo, Ilitolewa nafasi kwa washiriki kutoa maoni yao.

Mshiriki wa kwanza alisema kuwa endapo mto utahamishwa unakopita kwa sasa utaathiri maisha ya watu ambao wanaotumia mto huo kwa shughuli za kilimo.

Mtalaam alijibu hoja hiyo kuwa maji kipindi cha kilimo yataachwa yapite huko ili wakazi wa maeneo hayo wayatumie kwa shughuli za kilimo.

Afisa Mazingira wa Kata alielezea kirefu sana kuwa mradi huu hautaathiri maisha ya watu na shughuli zao pamoja na mifugo.

Mshiriki mwengine alitoa hoja kuwa mfereji wa matoleo ambao hujaa mchanga maji kwa maji.

Majibu toka kwa Mtalaam ni kuwa muwishowe Serikali na Wakulima ambao ni wanufaika kutakuwa na kugawana majukumu.

Moja ya majukumu ambayo W.D.C. Madibira imeahidi ni pamoja na kupanda miti rafiki na maji na kutumia sheria kwa wakiukaji wa sheria na wachafuzi wa maji,

Baada ya majadiliano hayo, mtadaam toka ofisi ya TUME YA UMWAGHLIAJI alitoa ratiba ya kukutana na kaadhi ya Wadau na Viongozi wa Seikali za Vijiji. Kwa vijiji vyote Saba vya Kata hii:

KUFUNGA KIKAO

Mwenyekiti Katika Kuhitimisha Kikao hiki alisesitiza Viongozi wa Vijiji Kuwaalika hao Wadau Ambao Wajemi wanahitaji Kuonana nao.

Alifunga Kikao Saa 11:01 jioni.

Sahihi ya Mlalah:
Erick M. Ngelyana

MWENYEKITI WA KAMATI
KAMATI YA MAENDELEO (WDC)
KATA YA MADIBIRA

Sahihi ya Katibu
Imani S. Mbogela
AFISA MTENDAJI
KATA YA MADIBIRA

MUHTASARI WA KIKAO CHA WAWAKILISHI WA KIJIJI CHA NYAKADETE NA NYAMAKUYU KUJADILI USANIFU WA MIUNDOMBINU NA TASMINI YA KITA-MII NA MATINGIRA SAKIMU YA MADIBIRA

Agenda:

1/Kufungua kikao
2/Mradi wa kukuza rasmali za maji
3/kufunga kikao

AGENDA: No 01/2018 KUFUNGUA KIKAO

4/Kiti kijiji alifungua kikao kwa kuwashukuru wajumbe kwa kufika na aliwataka kuwa wasikivu na kuchangia katika yale yatakayo jadiliwa. Kikao kilianza mnamo saa: 6:20 Mchana.

AGENDA: No 02/2018 MRADI WA KUKUZA RASMALI ZA MAJI

Wataalu walotufikia walieleza kuwa kutokana na kuwa Miongoni mwa watumiaji wa maji ndani ya kata yetu ya Madibira wameona ni bora kuimarisha Mradi wa Maji katika shamba letu la MAMCOS kutokana na Matatizo ambayo yameonekana katika Shamba hilo.

Aidha walaamu kwa kuelimisha zaidi alitumia Mchoro au ramani ya eneo husika na kuwaonesha wajumbe/wananchi Matatizo hiyo kupitia Mchoro huu.

Inaonesha kuwa Maeneo ya bani katika Shamba la Mradi kuna kuna

ambavyo vimeanza kujitokeza.
Lengo la Mradi ni kutengeza carnal four had
se carnal five.
Mtaalumu Mwingine alikazia kwa kusema
kuwa katika uboreshaji huo wa Mradi
wakulima wataelimishwa juu ya kuanza
shughuli zao za kilimo waanze kwa pamoja
ili kusiwepo na hali ya upotevu wa Maji
kwa Maeneo yasiyo na watumiaji.
MAPENDEKEO:

