Burqaa Phase II Baseline report

Biophysical, Socio-economic, and Governance Baseline Assessment

ACACIAWATER

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Executive summary

Burqaa Initiative Phase II aims to enhance the sustainability of the interventions implemented in Phase I and upscale successful practices to the previously unreached Upper Dabena and Hakim Gara sub-watersheds, as outlined by WVE (World Vision Ethiopia). The overarching objectives include advancing water balancing, carbon sequestering, and improving residents' livelihoods by 2027. Acacia Water is positioned to contribute significantly to WVE's efforts, playing a key role in diverse ways, including conducting a comprehensive baseline assessment. This report contains the findings of the baseline assessment. This assessment encompasses a broad spectrum of criteria, including biophysical, socio-economic, and governance-related aspects. The methodology adopted is designed to facilitate a holistic evaluation of potential intervention sites, with the aim of maximizing the positive impact of water balancing measures. Furthermore, the Baseline Assessment seeks to ensure the sustainability of interventions beyond the project's completion by providing actionable recommendations.

Colophon

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List of abbreviations

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3R	Recharge, Retention, and Reuse
AW	Acacia Water
BI-II	Burqa Phase II
CBO	Community-Based Organization
CD	Chart Datum
CEIC	Center Of Excellence International Consult
CHIRPS	Climate Hazards Group Infrared Precipitation with Station Data
DEM	Digital Elevation Model
EAT	East Africa Time
ELD	Economics Of Land Degradation
ESA	European Space Agency
ESS	Ethiopian Statistical Service
FDRE	Federal Democratic Republic Of Ethiopia
FEWS	Famine Early Warning System Network
FBDG	Food-Based Dietary Guidelines
FBO	Farmers' Based Organization
GIS	Geographic Information System
HA	Hectares
IGA	Income Generating Activities
IWRM	Integrated Water Resources Management
KEBELES	Administrative Units In Ethiopia
LTR	Liters
M3/M3	Cubic Meter Per Cubic Meter
MSC	MS Consultancy
NGO	Non-Governmental Organization
NDVI	Normalized Difference Vegetation Index
NPV	Net Present Value
OTT C31	Acoustic Doppler Velocity Meter
PFM	Public Forest Management
Q-H CURVE	Relation Between Water Level and Discharge
QT	Quintal (100 Kg)
QT/HA	Quintals Per Hectare
SLMP	Sustainable Land Management Program

SWC	Soil And Water Conservation
TEMP	Temperature
UTC	Coordinated Universal Time
WADI	Seasonal River
WVE	World Vision Ethiopia

1 Introduction

1.1 Burqaa Phase-I

The" Burqaa Initiative Phase-I" has been carried out in the period July 01, 2020, until June 30, 2023, with the primary aim of compensating for the water use of the Bedele and Harar Breweries by increasing water availability. This water balancing initiative was implemented by Acacia Water (AW) in collaboration with World Vision Ethiopia (WVE) based on four primary objectives drawn by WVE. The overall project's goal was to save 90,000 m3 of water per year by focusing on 5,521 ha of degraded land in five kebeles in Gechi woreda. Achieving this goal would mean a 150% compensation of the Bedele brewery's annual beer production of 600,000 hectoliters (i.e. 60,000 m3/y). In Harar, the water compensation measures intended to compensate 100% of the Ginela spring source only by saving 24,000 m3/yr, while enhancing the quality of life for the targeted beneficiaries.

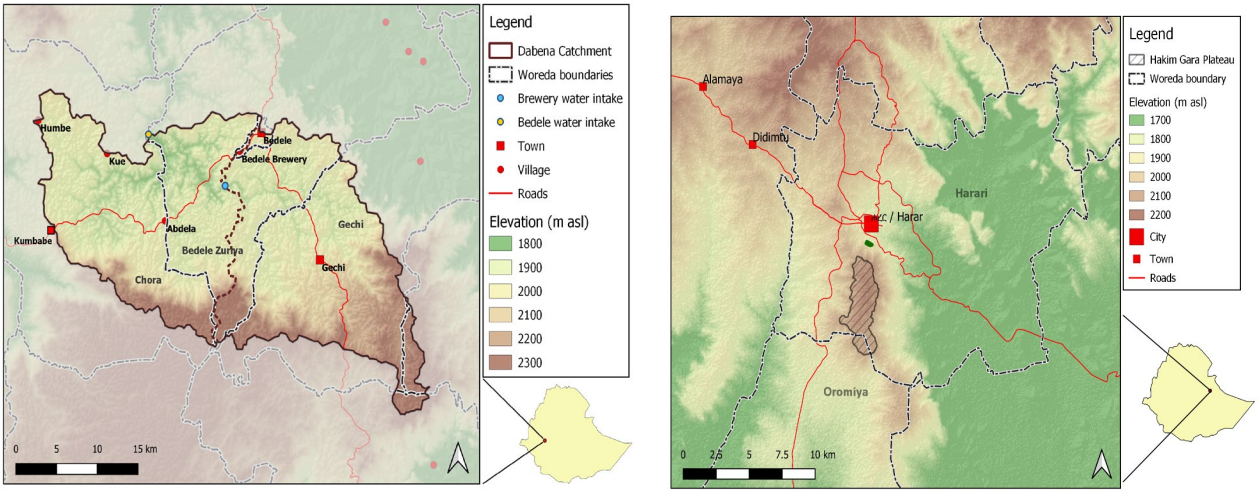

Figure 1. Dabena catchment (Bedele) and Hakim Gara Plateau (Harar)

To achieve these goals, soil and water conservation measures and seedling planting took place in the selected project areas. The Acacia Water team collected data using telemetric monitoring equipment for real-time data, taking manual soil moisture samples and discharge measurements. Next to the data collecting and monitoring Acacia Water also provided trainings for the WVE team, governmental water experts from Harar and Bedele. The training focussed on general hydrology, water balancing, monitoring equipment, and the online dashboard where project data can be viewed.

1.2 Burqaa Phase-II

Considering the success of Burqaa Phase-I, HEINEKEN Ethiopia foresees the continuation of the water balancing activities by both Acacia Water and WVE. Objective 1 aims to enhance the sustainability of the Phase-I activities and bring additional water balancing measures to increase the volume of water that can be compensated and thus extend the overall impact.

Based on indications from Heineken and WVE, Acacia understands that it has been decided to build on the Phase-I baseline to assess the feasibility of the potential intervention sites, despite some shortcomings. In this study, Acacia contributes to WVE's

effort to conduct a comprehensive 'Water Balancing Suitability Assessment' that encompasses a variety of biophysical and socio-economic criteria and governance-related criteria. This approach aims to provide a holistic evaluation of potential intervention sites, to maximize the positive impact of the water balancing measures. The impact is assessed through a combination of factors, including the baseline conditions (such as water availability, soil conditions, and income), the benefits (such as increased water availability, additional income, and agricultural potential), and the likelihood of successful implementation. To achieve maximum impact, the most beneficial measures are implemented in areas where they are most needed, and where the local community and environment are conducive to their success. In support of the suitability assessment, we conduct a comprehensive analysis of the biophysical, socio-economic, and governance baseline.

1.2.1 Operational areas (Kebeles)

The following table lists the focus areas of Burqa Phase II based on the information retrieved from WVE.

Table 1. List of kebeles

Catchment	District/ Woreda	Kebele
Upper Dabena Catchment	Gechi	Jisa, Kobe kela, Gole kora, Gole maya, Gole saka, Mine, and Iboro kebeles
	Bedele	Ilke Kerero, and Yabala Kebeles
Hakim Gara Catchment	Sofi woreda	Awuberkele kebele; Sofi kebele; Burqaa kebele; Aw-Umar kebele and Harawa kebele.

2 Methodology

This section contains the approach used to carry out the biophysical, socio-economic, and governance baseline assessments. The overall approach involves data collection related to climate, hydrology, land use, land cover, and erosion for bio-physical assessment, while socio-economic and governance assessment used data focusing on food nutrition, side income generating activities, policy and legal frameworks, stakeholders, and institutions in the project areas are a few data collected. This data/ information was collected from different sources including Google Earth Engine, ESA World Cover, CHIRPS, and other web sources as well as from the project area by AW and WVE experts. The detailed methodology used for each assessment is discussed below.

2.1 Biophysical Baseline Assessment

The biophysical baseline assesses the initial state of the physical environment in the area prior to the execution of the project as intervention. This baseline evaluation will serve as input for the comparison and monitoring the impacts of interventions. First, the primary data were collected during field visit and supplemented with the secondary data of biophysical parameters to describe and analyse the current situation of biophysical factors in the selected target areas. Remote sensing and geospatial data were used as a secondary data source and incorporated to the analysis. Those biophysical parameters (data) of rainfall, slope, vegetation cover (NDVI), land use and cover, geology, water resources system, soil moisture, and land erosion vulnerability to the degradation were discretely analysed. Then, based on biophysical parameters, 3R mapping was produced in QGIS platform for selected target areas. After that the intervention look up prepared by linking 3R mapping to list of possible interventions. Specially, the assessment focused on soil and water conservation practices and however the low hanging fruits like water harvesting techniques are included as supplementary. Finally, the intervention look up were supplemented with case studies as an exercise for implementation.
The main components of the tasks are described in the chapter 3 and 6.

2.1.1 Data collection

In both project areas data on the climate, hydrology, water resources, land use, land cover, land capability, and erosion will be collected. This data will be collected using desk study and different high-resolution satellite imagery resources (Google Earth Engine, ESA World Cover, CHIRPS). Google Earth Engine presents a wide catalog of satellite imagery and geospatial datasets, and it also provides geospatial analysis functionalities. ESA World Cover is a high-resolution imaging product that will be used to gather data on land use, and land cover. CHIRPS is a publicly available quasi-global rainfall data set, and it will be used in this assessment to generate gridded rainfall time series for analysis and future monitoring. Remote sensing allows the assessment of vegetation, land use, land cover, precipitation, and rainfall variations. The type of data that is going to be collected is shown as follows:

- Data on geology and soils will be obtained using desk studies from existing reports, research, and journals. Land slope information will be obtained from the Digital Elevation Model (DEM) and analyzed to determine the land capabilities and appropriate conservation or treatment needs.

- Climate, hydrology, and water resource data: Using CHIRPS rainfall variations will be estimated. Rainfall intensities are required for catchment management, especially for run-off estimation and erosion control. As well the current water availability will be assessed using available reports, journals, and data from the regional and zonal water authorities.
- Land use, land cover, and land degradation: Land use, land cover, and land degradation assessment will be conducted by combining high to very high-resolution satellite images with a desk study, which is accompanied by data from regional and zonal water authorities. For present land use, vegetation and range cover, cropland, plantations, recreation, and water areas will be identified. This data will reveal past lessons and experiences and the data will be obtained using desk study. Land degradation/ soil loss data are usually required to show the extent of the land degradation and to identify proper Soil and Water Conservation (SWC) measures in the catchments.
- Erosion data: The hotspot areas as well as the cause of erosion will be identified by carrying out a desk study and remote sensing analysis.

2.1.2 Analysis

Land use, Land cover, and Erosion.

Determination of proper land use and land cover is always the first step toward sustainable water resource management and water balance. Soil loss and run-off plot data will be analyzed in both catchments by identifying the hot spots of erosion and estimating the quantity of soil loss and frequency of flood. This can be done by using erosion models or soil loss prediction equations to estimate quantities and analyze rainfall frequencies. Based on the outputs we can verify which areas need rehabilitation/SWC initiatives and which type of SWC would be more feasible, to reduce run-off, increase infiltration, and decrease erosion in the catchments. Based on this analysis, land degradation, and land cover maps will be produced. The map will not only show the sites, extent, and seriousness of the problem areas but will also provide the basis for rationalization of the use of catchment lands. Land presently being used within capability but needing soil conservation treatments will also be shown on the map and can be used for planning soil conservation activities.

Water resources and use problems.

From the basic data collected, an analysis will be conducted on annual and seasonal rainfall, the current water use, and the availability of both ground and surface water. The timing and frequency of floods and droughts will also be addressed. From this analysis, we can find the main water resource problems in the catchments and investigate the solutions for sustainable water use and water balance.

2.1.3 Reporting

After the analysis of the data compiled from the desk study and the remote sensing analysis, on-demand maps will be produced for WVE (or Heineken, or the Burqaa project in general):

- Base map, showing boundary, sub-catchments, villages, and roads.
- Topographic map, showing elevations contours, landforms, streams, etc.
- Climatic map, mainly focusing on rainfall in the catchments in different seasons.
- Land degradation, showing the hotspot areas in each catchment area.

2.2 Socio-economic Baseline Assessment

To ensure the long-term lifetime of interventions, a comprehensive understanding of (local) socioeconomics is crucial. Only interventions that benefit local communities can anticipate sustained support and, consequently long-term maintenance and possible expansion. Integration of socio-economic factors is crucial not only for water conservation and carbon storage but also for community resilience. Acacia Water's socio-economic baseline assessment comprises three key components. Firstly, it includes demographic insights and the significance of agriculture in local livelihoods. Secondly, it involves an analysis of food security and nutritional intake. Lastly, a logistical efficiency GIS analysis is conducted to understand the socio-economic capacity of the targeted areas.

2.2.1 Demographics and Livelihoods

Future rural population and its growth in the target areas are projected using a combination of statistical data from various sources. This projection involves cross-referencing and extrapolating the number of households and housing units. Additionally, to gain a comprehensive understanding of the priorities of livelihoods, the role of agriculture is examined. This analysis reveals the extent of dependence on agriculture for income, the specific purposes of agricultural activities, and the time allocated to tasks such as water and food collection. Moreover, it examines land ownership and field sizes.

2.2.2 Food Security and Nutrition

For the first part of the analysis, reports on rural Ethiopia by the renowned Famine Early Warning System (FEWS) are studied. By studying these reports, the degree of food security for the study areas is understood, including their resilience to (climatic) shocks such as droughts and floods. This gives an impression of the potential relief caused by interventions to cope with these climatic extremes.

In the second part, nutrition values of rural communities are researched. This is done by comparing the census with the recommended intake. Based on the Food Based Dietary Guidelines (FBDG) of Ethiopia, eight different food groups are distinguished to guide analysis:

1. Grains, roots, and tubers
2. Pulses
3. Nuts and seeds
4. Mil and dairy
5. Meath, fish, and eggs
6. Fruits
7. Vegetables
8. Fats and oils

Comparing the recommended intake with the actual intake per food group can have a decisive influence on intervention choice. It is important to highlight that the actual intake was approximated based on national census data of Ethiopia. This implies that the results are very generic and require careful interpretation before relating them to the Burqaa context.

Nevertheless, deficits in food groups imply good potential for the related crops. In turn this implies improved food security but also implies existing demand for that crop. It thus serves as a valuable foundation for value chain improvements.

2.2.3 Logistical Efficiency

Interventions can have different purposes such as producing for the market, self-sufficiency, or ecosystem restoration. To determine suitable areas, logistical efficiency maps are made. These maps are based on the accessibility through the rural road network. The road network was approximated by analyzing satellite imagery, which allowed to capture of tertiary roads. The second criterion was the proximity to market (for market orientation) and nurseries (for ecosystem restoration). Locations and sizes of markets and nurseries were provided by WVE with a request by Acacia Water formulated and communicated through a formal letter of request.
Areas within a 2-hour drive are considered logistical efficient. Logistical efficiency can thus be used as an argument to decide for market-oriented interventions or for ecosystem restoration (e.g., reforestation), or a combination. Logistical efficiency should also be viewed with respect to land management and land use. Therefore, this is also studied, building forth on the bio-physical analysis. Based on logistical efficiencies and land cover and land management, a generic intervention can be drawn.

2.3 Governance Baseline

The methodology for the Water and Land Governance Baseline Assessment involves a multi-faceted approach to comprehensively evaluate the existing governance landscape. The Water and Land Governance Baseline Assessment aims to provide a comprehensive understanding of the governance landscape in the context of water and land management. As part of this initiative, the assessment focuses on evaluating existing policies, legal frameworks, and national strategies, setting the stage for a nuanced examination of governance structures and practices. This endeavor is essential for informing targeted interventions that contribute to sustainable water and land governance.

2.3.1 Literature Review

Initiating the assessment, an extensive literature review delves into policy documents, legal frameworks, and national strategies related to water and land management. This phase establishes a foundational understanding, laying the groundwork for subsequent analyses.

2.3.2 Indicator Identification for Governance Assessment

Building upon insights gained from the literature review, the methodology involves identifying key indicators that will serve as metrics for assessing governance structures and practices. These indicators provide a qualitative basis for evaluating the effectiveness of current governance mechanisms.