Kanali Six(6) iboreshwe na kuwekewa Mfuniko
Mbinu mzuri utakao saidia Maji yasipotee.
Ndani ya mashamba paboreshwa kwa
yale Maeneo ambayo yana ukorofi kusuasa
ni urekebishaji wa makorongo yaliyopo ndani
shamba la Mradi.
Mjumbe wapili ndugu Joseph Mgina alicha
ngia kuepo kwa Matibirika ya Maji kwa
ajili ya Mifugo.
Mchangiaji Mwingine alipendekeza kuwa kwa
kuwa katika mradi huo wapo wanandi
wanaonufaika kupitia Matumizi ya Maji
Majumbani aliomba walau katika uboresha
ji wananchi hao watengewe Maeneo kwa
jili ya kupata huduma hiyo ili uboresha
ji usi waathili. Mpereji wenyewe ni Matoleo

Vijiji hivyo vinavyonufaika kwa Majina ni Mahango, Chaliseka, na Iheha kasa wakati wa kiangazi.

Mtaalamu pia alishauri wananchi kuwa yale Maeneo ambayo yanasumbua ambayo yanapelekea Mto kugawanyika papandwe Mabete kwa ajili ya kuzuia Mto kuendelea kutanuka.

Mwananchi Mmoja ndugu Festo Mlunza aliguzia kwa kusema kuwa wao kulingana na Mapendekezo waliyotoa aliomba serikali kwa kutambua uhitaji wao juu ya mradi wao Wanaomba utekelezaji ufanyike kwa yale walochangia na kupendekeza.

AGENDA NO 03/ KUFUNGA KIKAO

M/kiti Kijiji alifunga kikao kwa kuwashukuru wageni walotufikia na kuporge za wajumbe walohudhuria kwa kupata elimu na kuwaasa kwenda kuelimisha wananchi wengine. kikao kilifungwa Mnamo saa: 13:39 alchanga.

MWENYEKITI WA KIJIJI

[signature]

Abdy H Ginga

KATIBU

[signature]

Ruth - E. Kasonezi

MUHTASARI WA KIKAO CHA CHAMA CHA WAKULIMA WA UMWAGILIAJI MADIBIRA (MADIBIRA AMCOS LTD BOARD) KUJADILI USANIFU WA MIUNDOMBINU NA TATHIMINI YA KISAMII NA MAZINGIRA TAREHE 06/11/2018

KUFUNGUA KIKAO

Mwenyekiti alifungua kikao na kuwakaribisha wageni kabla ushirika wa MAMCOS.

MAMCOS ni chama cha ushirika cha kilimo kilichoanzishwa mwaka 1997 kwa number ya usajiri MBR 407. chama kilipoanza kilikuwa na hector 3000. Baada ya kuendeleza kwa kutengeneza miundombinu hector za shamba zilongezeka na kufikia 3167 na kila mwanachama anachangia Sh 155000/= na Bodi ya MAMCOS ina wajumbe 9 wa bodi 7 wanaume na 2 wanawake.

Mchanganuo wa Sh 155,000/=

Ushuru	63000/=
Usafi wa mfereji	30000/=
Ada	35000/=
Ufungi wa mfereji mkuu	10,000/=
Barabara	17000/=
	155000/=

Mratibu wa mradi wa Regro alikielezea kikao kuhusiana na shughuli zitakazofanyika na mradi huo

- Kubomoa na kukarabati miundombinu
- Kusafisha Mfereji number 5 na mfereji mkuu
- Kufanya levelling block number 5

Pia mradi utaangalia mpango wa Mazingira na athari zake.

Mamcos ianze shamba darasa na kutafuta mtaalamu kwa ajili ya kuendesha shamba, pia kulima kilimo shadidi kitasaidia maji kutumika kidogo.

Mradi wa Regrow ni wa shillingi billion 3 za Kitanzania na ni mkopo kutoka Banki ya dunia. Serikali inatakka kuona kuna matumizi mazuri ya pesa hii na izalishwe kwa ajili ya kusaidia sehemu nyingine

Vilevile aliendelea kusema kwa mradi huu utakuza utalii na kuboresha miundombinu ya shamba la madibira na maji ambayo hayatumiki yaende kwenye mto kwa matumizi mengine.

Mamcos iwekke jitihada za kuzuia ng'ombe kuingia shambani ili miundombinu ya shamba isiharibiwe. Pia shughuli za kijamii kama kufyatua matofari ndani ya kingo za mto na shughuli zingine za kijamii zipigwe marufuku ili kuepusha uharibifu wa miundombinu.