2.3.3 Stakeholder Analysis: Roles, Interests, and Influence

A critical component of the assessment is the stakeholder analysis, seeking to discern the roles, interests, and influence of various actors in water and land governance. This analysis provides invaluable insights into the dynamics of stakeholder involvement, aiding in the formulation of targeted intervention strategies.

2.3.4 Institutional Framework Analysis

Concurrently, the methodology incorporates an institutional framework analysis to evaluate the organizational structures and mechanisms governing water and land

resources. This examination sheds light on the strengths and weaknesses of existing institutional frameworks, informing recommendations for improvements.

2.3.5 Identification of Gaps Using the 3R Framework

Utilizing the 3R framework the assessment systematically identifies gaps in the project areas. This framework provides a nuanced understanding of governance gaps, contributing to a comprehensive assessment.

2.3.6 Drawing Recommendations for Sustainable Interventions

In the final stage, the methodology involves synthesizing the gathered information to draw targeted recommendations. These recommendations are crafted to address identified gaps and ensure the seamless implementation of interventions. Emphasis is placed on strategies that promote sustainability, mitigate potential challenges, and reinforce the long-term viability of the interventions. The findings of this Water and Land Governance Baseline Assessment are presented in this comprehensive report. This report encapsulates key insights derived from each analysis and the formulated recommendations. The reporting process aims to communicate the assessment's outcomes effectively, providing implementers of Burqaa Phase II with actionable insights to tackle challenges that may arise from governance in the project areas to ensure a successful implementation and sustainability of the interventions.

3 Biophysical baseline report

In this chapter, we present the biophysical baseline data of the Burqaa phase II project, both the Harar and the Bedele sites., such as topography, climate, soil, land use /cover, and geology. In the survey analysis, the new target kebeles are included in the assessment. The descriptions are based on primary and secondary data collection, review of existing literature and reports, satellite, and remote sensing analysis and, supplemented by expert judgment with observations in the field. Field survey and data collection were conducted to supplement the biophysical baseline data. Hydrological monitoring sites have been inspected and soil moisture data were collected during the field mission.

3.1 General information

Based on Hurni et al., 2015. The Economics of Land Degradation (ELD) Initiative in Ethiopia, the Harar area is described as

- It is estimated that 20 to 40% of the land cover in East Harerghe is conserved due to the presence of conservation structures, mostly on croplands.
- At the woreda level, the net erosion/deposition is estimated to range from 5 to 30 t/ha.
- At the woreda level, when constructing additional conservation structures on all croplands with slopes › 8 % of the soil erosion rate can be reduced up to 30 to 40%.
- Fertilizer application is relatively low compared to the rainfed agricultural areas of Ethiopia / the Ethiopian Highlands.
  Like wise , due high magnitude of rainfall and flooding , the upper Dabena catchment experienced the land degradation and soil erosion. satellite images from google maps shown the bare lands and highly degraded soil. The soil is by the termites which hamper the plant growth. The site biophysical characteristics depicted separately in the following sub sections.

3.2 Harar Site

The Harar Area is characterized by limited natural water resources and the rapid growth of the rural population. Water resource development in the area has limitations in monitoring data and available resources. The area has a considerable slope along the hilly areas of the plateau which could be vulnerable to erosion and increased generated runoff. However, the Harar people are known for regenerative agriculture and soil and water conservation practices. Considering the success of Burqaa phase I implementation in Hakim Gara catchment: Burqaa Phase II Harar project site will be implemented in five kebeles of target areas, namely Burqaa, Awuberkele, sofi, Awumer, and Harawe.

3.2.1 Topography

The project area is in the Harerghe plateau in the southeastern highlands of Ethiopia (). The Harerghe highlands lying in the eastern part of the country are known for their rugged topography and mountainous landscapes which govern the variations in regional geomorphology, soil sequences, ecological zones, and quantity and quality of plant and animal life (Tamire H., 1981). The Hakim Gara plateau is the highest elevation area of the project site. Several springs were found at the foot of the plateau. Along the plateau chain where farmers practiced growing food (Maize and Sorghum) and cash crops (chat).

3.2.2 Elevation

The target kebeles have a variation of topographic elevation. The elevation ranges from a minimum of 1384 m to a maximum of 2129 m above sea level. The Hakim Gara Plateau chain extended several kilometers. In Awuberkele, Sofi, and Burka kebeles, the Hakim Gara plateau top ridge serves as a drainage divide. Awumer and Harawe kebeles have a drainage flow contribution from opposite sides of the Hakim Gara Plateaus. The Harar city runoff drains southeast to the target area kebeles.

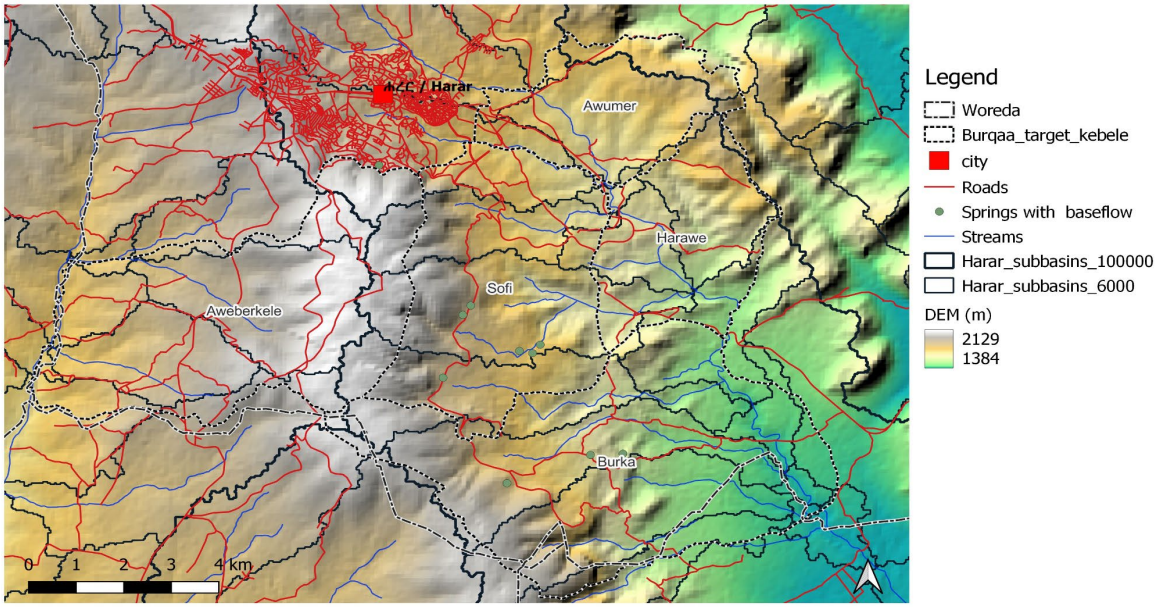

Figure 2. Elevation data (DEM).

3.2.3 Slope

The slope of the target area varies from the lowest (12%) to the maximum (48%). The slope variation has a considerable impact on soil erosion processes. The Hakim Gara plateau belt extends from Harar town to Erer. Comparatively, the newly added kebeles are on flat areas located downstream of old kebeles (Burqaa phase I).

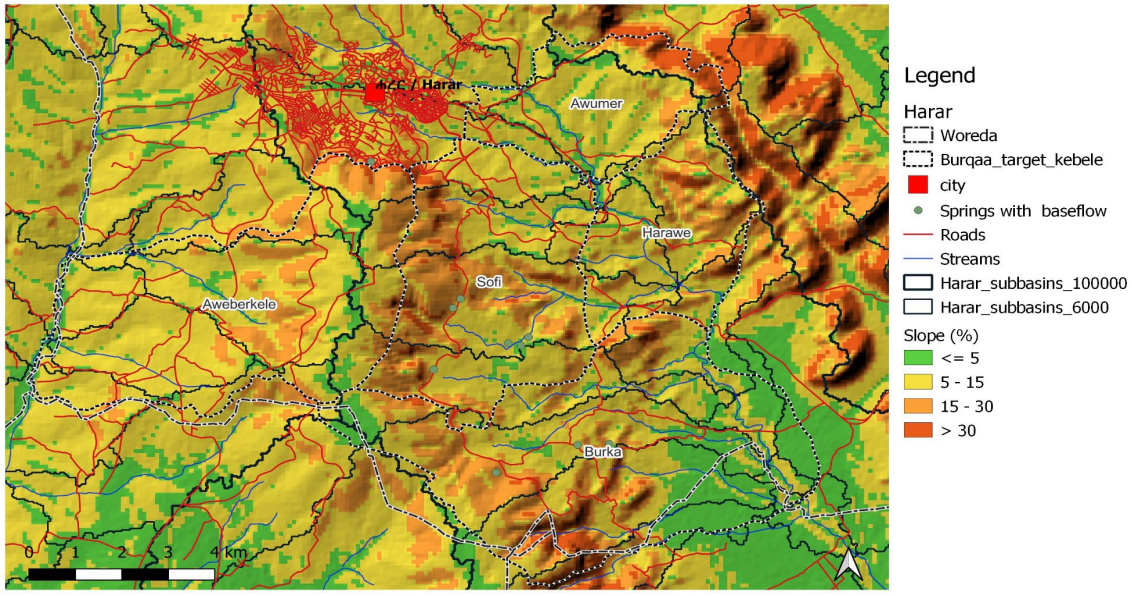

Figure 3. Slope (%) map of the Harar site

3.2.4Climate

Precipitation

According to CHIRPS data, the annual rainfall in the target area varies between 600 to 900 mm/year. Despite the availability of rainfall in the area, the natural recharge to groundwater is limited, and perennial rivers are absent. Larger volumes of groundwater are available in seasonal river (wadi) beds, in inland alluvial valleys, and locally in deeper sandstone and limestone deposits. During the dry season serious water scarcity is experienced in large parts of the area.

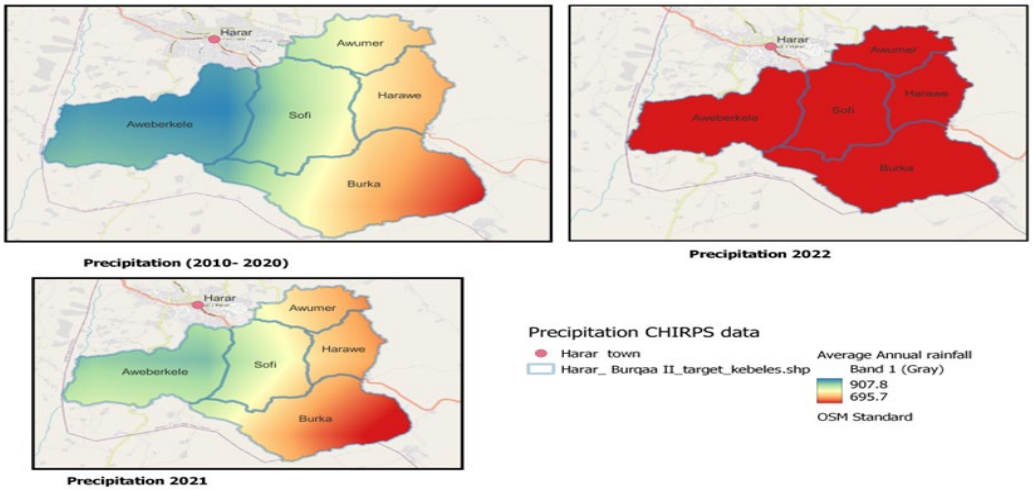

Figure 4. Average annual precipitation data using CHIRPS data (2010-2022)

NDVI

Multi-spectral images from the European Copernicus Sentinel-2 satellites3 were used to create a Normalized Difference Vegetation Index (NDVI) image of the target areas. This index gives a good indication of the plant health in the area. A higher number corresponds to a healthier, denser, wetter canopy. For each year that the sentinel data is available (2019-now), several months of data have been analyzed.

- October – November, at the end of the rainy season, to see if a larger volume of water infiltrates into the upper soil layer.
- January – February when de soil starts to dry up and vegetation decreases.
- March – April, to see the land at its driest and to assess if any water is being retained.

Sofi

The Sofi implementation site consists of various bunds along a slope. Measurement points of Sofi 2 and Sofi 3 are at the top and bottom of the plateau, respectively. The reference point is further south along the same height at Sofi-1. The NDVI varies (0.4 to 0.6) during the wet season and (0.15 to 0.35) in the dry season.

3.2.5 Land Use/ Land Cover

The Harar target area kebeles are classified into five land use /cover categories. The larger proportion are shrublands followed by croplands and grasslands. The built up and open tree cover constitutes small proportions. The high erosion vulnerable areas of Hakim Gara plateaus are covered with shrublands. The low-land areas intervention sites are covered with crops.

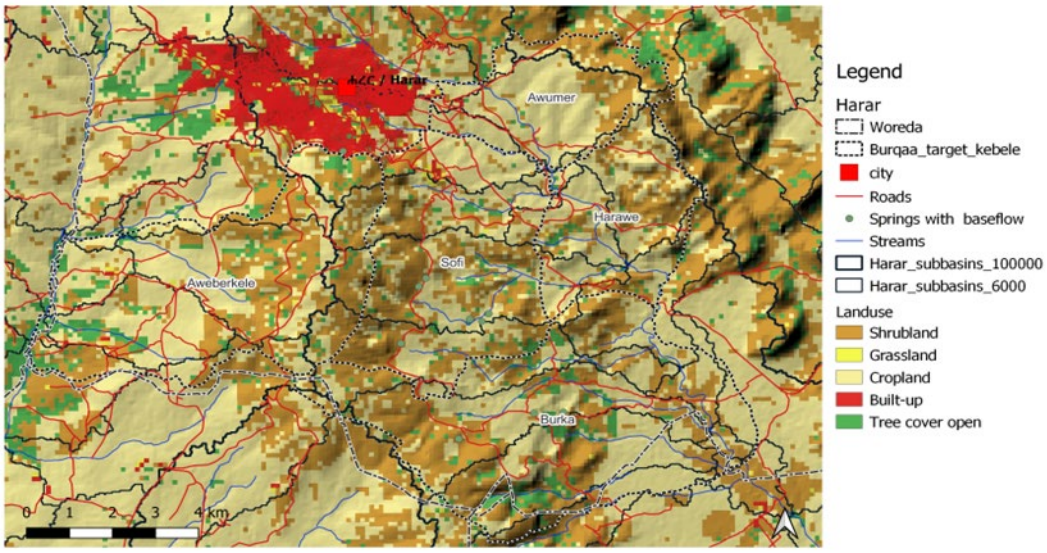

Figure 5. Land use and land cover

3.2.6 Soil Moisture

The Biophysical field data assessment is conducted for both old and newly proposed kebeles. In Burqaa phase I, World Vision Ethiopia and the community participated in land restoration activities -tree plantation and SWC on the Hakim Gara plateau. For the baseline survey, the following soil moisture data were collected. The soil was taken at a depth of 10-20 cm soil thickness. As the depth of thickness increases the soil moisture rate increases. For example, at the Sofi -3 site soil moisture varies vertically which is 0.078 m^3/m^3 at 5 cm from the topsoil whereas 0.135 m^3/m^3 at 15 cm from the topsoil. The new proposed kebeles' soil moisture data is shown in the following table. Please, refer to soil moisture data of old intervention kebeles on Burqaa phase I report.

Table 2. Soil moisture measurement locations at new proposed intervention sites (December 2023)

Soil Moisture data – New proposed (Burqaa phase II)					
Intervention Site	Point ID	Location (Lat)	Location (Lon)	Soil moisture (m^3/m^3)	Temp (^0c)
Hakim Gara	Awumar	9^0 17' 59.38"	42^0 10' 55.33"	0.062	29.2
	Harawe-1	9^0 15'54.75"	42^0 10' 54.58"	0.067	26.8
	Harawe- 2	9^0 15'53.92"	42^0 10' 50.27"	0.064	24.8

3.2.7 Land Degradation

Gully formation is observed at the foot of hilly areas. The Hakim Gara plateau is located on a steep slope and is vulnerable to land degradation. During heavy rainfall, the topsoil could be eroded, and responsible for the formation of gullies. Agricultural practices in the hilly areas of Hakim Gara increase generated runoff, while reducing the groundwater recharge. However, the agricultural practice in the Hakim Gara catchment is embedded with soil and water conservation. Due to low rainfall and soil fertility, in the recent times the farmers practiced soil and water conservation work to reduce the rate of erosion and improve soil moisture.

3.2.8 Hydrology

Surface Water

Harar project site is situated within the Shebelle River Basin, on the water divide between the watersheds of Wadi Erer to the east and Wadi Gobele to the west (Acacia Water & MS Consultancy, 2015a). A few springs that emerge from the foot of the Hakim Gara plateau are the perennial surface water sources in Harar town and its surrounding areas. There are four major springs, and their discharges vary from less than 2 l/s in dry seasons to over 100 l/s during the rainy season (source: Prefeasibility report Harar water supply,2023). At the foot of Hakim Gara, you can find three springs, namely Sofi, Awubarkale, and Burqaa springs. The discharge of the Hakim Gara springs is not enough during dry seasons to serve surrounding rural communities. Therefore, during dry season the spring water used only for domestic activities.

Groundwater

The lithology around Harar Town consists of high-grade metamorphic rock that does not store or transmit groundwater sources. Mesozoic sandstone and limestone are limited to high grounds. The source of groundwater for water supply is provided by Haseliso well field and Erer well field. Several hundreds of hands dug wells, farmers dug wide, unlined, and shallow water wells to pump water for small irrigations. The main users of the groundwater source of this basin are the small farmers.

Springs

Three springs, namely Awurbekele, Sofi, and Burqaa are located at the foot of the Hakim Gara plateau which serves the local community. Those springs used to serve the community and satisfy domestic water demand and livestock. During the rainy season, the volume of water in the springs is larger than the normal condition due to the influence of rainfall magnitude. Several discharge sampling data were taken during Burqaa Phase I and newly added kebeles in Burqaa Phase II. The discharge data fieldwork measurements were collected in December 2023 and shown in the following Table 4.

Discharge Measurement

Experiments have been conducted. over time, multiple measurements were required at different water levels to draw a relation between water level and discharge, the so-called Q-H curve. The discharge measurements were done through velocity- area method.

Table 3. Velocity measurements (Date: December 9,2023) Fieldwork measurements using floating methods (Source: Acacia Water).

Site	Distance (m)	Trial 1- time (s)	Trial 1- time (s)	Trial 1- time (s)	Average Velocity (m/s)
Sofi	3	67	81	92	0.0375
Abawayini	3	26	45	33	0.0288
Burqaa	2	14	19	18	0.03921

Table 4. Discharge measurements (Date: December 9,2023)

Site	Date Time	Average Velocity (m/s)	Cross-section area (m^2)	Q [m^3/s]
Sofi	2023-12-09 10:05	0.0375	0.075	0.00281
Abawayini	2023-12-09 11:18	0.0288	0.056	0.00161
Burqaa	2023-12-09 12:35	0.03921	0.104	0.00407

3.2.9 Geology

The Harari Region is generally overlain by Mesozoic limestone and sandstone deposits over the crystalline bedrock of granite and gneiss. Limestone is exposed on the surface throughout the slopes of the hills and on most of the plateaus. As a result of a long period of weathering and erosional effects, the Mesozoic sediments have been removed and the basement rocks mainly granite and granite-gneiss are outcropped and cover almost two-thirds of the total land mass of the Harari Regional State, and both are typically found in the Hamaresa, Harawe and Erer River catchment areas. The Mesozoic sedimentary formations composed of sandstone, limestone, Marble, and shale deposited unconformably on the lower basement complex.

At the bottom of the hills, layers of soft red and white sand are deposited. Granite rocks can also be found exposed at lower elevations, where both limestone and sandstone are completely eroded. The sedimentary deposits in the region mainly consist of sandstone and limestone with marl, thin layers of mudstone, and collar reefs. The limestone overlies the sandstones, while the marl and mudstones are either sandwiched within the sandstones or found between sandstone and limestone, indicating a transition in a continuous deposition of sediments. These are found exposed along the foot of the Hakim Gara plateau, the topographic high of the Harari Region, extending further to the north-northwest. Generally, the sedimentary rocks occupy the whole Hakim Gara plateau and its belt that extends further to the south as well as the northern and north-western corners of the region (MSC 2019).

3.2.10 Hydrogeology

At the fringes of the patch springs emerge at the contact with the basement rocks. Many of these springs are perennial and are used as a permanent source of water supply. Examples are the Sofi and Burka springs near Harer and the Ginella springs of the Harer Brewery. (Acacia Water & MS Consultancy, 2015a). The alluvial deposits along the wadis are widely exploited by shallow wells and form the main source of water supply in rural areas. In the Northern part of the study area, larger areas of relatively thick alluvial deposits occur. These alluvial aquifers are extensively exploited by shallow wells and boreholes with motorized pumps and water supply schemes (Haramaya, Adele, Finkile). Until recently, Harer town depended on these aquifers for its water supply. (Acacia Water & MS Consultancy, 2015a)

3.2.11 Land Degradation and Erosion Vulnerability

The Erosion Vulnerability map shows erosion hotspots and indicates areas in the water shed with low to high erosion vulnerability. The map can be used in the decision-making process to prioritize where erosion control measures should be implemented. The map can be used to show hot spots where erosion control measures have high priority. The following figure shows the erosion vulnerability mapping for Burqaa – Harar new target kebeles. The Hakim Gara plateau and the top ridge of Awumer and Harawe kebeles are highly vulnerable to erosion. The red color shows the areas which were vulnerable to erosion while yellow color (moderate) and green color (low vulnerable sites).

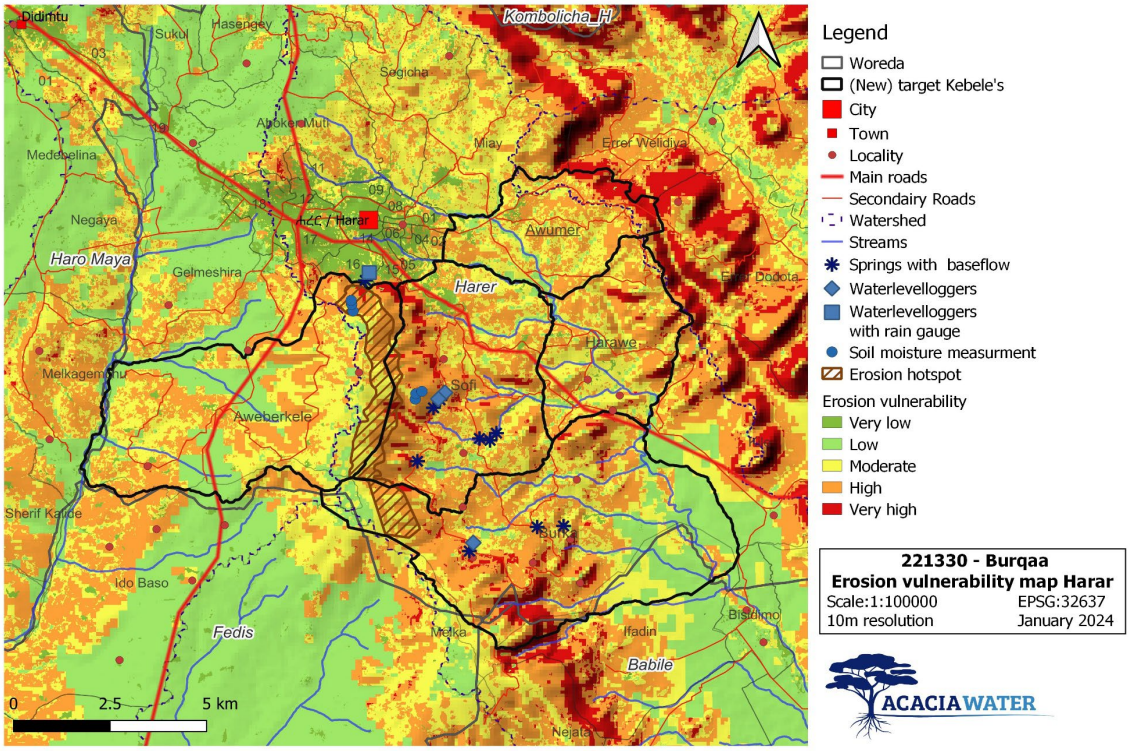

Figure 6. Erosion vulnerability and erosion hotspots

3.3 Bedele Site

The Bedele intervention site, at the upper Dabena catchment is characterized by limited activity in soil and water conservation practices. The upper Dabena catchment receives a significant amount of rainfall annually. Due to soil fragility, erosion rate contributes to high runoff and it reduced soil water retention. Water resources development in the area has a limitation in considering monitoring water resources data. The area has a considerable slope along the hilly areas of upper Dabena which could be vulnerable to erosion and increased generated runoff. After impressive intervention results during Burqaa phase I, Burqaa Phase II Bedele project will be expected to implement in nine kebeles of target areas. Namely: Jisa Kebele (*old*), Kobe Kela Kebele (*old*) Gole Kera Kebele (*old*), Gole Maya Kebele (*old*), Gole Seka Kebele (*old*), Koba Kela, Mine Kebele (*new*), Kobba Kebele (*old*), Iboro (new) Bedele District (Woreda), Ilke Kerero Kebele (*new*), Yabala Kebele (*new)*.

3.3.1 Topography

The Burqaa phase II – Bedelle target area is in the Illu Abba Boor zone (Figure 7). The Upper Dabena highlands lying in the Southwestern part of the country are generally known for high erosion hot spots due to its high slope. As the target area receives a high magnitude of rainfall, the valleys and gorges were created where the change in the landscape profile was observed. Gole Kora highland is the highest elevation area of the project site. Several springs were found at the foot of the plateau. In the target areas, the main crops are coffee and chat, and the cereal crops like maize, wheat, and barley.

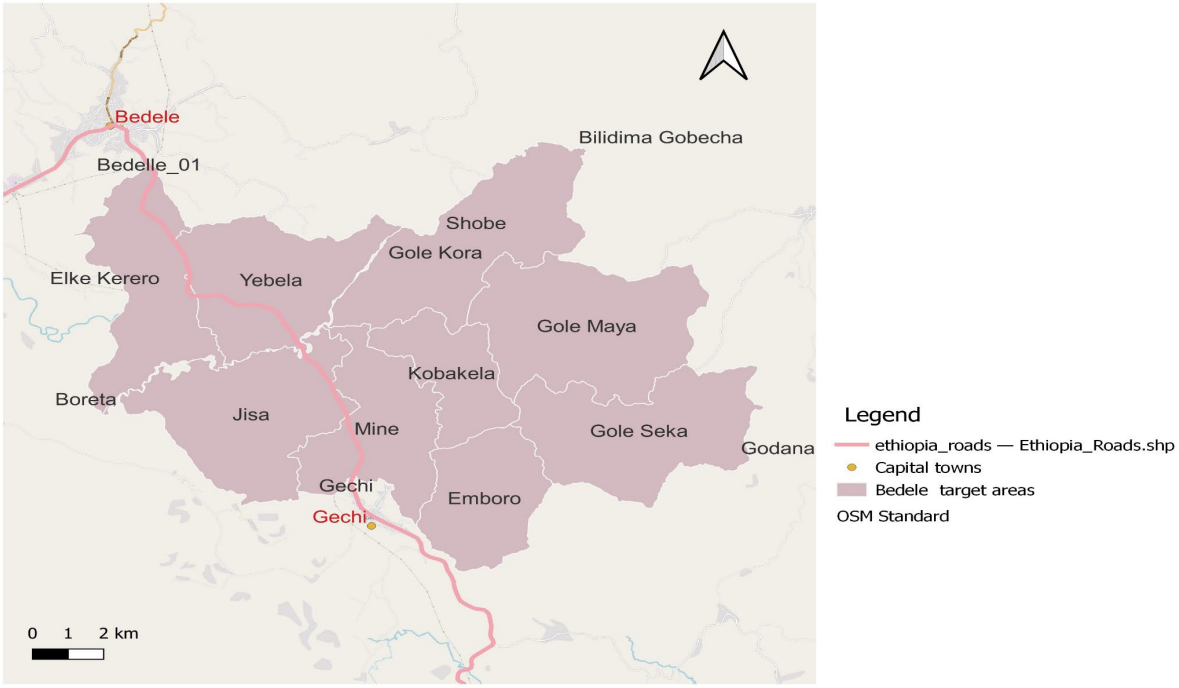

Figure 7. Locations of target area (Bedele sites)

Elevation

The Bedele area target kebeles DEM map is shown in the figure below. The elevation ranges from a minimum of 1476 m to a maximum of 2370m above sea level. Gole Seka, Gole Maya, and Gole Kora kebeles are located on the highest elevation point between 2000 to 2200m. Also, Emboro, Mine, and Jisa kebeles have a maximum elevation point between 1800 to 2100m. The drainage divides are at the peak elevation points and the river drainage flows South-North direction to Dabena River. The river tributaries flow to Dabena river to the downstream.

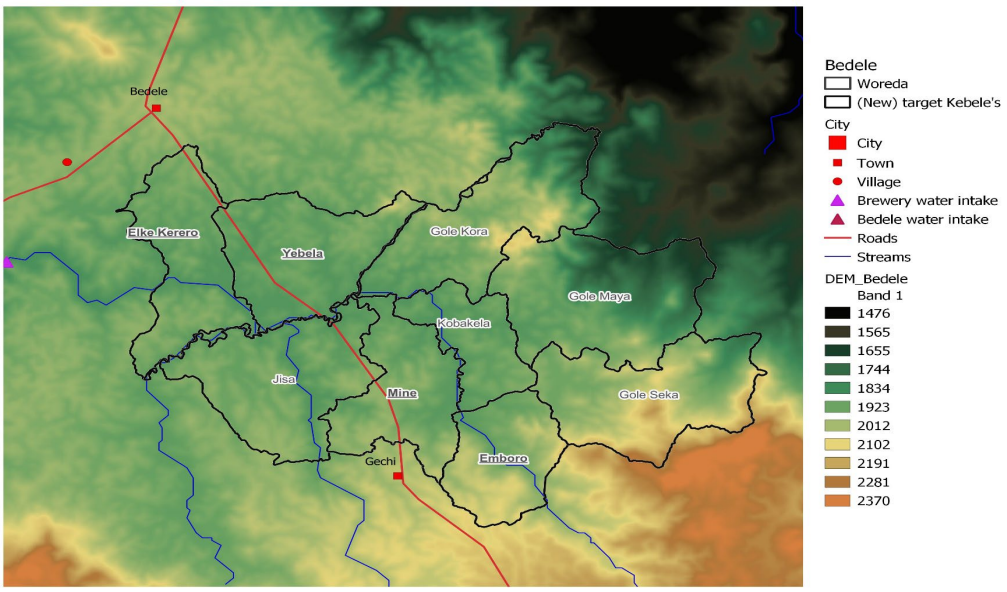

Figure 8. Digital elevation model (DEM)

3.3.2 Land use

Bedele area is mainly covered by forest. The slope in the target area varies from 0 to 30%. The mountainous areas of Gole Seka, Gole Maya, and Gole Kora slopes has above 30% slope variations. Mostly, the area has an average slope between (5 to 15) % and land use and cover are shown in Figure 9. Also, the area is mostly covered with open grass trees and croplands.

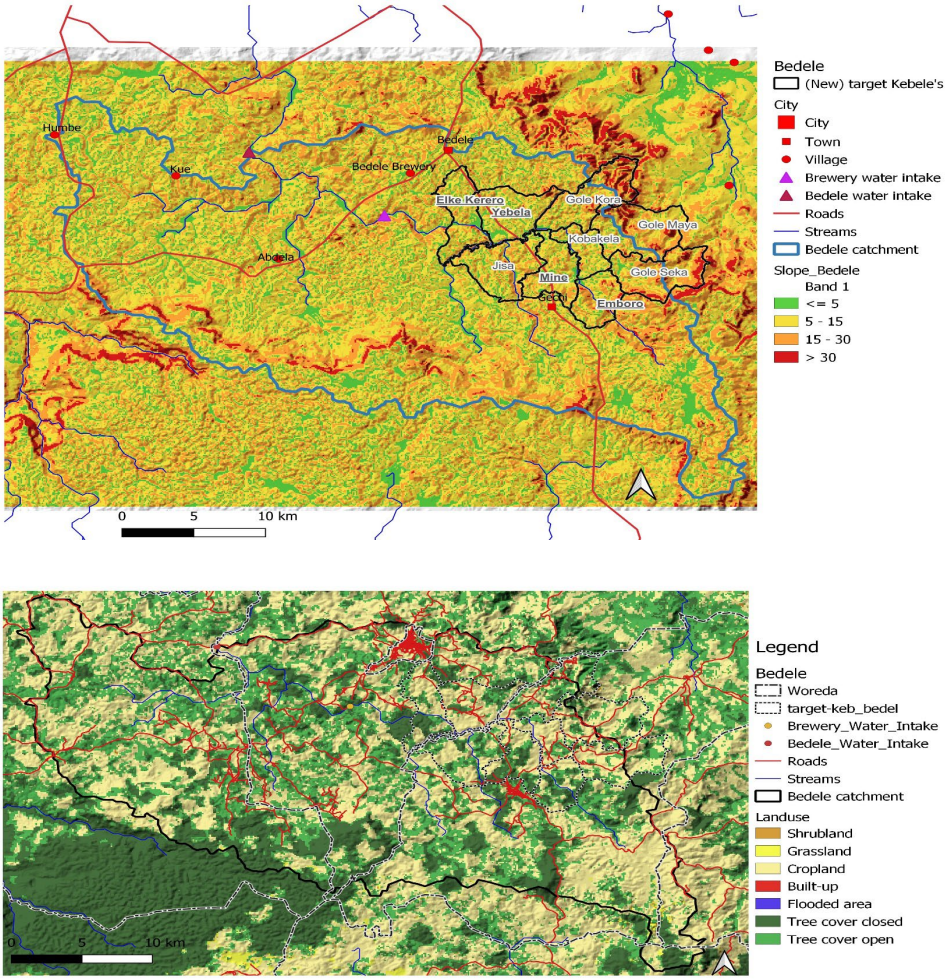

Figure 9. The slope and land use and cover map (the top map shows the slope, and the bottom is land use land cover.