Kupanda miti kandokando ya mto utasaidia kutunza mazingira ya shamba.

Baada ya kupata hayo maelezo, wajumbe wa bodi ya Mamcos walikupokea huu mradi kwa mikono miwili na kusema kwamba ni mkombozi wa shamba hili. Hata hivyo walishauri sehemu tuta lilipoliwa maji ya mto parekebishwe kabla mradi huu. Vilevile mwisho wa shamba matoleo yanapokutana pafukuliwe mchanga ili maji yaweze kufuata mkondo wake.

Mwenyekiti alifunga kikao saa 5. kamili mchana.

NICKSON NKAJIO

MANAGER

[signature]

MUHTASARI WA KIKAO CHA WAWAKILISHI WA KIJIJI CHA MKUNYWA NA IKOGA KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA SKIMU YA MADIBIRA TAREHE 06/11/18

AGENDA ZA KIKAO

1. KUFUNGUA KIKAO
2. KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA SKIMU YA MADIBIRA.
3. KUFUNGA KIKAO.

AGENDA NO 1. KUFUNGUA KIKAO

Kabla ya kufungua Kikao Afisa Mtendaji Kijiji cha Ikoga-mpya alimkaribisha Mwenyekiti wa Kijiji cha Mkunywa ili aweze kufungua kikao. Kikao kilifunguliwa Saa 08:55 Mchana na kuwataka wajumbe kuwa watulivu na wasikiva wakati wote wa Kikao. Pia alifanyika utambulisho wa wataalamu wa Skimu ya Umwagiliaji pamoja na Wawakilishi wa Vijiji vya Mkunywa na Ikogampya.

AGENDA NO 2: KUJADILI USANIFU WA MIUNDOMBINU NA TATHMINI YA KIJAMII NA MAZINGIRA SKIMU YA MADIBIRA.

Wataalamu walieleza lengo la uradi huo kuwa ni kuboresha miundombinu ya maji katika Skimu hizo ili kudhibiti upotevu wa maji. Pia kusaidia maji hayo yaweze kufika mto Ruaha, Ihefu. Pia maji hayo yatasaidia wanyama katika hifadhi ya Ruaha kupata maji wakati wa kiangazi.

Baada ya Maelezo ya wataalamu, wajumbe walipewa fursa ya kutoa Maoni/Mapendekezo kuhusiana na uboreshaji

shaji huo itiwa ni pamoja na ujenzi wa mfereji mkuu; Pia kusawazisha Mashamba kuondoa hali ya vichuguu na miinuko katika Mashamba.

Mapendekezo/Maoni ya Wajumbe

1) Pamoja na ujenzi wa mfereji mkuu. kupitia Mfereji wa sekondari kanali wa namba tano unaotarajiwa kusakafiwa katika mradi huu kuelekea Makutano ya Matoleo makuu ya kusini na kaskazini, Lakini pia wajumbe walipendekeza kuwa mto ndembela ufikuliwe Mara kwa mara kwa ajili ya kuondoa taka na mateke, Mchanga unaosababisha maji kushindwa kufikia lengo kwa wakati ili kuwezesha maji hayo kufika mto naha, Pia lhefu wakati wote.

2) Ujenzi wa bwawa Lugoda kwa ajili ya kutunza/kuhifadhi maji yatakayosaidia kuwa na Maji wakati wa kiangazi

3) Korongo la Mwishoni yanapokutania maji ya mito lifukuliwe Mara kwa mara, Pia ikiwezekana lisakafiwe ili kuwezesha maji hayo kufika eneo linapokusudiwa.

4) Mfereji Mkuu usijengwe kwa mteremko mkali utaoweza kuathiri upatikanaji wa Maji katika Mashamba kwa wakati.

5) Shamba lote litengenezwe ili kuondoa miinuko na Vichuguu ndani ya Mashamba yote.

Tathmini ya Kijamii na Mazingira Skimu ya Madibira.

⇒ Baada ya wataalamu kuelezea hoja hiyo, wajumbe walipewa fursa ya kutoa maoni yao.

i) Ipande miti ili kuimarisha eneo la Intake.
2) Wafugaji watengewe eneo la kunyweshea mifugo ili kuepusha migogoro.
3) Wakulima waendelee kupata mafunzo jinsi ya kuandaa shamba kwa pamoja na jinsi ya kilimo shadidi.
4) Wakulima wamependekeza kuwepo na huduma ya kwanza katika vituo vya afya.

AJENDA NO 3: KUFUNGA KIKAO

Mwenyekiti wa Kijiji cha Mkunywa aliwashukuru wajumbe wote pamoja na wataalamu kwa ushirikiano wao wakati wa kikao, kisha alimkaribisha Mheshimiwa diwani wa viti Maalumu-Madibira ili aweze kufunga kikao, kikao kilichukua mnamo saa 11:18 jioni.

Vitalia Kipinga
MWENYEKITI
M/KITI H/KIJIJI
MKUNYWA

AFISA MTENDAJI KIJIJI CHA IKOGA
J. KIGINA
KATIBU

MUHTASARI WA KIKAO CHA KWANZA CHA KUJIJI CHA NYAKAZOMBE, MIYOMBWENI, MABOGORO NA MAGIGIWE KUJADILI USANIFU WA MIUNDOMBINU YA UTAHIMINI YA KIJAMII NA MAZINGIRA SKIMU YA MADIBIRA TAREHE 07/11/18

AGENDA

1/ UTAMBULISHO

2/ KUKUZA NA KUSIMAMIA MRADI WA SKIM YA MADIBIRA

3/ MAONI YA WAKULIMA

4/

AGENDA NO 1 UTAMBULISHO

Mwenyekiti mwakilishi kijiji cha mapogoro alisima na kuwatambulisha wakulima kutoka kila kijiji cha kata ya Miyombweni, aliwatambulisha kwa ujumla kuli ngana na vijiji walivyotoka, pia mwakilishi mmoja wa ugeni uliokuja kutoka wilayani bwana kilau aliuta mbulisha ugeni waliokuja nao, pia kikao kikafenguliwa.

AGENDA NO 2 KUKUZA NA KUSIMAMIA MRADI WA SKIM YA MADIBIRA

Lengo kubwa la kuwaomba wakulima kutoka shamba la MAMCOS ilikuwa ni kuwafundisha namna ya kutumia kiasi kidogo cha maji na mbegue kidogo, mavuno kwa wingi, pia wali kuwa wanataka maoni ya wakulima kulingana na kilimo wanachoshauri wakulima watumie.
Pia muwezeshaji alianza kuwafundisha na ku waeleza wakulima kwamba
- kipindi cha kiangazi mto usakafiwe wote ili kuzuia maji yasipotee,
- Pia shamba lisawazishwe ili kuwezesha maji ya fike eneo la mwisho kwa ajili ya Utalii. Pia muwezeshaji alisisitiza kuwa wakulima waendelee kusimamia na kuzuia mifugo kuingia ili kuzuia up otevu wa maji

Muwezeshaji alisisitiza kuzuia wanyama kuingia ili kuzuia mmomonyoko wa udongo
- Muwekezaji aliendelea kushauri kuwa wakulima wawewanalima kilimo shadidi, pia wawe wanali ma pamoja, wanamwaga mbegu kwa wakati mmoja ikiwezekana hata wakati wa kuvuna wavune kwa pamoja ili kuwasaidia wakulima kuwera kupata na kutumia maji machache.
- Pili muwezeshaji aliendelea kusisitiza swala la mazingira, miundo mbinu na watu wanaozunguka shamba hilo ili kuboresha skim ili kupata maji yanayorudi Li

AGENDA NO 3 MAONI YA WAKULIMA

- Mkulima alisimama akasema kuwa bario lilo tengenezwa lilikuwa bovu na kusababisha kuingia za mchanga, akapendekeza mbinu mbadala ni kufukuwa mto japo kuna baadhi ya watu wa taadhiliwa, Ombi lake serikali ikishirikiana na wakulima waufukue mto huo.
- Mkulima alisema kuwa kule ambako inatakiwa vichugu visawazishwe pia kuna makorongo ambayo yanasababisha maji yapotee.
- Mkulima mwingine alisema semina ni nzuri na pia itawasaidia lakini kunasehemu kunamajani pia yanayozuia maji akaomba mifereji isakafiwe. lakini muwezeshaji alisibu kuwa