3.3.3 Climate

Precipitation

According to CHIRPS data, the annual rainfall in the Bedelle target area varies between 1400 to 2200 mm/year. Despite the availability of rainfall in the area, the natural recharge to groundwater is limited due to soil erosion happening because of flooding in the area. Larger volumes of groundwater are available in perennial riverbeds, in inland alluvial valleys. The target area receives the whole season of rainfall as it is located in the Ethiopian central rainforest region.

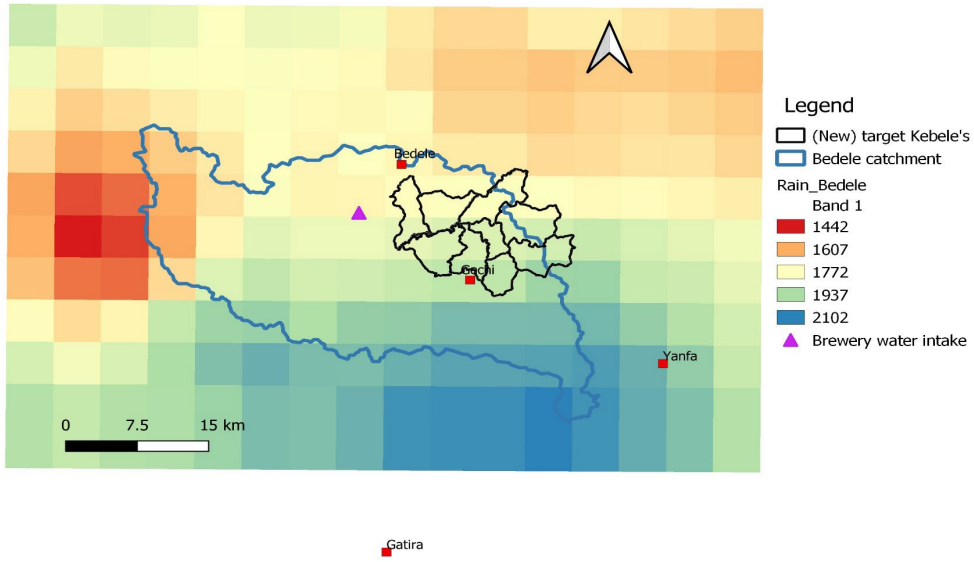

Figure 10. Annual rainfall variation at Bedele catchment.

NDVI

For each year that the sentinel data is available (2019-2022), several months of data have been analyzed.

- January – February, beginning of the dry season, when the soil starts to dry up and vegetation index decreases.
- March – April, Dry season, to see the land at its driest and to assess if any water is being retained.

3.3.4 Soil Moisture

The Acacia Water team went to the field and measured soil moisture in two locations in Gole Seka and four spots in Gole Maya. Other locations were later added as well. After that, the data collector took five measurements from each location. See Annex 2 for an overview of the soil moisture measurement locations. These measurements were taken every two weeks and recorded regularly. Since the measurement started in May 2022, most of the data is collected during the rainy season. The soil moisture measurement data collected from May 2022 to August 2022, was written under Burqaa phase I report. The baseline data were supported with a data collected in June 2024. The new soil moisture data is shown in Table 5.

Table 5 new soil moisture collection sites in Bedele

Soil Moisture data – New proposed site in Bedele (Burqaa phase II)					
Intervention Site	Point ID	Location (Lat)	Location (Lon)	Soil moisture (m^3/m^3)	Temp (^0C)
Upper Dabena	Yabala	36.383992	8.3976265	0.389	26.2
	Mine	36.4148786	8.3903885	0.358	28.4
	Emboro	36.4308693	8.3312427	0.36	31.8
	Ilke Kerero	36.3622473	8.4043239	0.39	26.7

3.3.5 Hydrology

The hydrologic condition of the area is influenced by the rainfall magnitude. The kebele target areas are considered as moist and perennial river flows. The hydrologic baseline assessment was conducted with both manual and automated digital devices. The automated data were received from sensors (water loggers) installed during Burqaa phase I.

Gechi groundwater well

A telemetric data of the ground water level showed to be increased during the summer season and drow dawn pattern existed during dry winter seasons. For in situ ground water well water level and precipitation data please refer Burqaa phase I project report. Gechi water well water level monitoring inspected during field work in June 2024 (see the following Figure 11). Reinstallled ground water and precipitation monitoring at Gechi and monitoring data depicted in .

Figure 11 Reinstallled ground water and precipitation monitoring at Gechi

Table 6 Manual water level measurements and depth of installation at Gechi Faris.

Date and Time	Depth of installment [m below reference]	Top of piezometer to GL [m]	Manual WL measurement ref to SWL [m below ref]	Bottom of well to top of piezometer [m]	Remark
20,06,2024 17:40	13.66	1.7	7.6	15.02m	The reference is the top of the piezometer.

					depth of the well is 14.45 meters from the top of the casing

Water level @ Brewery intake

The manual water level measurement is shown in the following Table 5, the measurement varies between 1.1 m to 1.9 m above the reference datum. Both manual and telemetric data show in the winter season the water level at intake decreased drastically.

For telemetric water level data, please refer to Burqaa phase I report depicted in upper Dabena catchment.

Table 7. Manual water level measurements at Brewery intake.

Date Time	Manual water level measurement [m below ref]	Water level above sensor [m]
2022-02-27 09:05	0.50	1.115
2022-05-19 10:26	0.37	1.245
2022-07-27 09:00	-0.33	1.945
204-06-19 10:00	1.93	1.121

Water level and Discharge data

At two sites (Upper Dabena and Gauging Station) flow discharge measurements had been conducted during Burqaa phase I activities. This discharge magnitude data will be used as a reference baseline data.

Table 8. List of discharge measurements, Bedele.

Site	Date Time	Water level	Q [m³/s]
Upper Dabena	2021-11-04 13:00 (EAT)	4.40m below top of bridge railing, 0.66m from bottom	2.418
	2022-02-27 13:16 (UTC)		0 (too little flow)
	2022-05-19 12:00	4.53m below top of bridge railing, 0.54m from bottom	0.831
	2022-07-27 13:00	3.1m below top of bridge railing, 1.97m from bottom	38.637
Gauging station	2022-02-27 15:30 (UTC)	6.50m below top of bridge railing. 0.56m C.D.	1.135
	2022-05-19 09:00	6.04m below top of bridge railing. 1.00m C.D.	10.53
	2022-07-27 09:00	1.84m below top of bridge railing, 5.20m C.D.	112.5

In Bedele sites two additional water monitoring loggers will be installed, one for surface water in Emboro Kebele and one ground water monitoring logger in Yabala Kebele. For the baseline purpose, the table below contains detailed manual data collected during filed visit in June 2024.

Table 9 Manual surface and ground water data collection for new sites in Yabala and Emboro

Site	Location	Lat(y) Decimal degrees	Long(x) decimal degrees	Internet	Ref	Depth of well/surface water from ref(meter)	WL from Ref(meter)	Remark
Yabela	Megersa village, Mr. Sira Tadesse Compound	8.3993011	36.3869675	Good	Top of casing	9.41	3.25	Hand dug well /Ground water in the compound of Mr. Sira Tadesse. The owner is willing to let us install the equipment. Ground water level logger
Emboro	Bishan Kelile Hussen	8.3315240	36.4317611	good	Top of gully	1.20	1.17	**It is a spring inside a private owned farm (Mr. Kelile Hussen). The owner is willing to let us install the equipment.** Surface water level data logger

3.3.6 Geology

This area is typically characterized by rugged terrain and a dissected valley with contrasting topographic scenery of the Didessa River valley/gorge in the west-central and Gibe River valley/gorge in the eastern part of the area. Incision which is accompanied by a set of faults creating extensive fractures is followed by intense weathering and deep erosion finally forming the existing dissected landscape of the valley/river gorge.
The difference in the resistance of the rock units to the action of weathering and erosion added to the ruggedness of the gorge terrain. Alluvial sediments are commonly present in flat-bottomed valleys. source: Geology of the Arjo area, Geological Survey of Ethiopia.

3.3.7 Land Degradation (Erosion Vulnerability)

The following map shows the erosion vulnerability and erosion hot spot areas in Bedele kebele target areas. Gole kara, Gole Maya, and Gole Saka areas are highly vulnerable to erosion and Gole maya highland areas are considered as erosion hot spot areas. The other new kebeles are not considered as non-vulnerable sites to erosion. It is recommended to implement soil and water conservation practices to reduce the impact of erosion. For further implementation of interventions see the look-up table of 3R / water balancing measures.

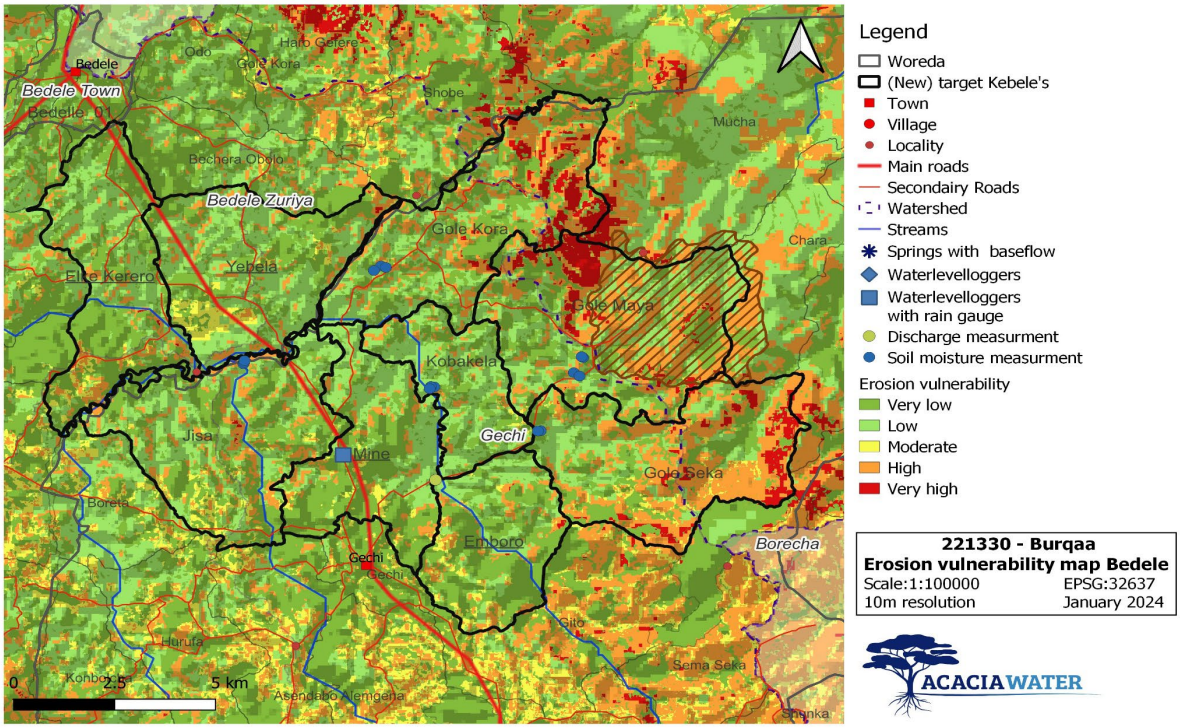

Figure 12. Erosion vulnerability map and erosion hot spots

4 Socio-Economic baseline assessment

4.1 Introduction

Effective water compensation requires interventions that are not only technically sound but also socio-economically relevant. Overlooking this aspect can lead to interventions that are not embraced by the local population; hence demolished or decayed rather soon. Conversely, interventions that benefit the local community are more likely to be maintained and even expanded upon. To address this, the socio-economic baseline starts with touching upon demographics and livelihoods, illustrating the reliance on agriculture. From there, it delves deeper into two remaining components: Food security to understand the demand and another on the Capacity to identify optimal intervention locations from a logistical standpoint. In the end, recommendations for interventions are drawn, based on the two components.

4.2 Demographic and Livelihood Assessment

This chapter provides contextual information on demographics, including growth projection for the target areas. After that, it goes into more detail on the livelihoods and their reliance on agriculture. Both indicate the importance of (SWC) interventions.

4.2.1 Demographics

To frame the socio-economic baseline, this paragraph describes the demographics as well as the livelihoods of the various woredas. This information aids in presenting the demand side of the SWC issue clearly. This demographic assessment contains the population projection for 2024, based on the 2007 census, population density, and the number of households and housing units. It shows that the population continues to grow, which poses pressures to land and water resources, agriculture, and food security.

Population projection

The population projections for 2024 in Gechi and Bedele Zuriya woredas are 106,531 and 117,424 respectively. Meanwhile, the population projection in Sofi woreda is 10,044. The estimated population density can also be found in Table 7 on the next page. The charts below display the total projection per woreda and gender.

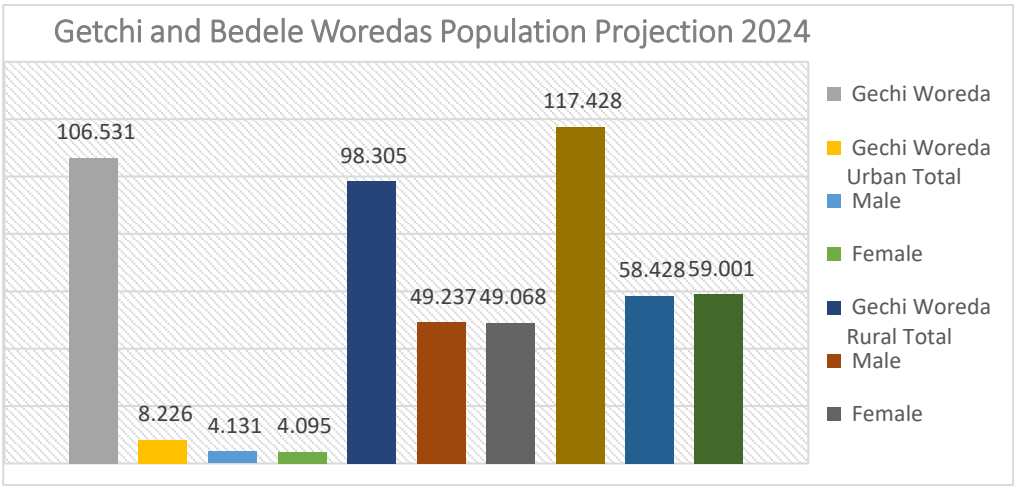

Figure 13. Population projection 2024, Gechi and Bedele Zuriya.

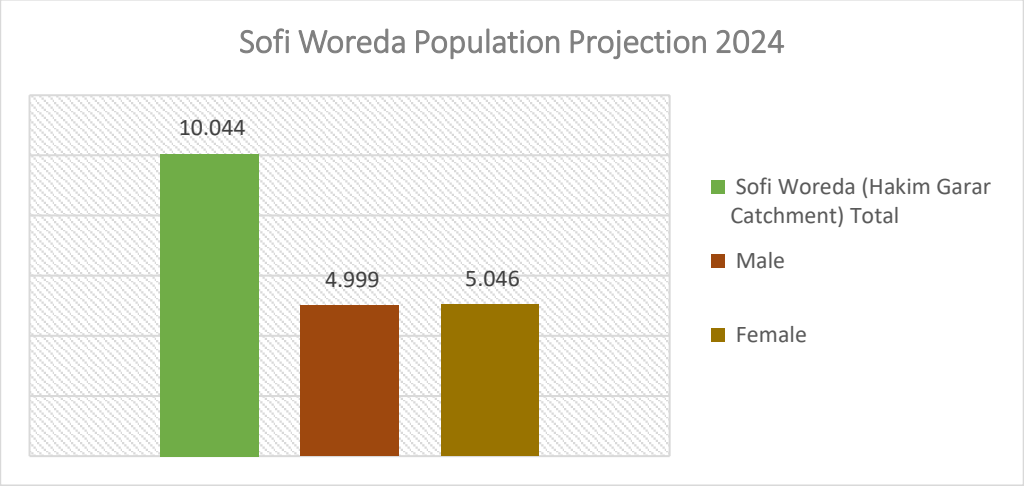

Figure 14. Population Projection 2024, Sofi Woreda.

Table 10. Population Density

Target woreda name	Area [km2]	Population density [persons/km2]
Gechi Woreda	1,400.47	76.07
Bedele Zuriya	1,678.44	69.96
Sofi Woreda	132.00	76.09

Number of Households and Housing units

The projection of the number of households and household units is calculated based on the 2007 census data and on the average household size in Ethiopia (6 people per household according to Global Data Lab, 2024).

Table 11. Household and House Unit Projection 2024, Gechi, Bedele Zuriya and Sofi woredas

Target woreda name	Population projection 2024	Households	Housing Units	Households per Housing units (average)
Gechi Woreda Total	106,531	17,755	17,205	1.03
Gechi Woreda Urban Total	8,226	1,371	1,338	1.02
Gechi Woreda Rural Total	98,305	16,384	15,991	1.02
Bedele Zuriya Total (Rural)	117,428	19,571	18,991	1.03
Sofi Woreda	10,044	1,674	1,636	1.02

4.2.2 Livelihoods and Agriculture

The following sections offer valuable insights into livelihoods within the study areas. As the SWC interventions are targeted mainly towards integration with agricultural land use, it is of importance to have an overview of agriculture's status. Furthermore, it also illustrates the high reliance on agriculture for livelihood income. This information has been compiled from various documents provided by the Ethiopian Statistical Service (ESS). Primary data sources include the Socio-Economics Panel Survey (ESPS), conducted jointly by the ESS and the World Bank Group between 2021 and 2023.

Agriculture as main income source

In Ethiopia, agriculture remains an important source of income, particularly in rural areas. As of 2022, approximately 85% of the rural population is employed in agriculture, with the

majority being female (at a ratio of 3 to 1). Eight out of ten individuals engaged in agriculture are self-employed. The annual average income from agriculture, measured as wage value, was around 11,000 Birr in 2019, decreasing to approximately 9,000 Birr by 2022. The majority of harvested crops are utilized for own consumption, with coffee being a notable exception see figure below.

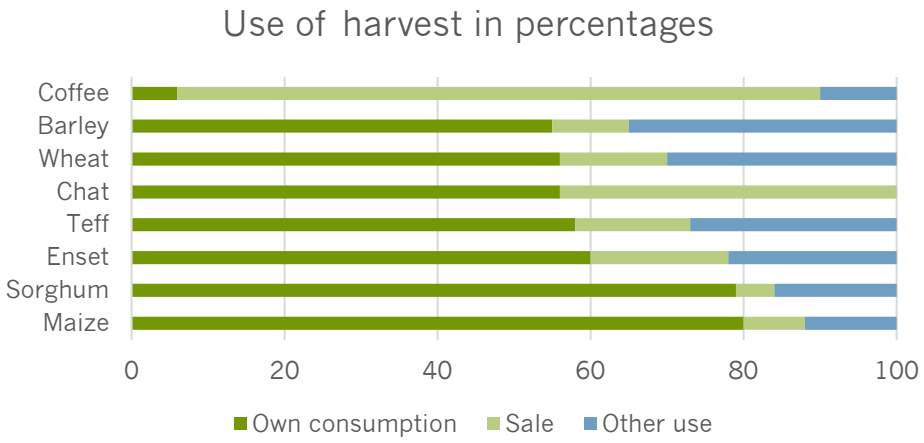

Figure 15. Use of harvest per crop in percentages (Rural Ethiopia wide) (ESPS, 2023).

Land ownership and field size

Land ownership is a critical factor in determining the implementation of interventions. Generally, farmers who rent land are less likely to implement interventions, whereas landowners experience increased land value and are assured of using the interventions, therefore they are more likely to make such investments. displays the percentage of households and their relationship to the land.

Table 12. Household relation to land ownership and access in percentages (ESPS, 2023)

Region	Own	Rented out	Free use	Rented in	Other
Rural Ethiopia	89.7	4.9	8.9	6.9	12.7
Oromia	94.9	4.8	7.1	8.8	13.9
Harari	96.2	0.0	1.1	1.1	1.6
Dire Dawa	92.3	0.0	7.7	1.4	2.8

Furthermore, it is crucial to comprehend the area of fields utilized by households, as Soil and Water Conservation (SWC) measures can vary in scale, ranging from small-scale interventions like micro water harvesting (e.g., zaï pits) to larger-scale methods such as terracing. The following table presents farm size information on average, based on samples collected. From Table 10 below it can be observed that most fields in the study areas are small-scale.

Table 13. Average land used by households (ESPS, 2023)

Region	Sample size (Fields measured)	Average fields per household	Average field size (ha)	Average household holding (ha)	Average cultivated land holding (ha)
Average Rural Ethiopia	15 528	9.1	0.1	1.1	0.8
Oromia	3 436	9.1	0.1	1.3	0.9
Harari	1 230	6.3	0.1	0.4	0.3
Dire Dawa	404	2.6	0.2	0.4	0.3

Fuel wood and water collection

In the study areas, a significant portion of time is spent on gathering water and fuel wood, which is predominantly carried out by women. Oromia region consistently scores lower compared to other regions and the national average. Interventions focusing on reforestation with promoting sustainable wood collection could serve as a fruitful intervention for poverty alleviation, particularly thus for women. By reducing the time spent on these activities, individuals, particularly women, would have the opportunity to engage in alternative (income-generating) activities.

Table 14. Average time spent per day on collecting water and wood in 2022 (in minutes/day) (ESPS, 2023)

Region	Male	Female
Average Rural Ethiopia	20.2	44.5
Oromia	17.3	38.8
Harari	12.6	27.4
Dire Dawa	12.1	32.5

4.3 Food Security

Water compensation interventions frequently intersect with agriculture. Building support from local populations and stakeholders relies on understanding their needs and defining their demands. From the above paragraphs, it was evident that population size is and will be substantial, and that agriculture is important for livelihood income and food sufficiency. The following paragraphs, examine food security in more depth so that in the end deficits in nutrition groups can identified, albeit based on nationwide census data. This in turn provides valuable insights on which crop interventions should focus.

4.3.1 Food (In)Security

Food security remains challenging in Ethiopia due to many reasons ranging from current and past armed conflicts to climate-related issues. According to the Famine Early Warning System Network (FEWS), Ethiopian food security remains challenging because of different reasons (FEWS, 2024). One major reason is the climatic phenomenon of El Nino, which has led to or exacerbated droughts in Northern and pastoral areas while inducing (flash)floods in the South. Moreover, in the South and South-East, the livestock is still suffering from immense losses for three years during drought. Recovery is expected to last still some years. Climate thus poses serious threats to food security. SWC interventions substantially boost climate resilience, hence SWC is a good strategy for increasing food security in Ethiopia. SWC can thus be a synergy for local food security and water compensation.

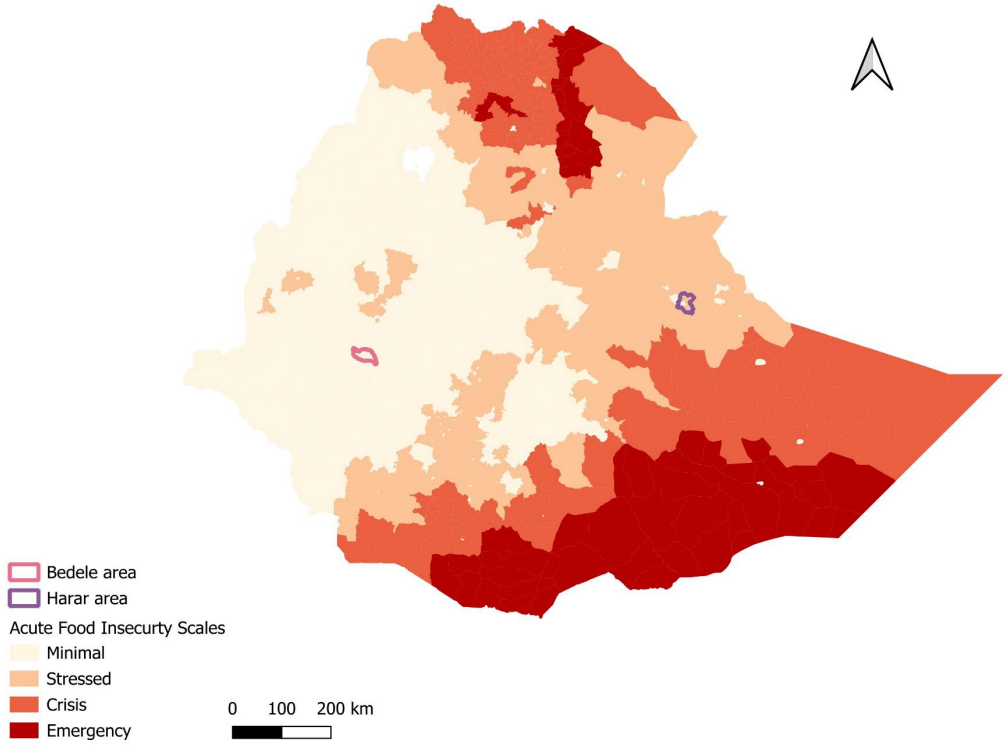

Figure 16. Indication of acute food (in)security scales in Ethiopia

4.3.2 Malnutrition

Food security is also linked to malnutrition. This is an insightful measure to guide decisions for 3R/SWC interventions or alternative income generation. In 2022, the Food-Based Dietary Guidelines (FBDG) were published by the Federal Government of Ethiopia, the Ministry of Health, and the Ethiopian Public Health Institute (2022). They state that a healthy diet has an energy value of 2,330 calories consisting of different nutrition groups (see Table 12 below). For this baseline assessment, we compared the recommended food intake with the actual intake. To find the actual food intake, the 2016 nationwide "Household Consumption and Expenditure Survey" by the Ethiopian Statistical Service was analysed (ESS, 2018). Specifically, we looked at rural areas since these are most relevant for the study areas of Harar and Bedele. Still, it should be highlighted that the used census is nationwide, hence it does not one on one explain the specific and unique situations in Bedele and Harare.

Table 15. Household food consumption and expenditure survey at national level (2016)

	Household consumption and expenditure survey (2016)					FBDG
Income class	Low	Low-medium	Medium	Medium-high	High	Recommended
Household consumption [Birr/yr]	<5350	5350-7650	7650-10100	10100-15100	>15100	
Grains, roots, tubers	1100	1391	1621	2045	2409	1282
Pulses	110	145	156	192	221	188
Nuts and seeds	1	3	2	4	4	151
Milk and dairy foods	17	25	42	58	79	185
Meat, Fish, and eggs	2	4	7	25	91	98
Fruits	1	3	3	7	9	170
Vegetables	253	347	365	489	506	76
Fats and oils	79	117	171	244	361	180
SUM	1563	2035	2368	3063	3680	2330

When two datasets are compared, figure 1 can be drawn. Several interesting insights can be drawn from this figure. Firstly, an income of 7650 Birr per year likely correlates with less calories per day than is recommended by the FBDG. Secondly, the nutrition group “grains, roots, and tubers” is compensating for the deficit intake of the other nutrition groups. Thirdly, independent of income, several nutrition groups are consumed too little. In this segment, four major groups are identified:

- Nuts and seeds
- Milk and dairy production
- Meat, fish, and eggs
- Fruits

To enhance the relevance and sustainability of water compensation interventions, it is wise to target the nutritional needs of the local population. By addressing these specific needs, interventions are more likely to be embraced and maintained by the community. Furthermore, as nutrition is a prominent focus for many NGOs, targeting malnutrition could count on additional support from these organizations.

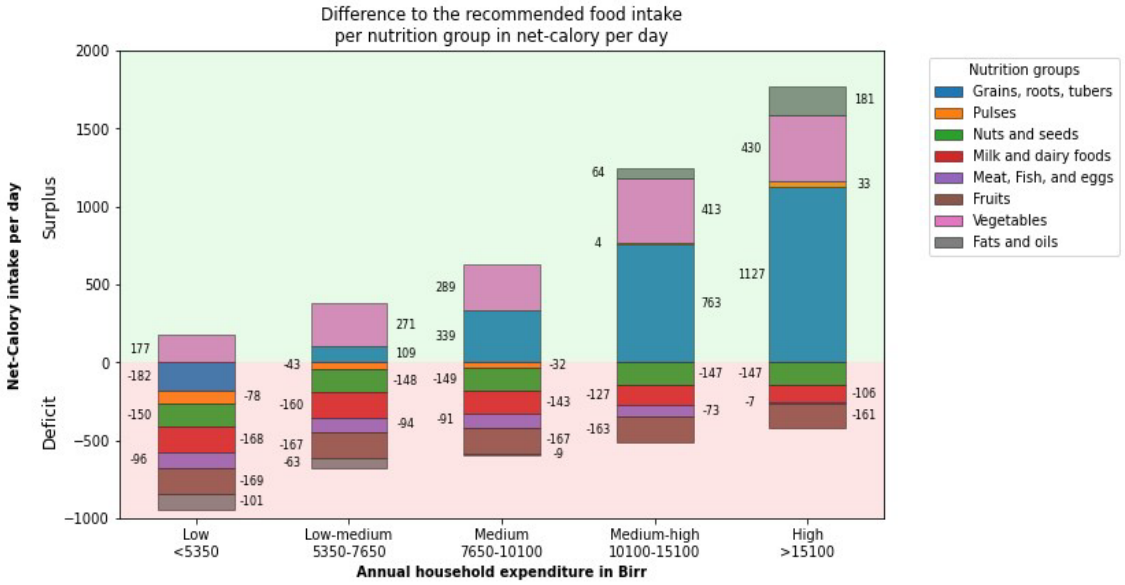

Figure 17. Overview of difference to the recommended food intake per nutrition group in net-calory per day

The nutrition and food security analysis as presented above, is based on nationwide census data which means it does not fully reflect the specific circumstances as experienced in the two target sites. Although this well-acknowledged in this report, it is still a useful exercise as it can be re-done if and when new data collect. In addition, the fact that 3R or water compensation or SWC interventions are often combined with food production, makes targeting under-utilized nutrition groups still very valid. In other words, although the data does not perfectly represent the specific context of Bedele and Harare, the principle rationale remains valid and useful.

4.3.3 Capacity/Logistics

An essential indicator of the socio-economic capacity of a region is the accessibility provided by its road infrastructure. Roads facilitate easier travel and transportation, resulting in reduced associated costs. Recognizing this, Acacia Water utilized satellite

imagery to generate an approximate road network for Hakim Gara and Upper Dabena, including many tertiary roads as well. This provides valuable insights because enhanced accessibility has logistical advantages. When lands are well connected to roads and close to markets or tree nurseries, it provides a logistical advantage for (income-generating) interventions.

For reforestation efforts, proximity to tree nurseries offers logistical efficiencies in maintenance and replanting activities, potentially reducing associated costs. This can be considered a tactical approach in the light of findings reported by the Center of Excellence International Consult (CEIC) submitted to World Vision Ethiopia (WVE) in 2021. The report showed that in Hakim Gara (Harar), 75% of trees survived, while in Upper Dabena (Bedele), the survival rate was 64%. Given that 10,000 seedlings were planted in Hakim Gara and 65,000 in Upper Dabena, approximately 26,000 seedlings did not survive, negatively impacting water compensation efforts. Hence, there is an ongoing need for replanting initiatives to mitigate these losses and uphold the integrity of water compensation efforts.

Based on data provided by WVE, upon request of Acacia Water through a formal letter of request, information on markets and nurseries in both study areas is presented below. For Upper Dabena, the primary agricultural market is situated in Gechi town, operating every Monday. This medium-sized market facilitates trade in various commodities including maize, teff, sorghum, vegetables, potatoes, beetroot, coffee, meat (cow, sheep, and goat), fruits, and honey. Within the catchment area, two nurseries, namely Dabena and Kabo Kala, produce seedlings for Gerillia Robusta, Pinus patula, Nim tree, and bamboo.

Hakim Gara's main market is in Harar city, open daily, and also classified as medium-sized. This market trades in maize, sorghum, mango, guava, chat, and coffee. Additionally, the nursery site in Harar City produces a variety of forest and fruit trees such as guava, mango, papaya, prunes, and persimmons.