- Mwezeshaji alishauri kuwa ule mchanga dhumuni ni ufukuliwe ili mchanga usilingie shambani pia kujaali ii nini cha kufanya ili maji yawe yanafuata mkondo wake.
- Mkulima alisema kwenye mto ule kuna asili ya mawe, kwahiyo aliomba wafugaji watengewe sehemu ya mawemawe wawe wanakumia kunyweshea mifugo, pia aliongezea kwa kusema kila mkulima achangie gunia moja kwa ajili ya kusakafia miereji ya ndani na matolea. Pia wakati wa mvua kwasaba bu maji yanakuwa mengi basi banio liwe linabanwa ili maji yawe yanapita moja kwa moja na sio kugawana kena
- Pia kunamkulima mmoja alisimama akasema kuwa kuna mfugaji maarufu wa ng'ombe huwa anaingiza ng'ombe zake mtoni na hachukuliwi sheria.
- Mkulima mwingine alisema swala la kutengeneza miereji ya ndani liwekewe mkazo ili kuwezesha maji kuja kwa urahisi, pia litengenezwa kuta likine lizuie maji yanayoenda lpande.
- Pia mkulima mwingine alipendekeza serikali lijenge bwawa la kunyweshea mifugo ili kuzuia ng'ombe wasilingie, pia waliomba mfugaji maarufu anaefahamika kwa jina la Simbagungile adhibitiwe na serikali

- Mkulima mwingine alipendekeza kuwa wao wenyewe wakulima waanzinze uchimbaji wa bwawa kwa kuwa wao ni serikali ili kama kuna sapoti watasaidiwa baadae.
- Mkulima mmoja alisema kuwa mfugaji huyo anawashawishi na wafugaji wengine kuingiza mifugo wiku kitu ambacho kinasababisha uharibifu wa miundombinu ya shamba. Pia Muwezeshaji alisha uri kuwa mfugaji huyo apigiwe kula ili afahamike
- Mkulima mmoja alisema huyo mfugaji Simbagungile ni maarufu kwa kesi kuwa anashinda kesi na mifugo inaendelea kuingia.
- Muwezeshaji alifunga swala la mifugo kuingia kwa kusema kuwa hilo ni tatizo kubwa, wakulima waweke sheria kali pia atoomba bwawa la kunyweshea mifugo ili kuzuia uoharibifu wa miundo mbinu.
- Mkulima mwingine alisima akasema wakulima pia washa uriwe kupanda miti ili kuzuia mwingiliano na wafugaji
- Mkilima mwingine alisema wasipande miti inasababisha ndege.

AGENDA NO 4 KUFUNGA KIKA

Mwenyekiti wa kijiji cha mapogoro alisimama na kuwashukuru wageni kwa elimu waliotoa pia aliahirisha kika muda wa saa saba mchana.

MWENYEKITI
VICTORY B. MINDE

K.N.Y. AFISA MTENDAJI KATA
KATA YA MIYOMBWENI

KATIBU

PEMDO w. CHOTAMGANGA

MUHTASARI WA KIKAO CHA WAWAKILISHI WA KIJIJI CHA MAHANGO, IHEHA NA CHALISEKA KUJADILI USANIFU WA MIUNDOMBINU NA TATHIMINI YA KUTAMII NA MAZINGIRA SKIMU YA MADIBIRA TAREHE 07/11/18

AGENDA

1) KUFUNGUA KIKAO

Mwenyekiti wa kijiji cha Mahanga amewakaribisha wageni na kufungua kikao saa 3:40 asubuhi.

2) UTAMBULISHO.

Afisa kilimo kata KILAWA alipata fursa ya kuwatambulisha wageni wa kitaifa, Mkoa na Wilaya. pamoja na Wataalam wa Kijiji vya Mahanga, Chalinze na Ihehe.

3) UTAMBULISHO WA MRADI WA REGROW.

Mtaradi huo utahusika katika Shamba la umwagiliaji Madibira.

Lengo kuu ni kuboresha Miundombinu ya Shamba ili kuruhusu Matumizi ya Maji ndani ya Shamba, kilimo na kuwa na Matumizi Mengine ya Maji walau wa kiangazi.