As was explained earlier, the road network and proximity to markets and nurseries provide logistical efficiency for certain interventions that can be market-oriented, reforestation-oriented, or a combination. The logistical efficiency areas are considered within a less than 2-hour drive radius, considering poor quality tertiary roads. The logistical efficiency areas are presented in the below maps.

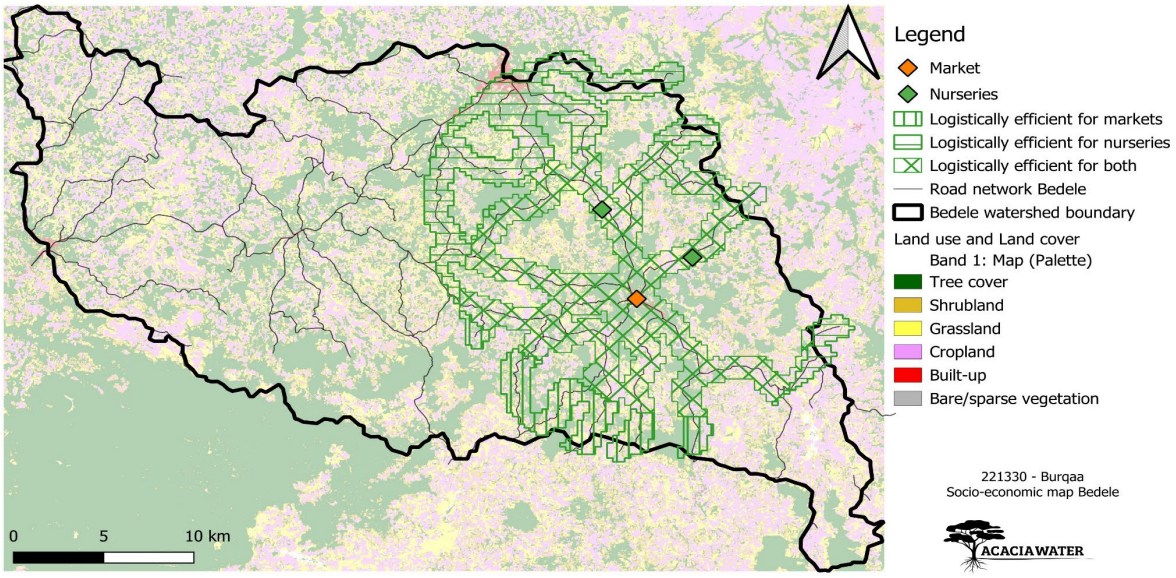

Figure 18. Socio-economic capacity map of Bedele.

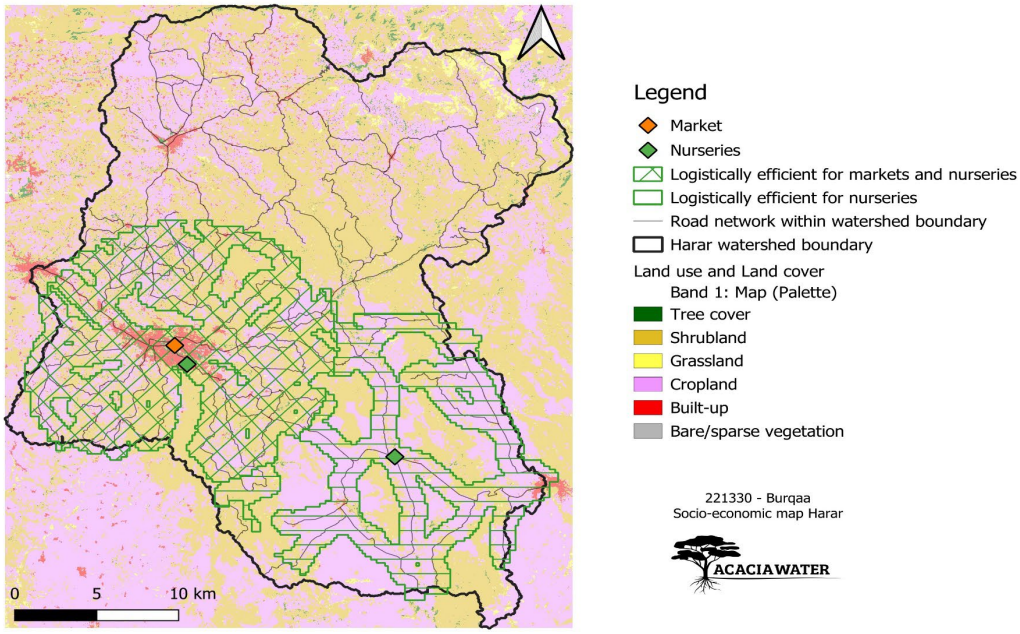

Figure 19. Socio-economic capacity map of Harar.

4.3.4 Land use and Land management.

As the above maps already imply, both Bedele and Harar have areas suitable for market and reforestation interventions, which can be combined with SWC. However, as the maps clearly indicate there is a substantial difference in land management and land use between both study areas (see Figure 19 below). This is important because different land management practices require different interventions.

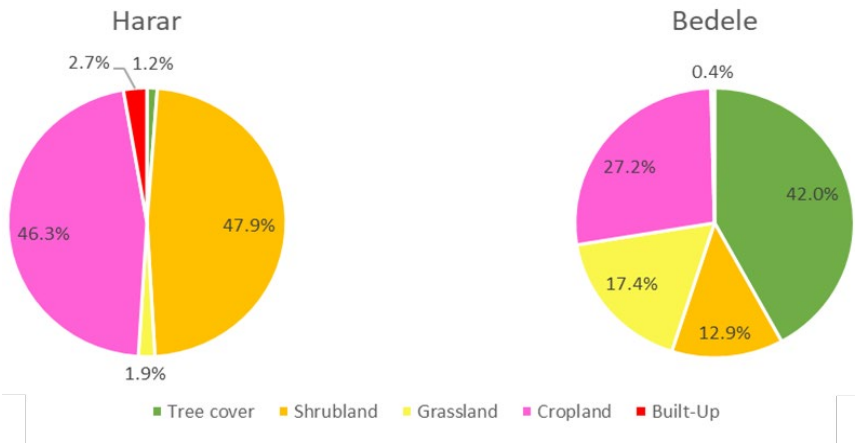

Figure 20. Land use and land management distribution for Harar and Bedele

Agro-Forestry

When combining trees with crops to produce for human needs, it is called agroforestry. This can be realized by introducing trees to cropland or introducing crops to forests. By combining crops with trees, agroforestry systems provide numerous benefits such as improved soil health, water conservation, and carbon sequestration. In the end, agroforestry contributes to climate resilience and income generation of local livelihoods.

Silvo-pasture

Silvo-pastoral systems integrate trees, forages, and livestock within a single land management strategy (FAO). This approach allows for simultaneous production, forage, and livestock on the same piece of land. By combining trees for nut or fruit production with pasture for grazing animals, silvo-pastoral systems enhance biodiversity, improve soil fertility, and provide shade and shelter for livestock. Additionally, these systems contribute to carbon sequestration and mitigate the effects of climate change while promoting sustainable agricultural practices. Overall, silvo-pastoral systems offer a multifunctional approach to land use that balances economic, environmental, and social benefits.

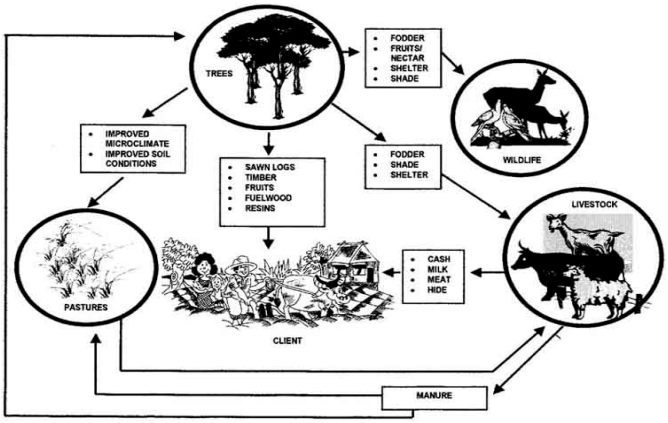

Figure 21. Silvo pasture system (FAO)

4.4 Recommendations

Socio-economic analysis is essential for the effectiveness and sustainability of water compensating interventions. Without support by the local inhabitants, interventions risk early decay or demolishment. Whereas, when the interventions are supported by the local inhabitants, it can rely on their effort for maintenance and potentially further adoption.

Therefore, a thorough socio-economic baseline assessment was conducted, which uncovered several significant findings. Firstly, the demographic and livelihood analysis revealed a projected increase in population in the study areas, with agriculture serving as the primary source of income for the livelihoods, which are pre-dominantly small-holder farmers. The average household holding is less than 1.3 hectares, usually spread over 9 fields. Moreover, it highlighted the substantial time consumption for fuel wood and water gathering, particularly affecting women.

Secondly, food security was researched, and it was found that food security is threatened by changing climate and rainfall variability. To improve food security, it thus important to improve climate resilience for which SWC interventions are indispensable.

Thirdly, a comprehensive but general food intake analysis underscored deficiencies in calorie consumption among lower-income groups, particularly in essential food groups such as fruits, protein, meat, and nuts. Smaller deficits were observed for pulses. Cereal consumption compensates for these deficits. This was based on nationwide census data, which means that the specific situations in Bedele and Harare can be different.

Fourthly, an examination of market and nursery accessibility revealed logistical efficiency for both market-oriented interventions, reforestation interventions, or their combination. However, significant variations in land use were observed, with Harar predominantly characterized by croplands and shrublands, while Bedele exhibits a greater presence of tree cover alongside croplands. This influences the choice of intervention.

Overall, these findings provide valuable insights into the socio-economic dynamics and resource distribution within the study areas, laying a foundation for targeted interventions to address identified challenges and capitalize on existing opportunities.
Based on these findings, the following three recommendations can be done:

1. Based on nationwide census and from a nutrition perspective, four nutrition groups should be targeted by the interventions. Firstly, reforestation can be valuable part for this because two of the four groups are nuts, and fruit. Nut and fruits production can be included in agro-forestry or silvo-pastural systems, making them suitable for diverse range land uses. Moreover, silvo-pastural systems can also overcome the deficits in meat. It is expected that besides food security, there will be local demand for the produce since this is recommended by national guidelines (FBDG). Moreover, fuel wood gathering consumes much time for a household hence reforestation with sustainable (timber/wood) management can reduce or alleviate that, allowing more time for other activities (e.g., beekeeping, off-farm work, education).
2. Looking at malnutrition from a value chain perspective, interventions should target meat, dairy, and egg production. This can be done by alternative income generation such as poultry production. However, the value chain should not be overlooked, for example, interventions could also target (improved) dairy processing, post-harvest efficiency, or cooling to make more efficient use of the sources and prolong shelf life. Improving shelf life also enhances the resilience of the livelihoods. It is expected that there is (local) demand for this since this is recommended by national guidelines (FBDG). Moreover, interventions should not

necessarily target grains or vegetables since the comparisons showed that people have surplus in this.

3. According to the nationwide census, the consumption of pulses among lower income groups fell slightly below recommended levels when comparing the general actual intake with dietary guidelines. Here lies opportunity because, incorporating pulses into diets can significantly enhance food security for these demographics. Furthermore, the cultivation of pulse-producing plants (e.g., lentils or peas) can yield benefits beyond nutrition. These plants play a crucial role in soil health by fixing nitrogen, thereby improving soil moisture retention.

Additionally, pulses are well-suited for intercropping, crop rotation, and cover cropping, making them an effective intervention to be considered and that synergizes biophysics and socioeconomics. Putting this in the perspective of socio-economic capacity the following table of Table 16 on the next page can be drawn.

Table 16. Socioeconomic capacity and logistical efficiency potential towards SWC interventions per Land Use class

LULC	Legend	Logistical efficiency		
		Market	Both	Reforestation
				
Cropland		-Crop rotation or intercropping with oil crops or pulses	-Agro-forestry with marketable fruits and nuts	-Establishing seedling or seed nurseries
Tree cover				-Reforestation with native species and nutritious fruit and nut trees
Grassland		-Cut-and-carry -Area closure -Poultry	-Silvo-pastoral systems	-Extensive silvo-pastoral systems
Shrubland				-Reforestation with native species and nutritious fruit and nut trees

5 Governance baseline assessment

5.1 Introduction

The objective of the governance baseline assessment is to ensure the successful implementation and sustainability of selected interventions by the biophysical and socio-economic assessment. The governance baseline aims to achieve a thorough comprehension of the present state of governance, highlighting both its strengths and areas requiring improvement to support the Burqaa initiative by facilitating a way for sustainable implementation of the most suitable interventions in the project area.

Therefore, it provides two useful findings: (a) a governance assessment showing gaps and providing recommendations, and (b) a comprehensive stakeholder analysis for both study areas identifying the main stakeholders and their interests. The governance baseline assessments follow the 3R governance framework that is based on four main indicators (see Figure 22 below).

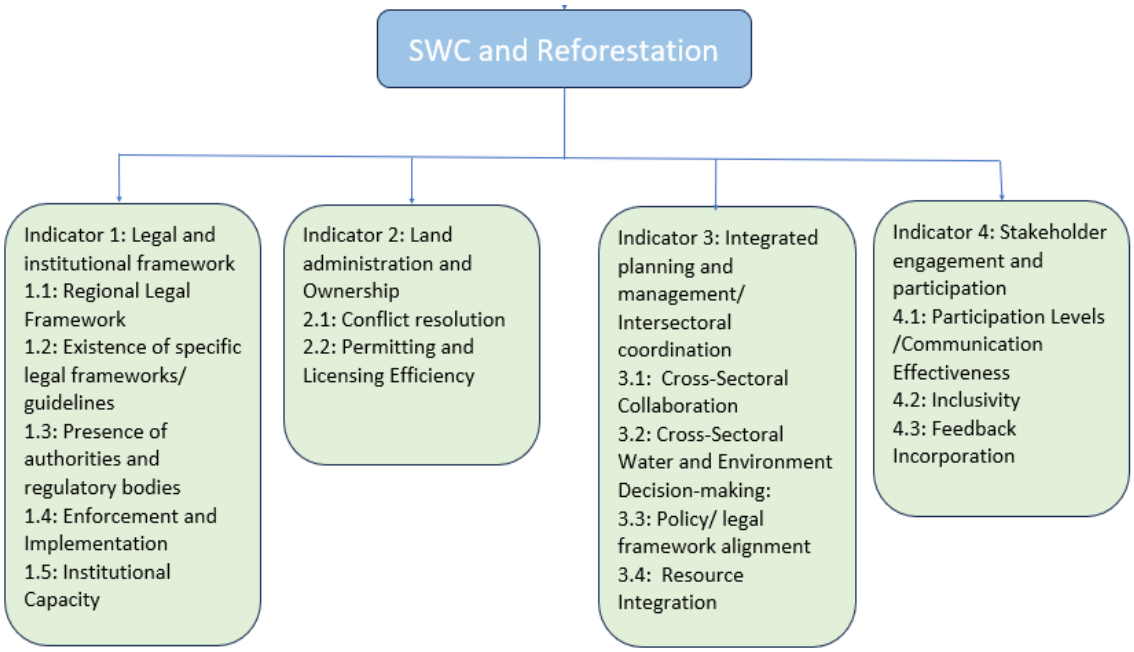

Figure 22. Governance baseline assessment following the 3R Governance Framework

To operationalize the framework, numerous constitutional documents, proclamations, regulations, guidelines, and other literature were critically reviewed, and complementary field data was used. The field data was delivered by World Vision Ethiopia with a specific request from Acacia Water. This chapter starts with a review of legal frameworks and national programs focusing on SWC, and Reforestation. After the literature review, the institutional framework in both project areas follows. Then it goes into stakeholder analysis, identifying gaps in water and land governance in both project areas and finally, the conclusion and recommendation are drawn.

5.2 Legal Basis for Land and Water Resources Management

5.2.1 National Law/ The Constitution

The administration of land and water resources in Ethiopia is influenced by clauses in the Constitution that outline the roles and responsibilities of the federal government and regional states.

The constitution has mandated the federal government in order to enact laws for the utilization and conservation of land and other natural resources (Article 51 (5) of FDRE Constitution, 1995) while regional states are responsible for administering land, water, and other natural resources in their administration boundary in accordance with the federal laws (Article 52 (2d) of FDRE Constitution, 1995). However, large-scale land deals are managed by the Federal Ministry of Agriculture (MoA) and transboundary waters are managed by the Federal Ministry of Water and Energy (MoWE).

5.2.2 Legal Framework related to Water

Water Resources Management Proclamation

The Ethiopian Water Resources Management Proclamation No. 197/2000 serves as the foundation for the management and administration of water resources in Ethiopia. It designates the Ministry of Water, Irrigation, and Energy as the primary federal agency responsible for water management. It calls for coordination between different sectors and the participation of stakeholders at all levels. While the Constitution gives the federal government primary authority over water resources management, the Policy promotes decentralized management and the establishment of River Basin Organizations. It also provides the regional offices with the right to manage the water resources within their boundary based on the national policy.

5.2.3 Legal Framework related to Land

Rural Land Administration and Use Proclamation

Land management administration in Ethiopia is guided by Proclamation 456/2005 at the federal level. According to the proclamation, rural land in Ethiopia is owned by the state and cannot be privately owned. However, individuals and communities have the right to use and benefit from the land as long as they abide by the rules and regulations outlined in the proclamation. The proclamation establishes a system for land administration, which includes the identification, registration, and certification of land rights. It aims to address issues of land tenure insecurity and land disputes by formalizing land rights and providing legal protection to landholders. It also emphasizes the importance of sustainable land use and management practices. It promotes the conservation of natural resources, including soil, water, and forests, and encourages the adoption of environmentally friendly agricultural techniques. It recognizes the importance of communal land and seeks to promote community-based land administration and utilization. By granting communities the autonomy to manage and make decisions regarding their communal land, the proclamation aims to ensure sustainable land use, equitable distribution of land resources, and social harmony within rural communities.

The federal Rural Land Administration and Use Proclamation provide a general framework for regional states to enact their rural land administration and use laws and establish institutions based on their regional conditions (Article 17 (1) of Proclamation No. 456/2005). Oromia is one of the regional states that have enacted their own regional land

administration and use laws and established land administration institutions based on the framework legislation. This land administration policy was first issued in 2002 and amended in 2007 (130/2007). Harar Region did not have its own land administration policy; the land administration was done by the federal proclamation. On the other hand, the Harar region adopted the national land administration law directly.

Oromia Rural Land Use Proclamation

The Oromia Rural Land Use and Administration Proclamation No. 130/2007 is a legal framework established in Oromia, a region in Ethiopia, to manage rural land use and administration. It aims to ensure sustainable land management practices, address land-related conflicts, protect the rights of landholders, and promote agricultural development. This proclamation outlines several key provisions related to sustainable land management. These provisions include:

- Land Use Planning: The Proclamation emphasizes the importance of land use planning to ensure that agricultural activities, settlements, and infrastructure development are conducted in a manner that is sustainable and does not harm the environment.
- Land Rights and Tenure Security: The Proclamation recognizes and protects the rights of landholders, including farmers, pastoralists, and other rural community members. It establishes procedures for land registration, certification, and tenure security, ensuring that landholders have legal recognition and protection.
- Environmental Protection: The Proclamation emphasizes the need for environmental protection while using land resources. It promotes practices that minimize soil erosion, deforestation, and the degradation of natural resources. It also encourages sustainable agricultural techniques and the adoption of environmentally friendly practices.
- Land Conflict Resolution: One of the key goals of the Proclamation is to address land-related conflicts fairly and efficiently. It establishes mechanisms to resolve disputes over land ownership, use, and management through local and regional institutions.
- Participatory Decision-Making: The Proclamation emphasizes the importance of involving local communities in decision-making processes related to land management. It calls for the establishment of community-based institutions and encourages public participation to ensure transparency and accountability.

5.2.4 Legal framework related to Environmental and biodiversity protection

Forest Development, Conservation and Utilization Proclamation

The Federal Forest Development, Conservation and Utilization Proclamation No. 542/2007 outlines three types of forest ownership: state forests owned by the federal or regional government, private forests developed by private individuals, associations, NGOs, or investors, and community ownership, where regional authorities allocate state forests for privately managed plantations or conservation purposes. These proclamations in the Oromia region encourage community engagement in state forest management, promoting sustainable forest resource management through Public Forest Management (PFM) and developing PFM forest areas out of non-gazette reserves. Establishing PFM requires legally binding contracts between the Forest Management Group and regional authorities. In Oromia, a PMF has been developed, but not in Harar.

Oromia Forest Development, Conservation, and Utilization Proclamation

The Oromia Forest Development, Conservation, and Utilization Proclamation is a legislative act that outlines the measures and guidelines for the sustainable management of forests in the Oromia region of Ethiopia. The proclamation emphasizes the importance of preserving the forest ecosystem and biodiversity, as well as the need for community participation in forest conservation activities. It also seeks to promote the sustainable utilization of forest resources to benefit local communities and the economy, while ensuring the protection of ecological integrity.

Environmental Impact Assessment Proclamation

The Environmental Policy of Ethiopia serves as a crucial foundation for sustainable development and environmental management in the country. Enacted to address the challenges posed by environmental degradation, the policy underscores the importance of conservation, sustainable resource utilization, and the integration of environmental considerations into various sectors. Within the context of the Burqa Phase II project, this policy provides a framework for assessing the environmental impact of the initiative. It emphasizes the need to enhance agroforestry, fruit, and forestry trees coverage (Objective 1.1) and supports water balance activities (Objective 2) to ensure that the project aligns with the broader environmental conservation goals of the nation.

Development, Management, and Utilization of Community Watersheds

The Ethiopian Development, Management, and Utilization of Community Watersheds Proclamation No. 1223/2020 aims to prevent environmental degradation, conserve biodiversity, and develop water resources. It emphasizes the importance of extending watershed development activities to increase agricultural productivity, ensure food security, and create job opportunities. The proclamation highlights the need for community involvement, promoting the establishment of cooperative societies for community watershed users. The defined objectives include reducing vulnerability to drought, enhancing resilience, increasing land productivity, and establishing a system for community watershed users to protect, develop, and use natural resources with a sense of ownership. It outlines the scope of the application, defining terms such as community watershed, communal holding, and major watershed. The document details the preparation of community watershed plans, the types of watersheds, and the responsibilities of community watershed users. The proclamation encourages sustainable practices, such as the use of natural agricultural inputs, and addresses issues related to membership, rights, and duties within community watershed cooperatives. It also covers compensation for ecological damage, gender balance, and the responsibility of government entities. The proclamation aims to enhance community engagement and sustainable management of watershed resources in Ethiopia. The Ethiopian Development, Management, and Utilization of Community Watersheds Proclamation No. 1223/2020 aligns with all objectives of the Burqa II project, specifically:

- **Objective 1** (Enhancing sustainability of the phase-I outcomes and scaling up to new Kebeles): The proclamation's focus on preventing environmental degradation and developing water resources resonates to enhance sustainability in the Burqa project. It promotes practices like agroforestry and increasing tree coverage, contributing to sustainable outcomes.
- **Objective 2** (Increasing water balance activity interventions): The proclamation's emphasis on watershed development and management directly aligns with the

Burqa project's objective of increasing water balance activity interventions, ensuring efficient water use in the community.

- **Objective 3** (Carbon sequestration or carbon balance of the catchments): While the proclamation doesn't explicitly address carbon sequestration, the overall goals of environmental conservation and sustainable resource utilization indirectly contribute to the objective of achieving a carbon balance in the Burqa project.
- **Objective 4** (Promoting community-based livelihood-improving activities): The proclamation's encouragement of community involvement, cooperative societies, and sustainable practices corresponds to the Burqa project's aim to promote value chain commodity-based livelihood-improving activities. This synergy ensures a holistic approach to community development.
- **Objective 5** (Strengthening and expanding institutionalization): The proclamation's provisions for the establishment of cooperative societies align with the Burqa project's objective of strengthening and expanding institutionalization, creating structures for sustained community engagement and development.
- **Objective 6** (Undertaking sound MEAL and reporting): The proclamation's focus on monitoring, evaluation, and accountability parallels the Burqa project's objective of undertaking sound monitoring, evaluation, learning, and reporting, ensuring transparency and effectiveness in project implementation.

Harari State Environmental Protection Authority Proclamation

The Harar State Environmental Protection Authority Proclamation, on the other hand, focuses specifically on the protection and preservation of the environment in the Harar state of Ethiopia. This proclamation establishes the Harar State Environmental Protection Authority as the regulatory body responsible for enforcing environmental conservation laws and regulations. It outlines various environmental protection measures, such as the preservation of natural resources, the prevention of pollution, and the promotion of sustainable development practices.

Mining Proclamation

Mining activities in Ethiopia are regulated by Mining Proclamation No. 678/2010, which promotes sustainable mining development. The proclamation declares that no person shall be granted an exploration license, a retention license, or a mining license over an area if it is (i) reserved for cemeteries and religious sites (ii) containing archaeological remains or national monuments (iii) reserved for physical infrastructure (iv)within areas reserved for natural habitats or national parks (v)within 500 meters from the boundary of a village, city or water reservoir or dam without the consent of the competent body; or (vi) reserved by any other law of the country. However, small, and local mining rights co-exist in communally owned areas.

5.2.5 BURQAA Initiative's Relationship with National Programmes

The National Forest Sector Development Program

The National Forest Sector Development Program plays a pivotal role in shaping the sustainable management and utilization of forest resources in Ethiopia. As the Burqa Phase II project aims to enhance sustainability and scale up agroforestry and forestry tree coverage (Objective 1.1), the National Forest Sector Development Program becomes a crucial reference point. This policy offers guidelines for the responsible management of forest resources, aligning with the project's objectives of increasing agroforestry practices

and contributing to water balance activities. Additionally, the program may provide insights into policies related to carbon sequestration, supporting the project's Objective 3.

The Climate-Resilient Green Economy Strategy

The Climate-Resilient Green Economy Strategy is designed to integrate climate resilience into Ethiopia's development agenda. This strategy addresses the challenges posed by climate change while fostering sustainable economic growth. In the context of the Burqa Phase II project, the strategy aligns with the objectives related to carbon sequestration (Objective 3) and the promotion of value chain commodity-based livelihood-improving activities (Objective 4). The emphasis on green initiatives and sustainable practices in this strategy can guide the project in implementing environmentally friendly measures. Furthermore, the strategy may offer valuable insights for capitalizing on new government initiatives (Objective 4.1) to enhance the project's impact on residents' livelihoods.

Ethiopian Green Jobs Initiative

This was launched in 2016 by the Ministry of Environment, Forest, and Climate Change. This initiative focuses on promoting environmentally sustainable and climate-resilient jobs. With a commitment to addressing environmental challenges and fostering green development, the Ethiopian Green Jobs Initiative aligns with Burqa Phase II's goals, especially in enhancing sustainability (Objective 1) and promoting value chain commodity-based livelihood-improving activities (Objective 4). The initiative's emphasis on job creation and sustainable practices could complement the Burqa project's efforts in improving residents' livelihoods.

Sustainable Land Management Program (SLMP)

Initiated in 2008 and implemented by the Ministry of Agriculture until 2018, the SLMP aims to enhance land productivity, improve watershed management, and promote sustainable agricultural practices. This national program's objectives relate to Burqa Phase II's goals, specifically water balance interventions (Objective 2) and agroforestry practices (Sub-objective 1)

Table 17. Burqaa Phase II Initiative Through the Lens of Ethiopia's Legal Frameworks.

Law/ strategy/ national program	Relation with Burqaa phase II
Constitution of the Federal Democratic Republic of Ethiopia	This policy provides a strong foundation for the Burqa Phase II project's objective of enhancing sustainability and improving residents' livelihoods. By recognizing the right to a clean and healthy environment, the Constitution acknowledges the importance of protecting natural resources and promoting sustainable development.
Environmental Policy of Ethiopia	This policy aligns with the objectives of the Burqa Phase II project by emphasizing the importance of sustainable development and environmental protection. It provides a framework for implementing interventions that enhance water balancing, carbon sequestration, and livelihood improvement in the targeted regions.
Water resource management proclamation	The National Water Resource Proclamation supports the Burqaa Initiative by providing regulations and guidelines for water management and conservation, which are essential for the success of water balance activity interventions (Objective 2 of the Burqaa Initiative)
Rural Land Administration and Use Proclamation	Rural Land Administration and Use Proclamation are crucial for the Burqa Initiative as it addresses land use planning and administration in rural areas. This policy can support the project by providing a legal framework for sustainable land management practices, including agroforestry and tree coverage (Objective 1.1). The proclamation may guide the allocation and use of land resources in a way that

	aligns with the project's goal of enhancing sustainability and improving residents' livelihoods through responsible land use practices.
Forest Development, Conservation, and Utilization Proclamation	The Forest Development, Conservation, and Utilization Proclamation supports the Burqaa Initiative by promoting the conservation and sustainable management of forests. This aligns with Objective 1 of the Burqaa Initiative in enhancing sustainability and increasing agroforestry, fruit, and forestry tree coverage.
Community Watersheds Proclamation	By addressing environmental conservation, sustainable resource management, and community engagement, the proclamation complements the goals of the Burqa project, fostering a comprehensive approach to watershed development and community well-being.
Environmental Impact Assessment Proclamation	The Environmental Impact Assessment Proclamation supports the Burqaa Initiative by ensuring that the project implementation follows environmental regulations and guidelines. This helps in achieving Objective 6 of the Burqaa Initiative, which is to undertake sound monitoring, evaluation, learning, accountability, and reporting.
National Mining Proclamation	The Mining Proclamation may indirectly support the Burqaa Initiative by providing a legal framework for responsible and sustainable mining practices. While the primary focus of the Burqa Phase II project is on water balancing, carbon sequestration, and livelihood improvement through agroforestry, the mining proclamation ensures that any mining activities in the project areas adhere to environmental standards and do not negatively impact the targeted watersheds. Compliance with this proclamation can contribute to maintaining the ecological balance, which is essential for achieving the project's objectives, especially those related to water balance and carbon sequestration.
Ethiopian Sustainable Land Management Framework:	The Ethiopian Sustainable Land Management Framework supports the Burqaa Initiative by providing guidelines and strategies for sustainable land management. This aligns with Objective 1 and Sub-Objective 1.1 of the Burqaa Initiative, which focuses on increasing agroforestry and improving land management practices.
National Forest Sector Development Program	The Burqa Phase II project's objective of increasing agroforestry, fruit, and forestry trees coverage is supported by this policy. The National Forest Sector Development Program emphasizes sustainable forest management and conservation, providing guidelines for implementing interventions that enhance tree coverage and promote environmental sustainability.
Climate-Resilient Green Economy Strategy	This policy is highly relevant to the Burqa Phase II project's objective of carbon sequestration and balancing the catchments' carbon emissions. The Climate-Resilient Green Economy Strategy provides a roadmap for addressing climate change through sustainable development practices, aligning with the project's goals
Oromia Regional State Sustainable Land Management and Environmental Protection Policy	This policy is crucial for achieving the Burqa Phase II project's objectives of enhancing sustainability and improving residents' livelihoods. The Oromia Regional State Sustainable Land Management and Environmental Protection Policy provides guidelines for sustainable land use practices, ensuring the long-term viability of the project's interventions
Oromia Forest Development, Conservation, and Utilization Proclamation	This policy directly supports the Burqa Phase II project's objective of increasing agroforestry, fruit, and forestry trees coverage. The Oromia Forest Development, Conservation, and Utilization Proclamation provide regulations for forestry practices, ensuring that tree planting and conservation efforts are carried out effectively.
Harari State Environmental Protection Authority Proclamation	While this policy specifically focuses on the Harar region, it aligns with the Burqa Phase II project's objectives of enhancing sustainability and improving residents' livelihoods. The Harari State Environmental Protection Authority Proclamation provides guidelines for environmental protection, ensuring that the project's interventions are carried out in an environmentally responsible manner.

5.3 Institutional framework

The specific institutions involved in governing access to, and use of water and land include government agencies such as the Ministry of Agriculture, the Ministry of Water, and Energy, and the Ministry of Environment, Forest, and Climate Change. These agencies,

along with regional and local authorities, play a role in overseeing land and water management The involvement of relevant institutions and co-ordinations with various line bureaus, departments and offices, taskforces, and committees from regional to kebele levels is essential for the success of the interventions. Institutional setup is one of the most important factors that contribute to the success of land and water administration systems by transforming legal tools and policies into practice. In this section, the institutional arrangement in both project areas is discussed.

5.3.1 Oromia/ Upper Dabena Catchment

The administration of water and land resources in the Oromia region, from the regional level down to the kebele level, involves several offices. The hierarchy of levels from the national to the kebele level is presented in this assessment. In the Table 18 below the hierarchal arrangement is illustrated while the general responsibility of the institutions and their possible involvement in the Burqa initiative can be found in Table 20.

Table 18. Institutional arrangement in Bedele Upper Dabena Catchment.