⇒ Wadau wanaoteleleza Mradi
1) Timu ya taifa ya Umwagiaji
2) Maliasili
3) Bonde la Mto wetu.

⇒ Maelezo yaliyo ndani ya Mchoro wa Mradi kwa Skim ya Madibira
→ Mto unapeleka Maji kwenye bwawa unaitwa Lyandemela.
→ ~~Ka~~ kwenye bwawa kuna Neatuta Maweli Makubwa ya kuleta Mafuriko
→ Maji yakitoka kwenye bwawa yana ingia kwenye Mfereji Mkuu.
→ Kuna Mfereji wa kwenda wa Kusini wa Kutoa/Kuchuja Mchanga.
→ Kuna Mifereji ya Shamba Sita ina yo Ingiza Maji na Mifereji Sita Inayotoa Maji.
→ ~~Kuta~~ tuta kubwa linalozunguka Mradi kwa ajili ya kuzuia Mafuriko.

→ Ushauri kama muhandisi wa mradi
i) Mfereji Mkuu usafishwe wote.
ii) Eneo lenye visuguu cane 5 lisawazishwe ili liweze kutumika vizuri
iii) Kilimo shadidi ili kupunguza Matumizi ya Maji.
iv) Hali ya tuta la kulanga Maji kabla ya kufika kwenye bado sio nzuri linaweza kuharibika/kubomoka muda wowote
v) Mfereji unaotoa Maji na unaotumika kuchuja Mchanga unajaa Mchanga

~~vi)~~ Maoni ya Wataalam.

- Usawazishaji wa Shamba ili kilimo shadidi kitumike ili kupunguza Matumizi Makubwa ya Maji.
  → Kila block Itatakiwa kuwa na Shamba darasa la shadidi.
  → ~~Upanda~~ Shughuli zote za kilimo zinatakiwa zifanyike wakati mmoja kwa Majadiliano na Wakulima.
  → Utaratibu wa uendeshaji wa Shamba ili liweze kujitegemea.

5) Maoni ya Wakulima

Yatalenga

i) Mazingingira.

ii) Mambo ya uhandisi.

iv) Mambo ya Kijamii.

Maoni na Maswali

I - Mradi hautaathiri Shughuli za kilimo?
Jibu Hautaathiri - Utaendelea wakati Shughuli za kilimo zimesimama.

II - Shamba darasa kila block litatoka wapi? - Jibu, Miongoni mwa Shamba la ~~A~~ Wakulima.

III - Kama Maji yote yatapita katika Mfereji uliosakafiwa Vipi Mfereji Uliotengwa kwa ajili ya Wananchi na Mifugo - Mfereji utaendelea kwa Majibu wa Katibu

IV - Ushauri juu ya ukarabati wa tuta ambalo linaweza kubomoka na kuleta athari Shambani na kwenye Makazi ya Wananchi.

V Pendekezo juu ya Korongo la Ihangalalo linaloingiza Michanga Mferejini.
- Korongo lifuatiliwe 1km nyuma kabla kabla ya kufika Mferejini ~~Mfer~~ wa tofali.

VI - ~~Maoni~~ Shuuri gunia ambalo limegundue kera kwa ajili ya Mundombina litamaliza kazi - Jibu zoezi litalauwa endelevu.

VII Maoni kuwenye tuta kabla ya bamio Ongezeko la ushuru kwa ajili ya Maboresho ya Mundombina ikiwepo eneo hatarishi.
- Mazingira ya toleo la kaskazini ni Machafu.

VIII - Uharibifu wa eneo kabla ya banio
i) Kilimo
ii) Mifugo
iii) Hemo limelowa kali inayosababisha Mmomonyoko.
iv) Wafyatua tofari.

IX - Wakulima wasaidiwe kutafutiwa Masoko

X - Wakati wa uboreshaji wa Mfereji, Wakulima wanomba kufanya kilimo cha kiangazi

XI - Makutanio ya toleo yanatakiwa yaboreshwe.

XII - Marambo kwa ajili ya kunywesha Mifugo yatengenezwe.

REMATA CHATO
[signature]

KATIBU

LUCAS KULAMAGULU
LUKASI
MWENYEKITI

AFISA MTENDAJI
KIJIJI CHA MAHANGO
MADIBIRA