Level	Institution	Possible Involvement in Burqa Project
Regional Level	Regional Government	Give direction on the institutional process, allocate budgets, supervise and provide technical support.
	Regional Environmental Protection Authority	Executing environmental conservation measures, coordinating with local authorities
	Oromia Regional Agriculture Bureau	Coordinating agroforestry and forestry tree coverage activities
	Oromia Regional Land Administration Office	overseeing activities concerning land use
	Oromia Regional Water Bureau	Implementing water balance interventions, overseeing water-related aspects of the project
	Regional Investment and Revenue Offices	Disclose implications of protecting the environment and attracting investments (Objective 4), supporting the project in engaging with potential investors, and ensuring legal compliance in project activities.
District level	Agriculture and NRM Bureau - Bedele District (Gechi, and Bedele District)	Validate selected activities, mobilize communities for sustainable land management (Objective 1, 5), and co-raise seedlings for environmental conservation.
	Environment and Land Administration offices - (Gechi, and Bedele District)	Engage in land use policy dialogue, leading communities to follow land use principles (Objective 5), and providing guidance on sustainable land use practices.
	Bedele District Municipality	Ensure proper waste management to avoid pollution (Objective 2, 5), particularly around boreholes and the plateau.
	Bedele District Cooperative Bureau/Office	Support in the formation and certification of cooperatives relevant to the project
	Kebele-level Agriculture, environmental, and land administration offices	Play a major role in solving problems that may arise during the project implementation period. Play a role in addressing challenges that may arise during project implementation (Objective 6) and actively participate in monitoring and evaluation activities.
	FBOs and CBOs	Participate in identifying beneficiaries, organizing and facilitating project activities (Objective 1, 6), and taking the lead on conflict resolution if conflicts arise during project implementation. Participate in monitoring the project progress through their delegate

5.3.2 Harar/ Hakim Gara Catchment

The administration of water and land resources in the Harar region, from the regional level down to the kebele level, involves several offices. The organizational structure from the national to the kebele level is discussed in this assessment. The Table 19 below hierarchal

arrangement is illustrated while the general responsibility of the institutions and their possible involvement in the Burqa initiative can be found in Table 20 below.

Table 19. Institutional arrangement in Bedele Upper Dabena Catchment.

Level	Institution	Possible Involvement in the Burqa Project
Regional Level	Harar Regional Government	Give direction on the institutional process, allocate budgets, supervise, and provide technical support.
	Harari Regional Environmental Protection Agency	Executing environmental conservation measures, coordinating with local authorities
	Harari Regional Agriculture Bureau	Coordinating agroforestry and forestry tree coverage activities. Validate activities, mobilize communities for SWC and pothole protection, and co-raise seedlings.
	Harar Region Mining and Energy Bureau	Direction on the institutional process; Allocating budgets; Supervising and providing technical support to stakeholders; Controlling and managing illegal mining process
	Harar Region Justice, Investment, Revenue Offices	Control illegal mining, create community awareness, train on consequences, and expedite legal cases for illegal mining. Disclose investment implications.
	Harari Regional Water Bureau	Implementing water balance interventions, overseeing water-related aspects of the project
	Harari City Administration	Collaborating with project implementation, supporting community engagement
District level	Woreda and Kebele Agriculture and Natural Resource Bureau, Environment and Land Administration offices	Playing a major role in solving problems during the project implementation; Involved in project monitoring activities; Lead the community in following land use principles; participating in land and water conservation activities;
	Cooperative Bureau	Facilitate cooperative involvement in the project
	FBOs and CBOs	Participate in identifying beneficiaries, organizing and facilitating project activities (Objective 1, 6), and taking the lead on conflict resolution if conflicts arise during project implementation. Participate in monitoring the project progress through their delegate

5.4 Stakeholder Mapping

Stakeholder mapping is a crucial step in identifying and engaging key actors for effective land and water management and governance. It involves analyzing stakeholders based on their level of interest and influence in decision-making processes. In both the Oromia and Harar regions, stakeholders related to land and water management and governance can include government agencies, local communities, non-governmental organizations, private sector entities, researchers, and development partners. Using a matrix of interest vs. influence, stakeholders can be categorized into four groups: high interest and high influence, high interest and low influence, low interest and high influence, and low interest and low influence. The Figure 23 and Figure 24 below illustrate the stakeholder matrix for Bedele and Harar, while in Table 20 the potential interests and influence of identified stakeholders on the Burqaa Initiative based on their level of influence and interest can be found.

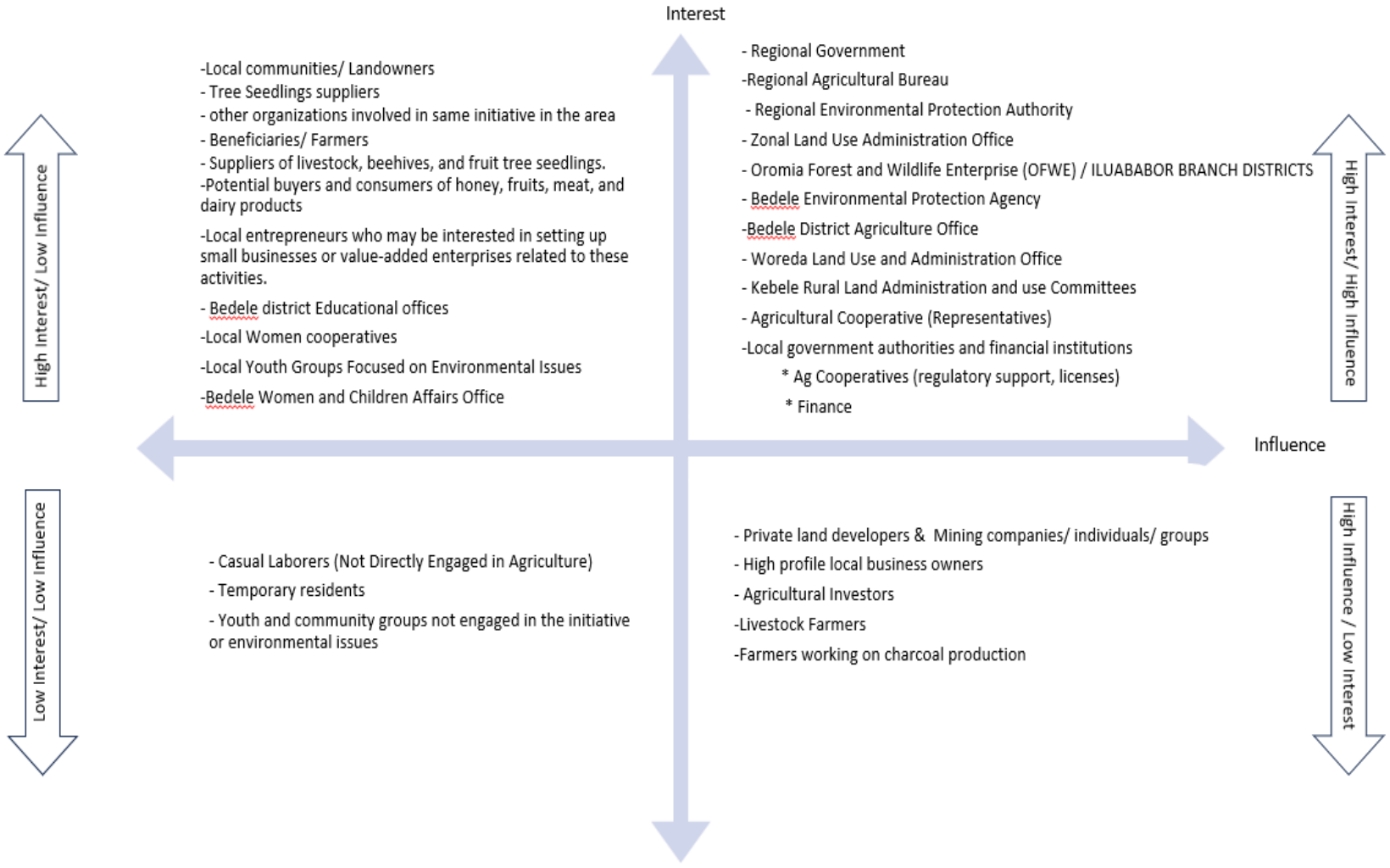

Figure 23. Stakeholder matrix of Bedele (Upper Dabena catchment); influence Vs interest

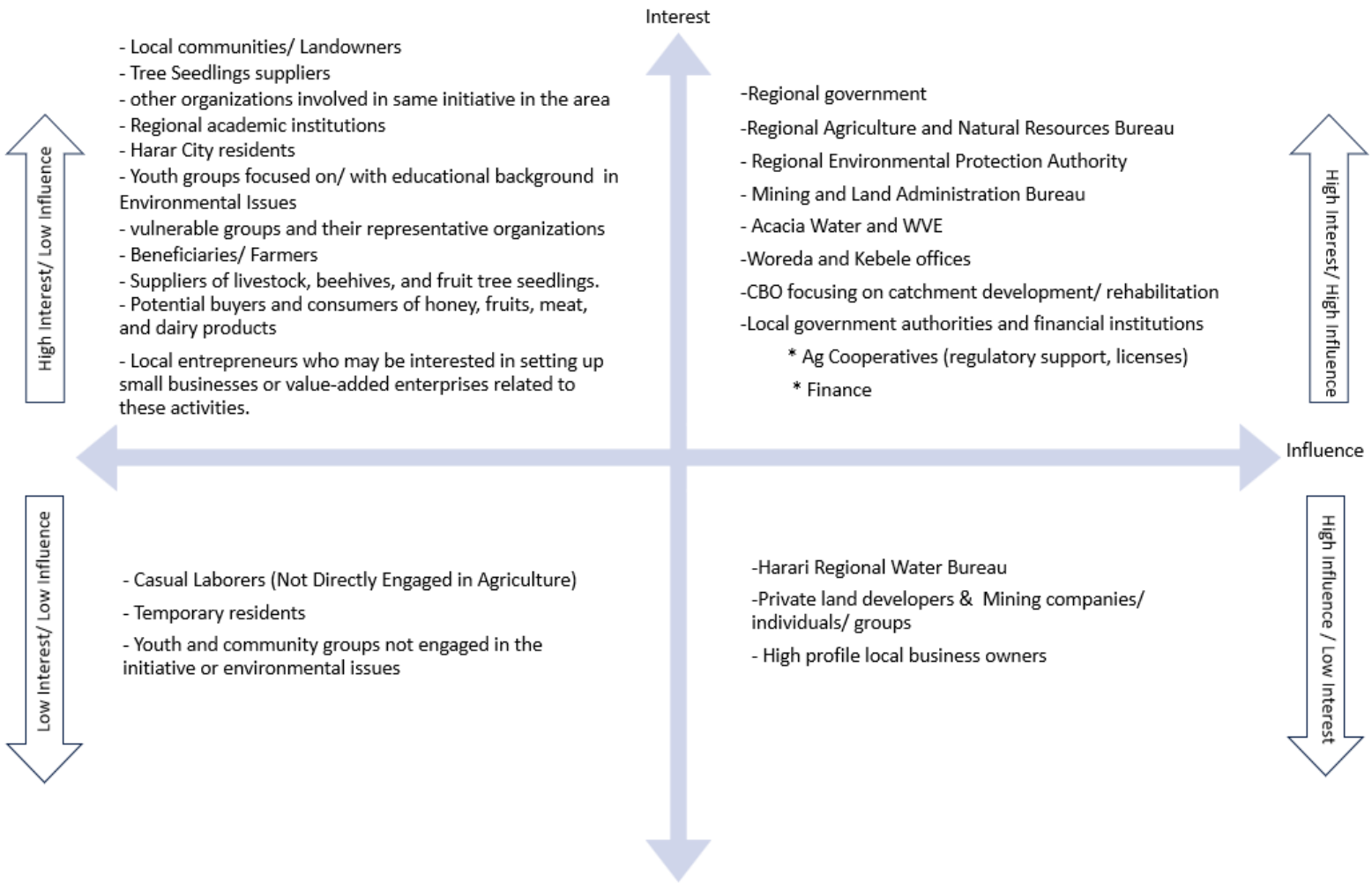

Figure 24. Stakeholder matrix of Harar (Hakim Gara catchment); influence Vs interest

Table 20. Potential interests and influence of identified stakeholders on the Burqaa Initiative

Stakeholder Category	Stakeholders	Potential Involvement in the Initiative
High Influence and High Interest	Regional Government	Active involvement in decision-making, policy formulation, and resource allocation for the initiative.
	Regional Agriculture and Natural Resources Bureau	Implementation of sustainable agricultural practices, collaboration in resource management.
	Regional Environmental Protection Authority	Monitoring and ensuring compliance with environmental regulations.
	Mining and Land Administration Bureau	Collaboration in ensuring sustainable land use practices and mining activities.
	Acacia Water and WVE	Collaboration in community-based water resource projects and environmental initiatives.
	Woreda and Kebele offices	Local-level implementation, community engagement, and land administration.
	CBO focusing on catchment development/rehabilitation	Active participation in catchment development projects and community awareness programs.
	Local government authorities and financial institutions	Providing financial support, regulatory guidance, and licenses for initiative activities.
High Interest and Low Influence	Tree Seedlings suppliers	Supplying tree seedlings, involvement in environmental conservation.
	Other organizations involved in the same initiative	Information exchange, collaborative efforts, and sharing of experiences in the same initiative.
	Regional academic institutions	Conducting research, knowledge sharing, and community engagement initiatives.
	City residents	Participation in awareness programs and community initiatives but with limited direct influence.
	Youth groups focused on/environmental issues	Involvement in community projects, awareness programs, and sustainable practices.
	Vulnerable groups and their representative organizations	Representing the interests of vulnerable groups, advocating for their needs, and participating in community development.
	Beneficiaries/Farmers	Direct beneficiaries, actively participating in and benefiting from the initiative.
	Suppliers of livestock, beehives, and fruit tree seedlings	Supplying livestock, beehives, and fruit tree seedlings for the initiative.
	Potential buyers and consumers of honey, fruits, etc.	Supporting sustainable production, buying and consuming the products.
	Local entrepreneurs interested in related activities	Establishing small businesses and value-added enterprises related to initiative activities.
	Bedele district educational offices	Inclusion of educational programs, community engagement, and environmental awareness initiatives.
	Local Women cooperatives	Active participation in economic opportunities and community projects.
	Local Youth Groups Focused on Environmental Issues	Involvement in community projects, awareness programs, and promoting sustainable practices.
	Bedele Women and Children Affairs Office	Representing women and children's welfare, advocating for community development.
High Influence and Low Interest	Harari Regional Water Bureau	Influencing policies and regulations related to water resource management.
	Private land developers & Mining companies/individuals/groups	Influencing land-use policies and regulations, ensuring compliance with development projects.
	High profile local business owners	Influencing local economic policies and development initiatives.
Low interest and Low Influence	Casual Laborers (Not Directly Engaged in Agriculture)	Influencing labor policies and participating in community development initiatives.
	Temporary residents	Participating in local community initiatives and adhering to local policies.
	Youth and community groups not engaged in the initiative	Advocating for diverse interests, participating in community engagement initiatives.

5.5 Identified Gaps in Land & Water Resource Management

The assessment results for both project areas are discussed in this section, along with a brief overview of the assessment tables for SWC, and Reforestation. The table with the indicator rating system can be found in Annex 2. Please note that this assessment focuses on the governmental institutions not the implementation parties of the burqa phase II initiative.

The assessment rating system for legal and institutional framework and Land Administration and Ownership is as follows:

- **++++ Formulated and fully functional:** If the legal and institutional framework is comprehensive, up-to-date, well-implemented, and consistently monitored, ensuring effective soil and water conservation governance. If land ownership is well-distributed, with equitable access and clear rights, and designated common land enabling effective implementation of soil and water conservation measures.
- **+++ Formulated but not fully implemented:** If there are sufficient laws and robust institutional frameworks that address soil and water conservation effectively, providing clear guidelines and regulatory mechanisms. If there is a clear system of land ownership rights that supports soil and water conservation efforts, with mechanisms in place to address any disputes or challenges. But still no designated common land.
- **++ Formulated but not implemented:** If there are sufficient laws and robust institutional frameworks that address soil and water conservation effectively, however no clear guidelines and regulatory mechanisms. If there is a clear system of land ownership rights that supports soil and water conservation efforts, however, the enforcement is weak which leads.
- **+ The legal framework/institution arrangement:** If some inadequate laws or institutions do not address soil and water conservation, or if legal loopholes or conflicts are hindering effective governance in this regard. If there are no existing legal or institutional frameworks in place, or if the ones in place are outdated, obsolete, or non-existent. If there are unclear or contested land ownership rights, conflicts, or difficulties in implementing soil and water conservation measures. If there is widespread land grabbing, landlessness, or significant inequalities in land ownership, hindering effective soil and water conservation practices. and no designated area as common land

The assessment rating system for Integrated planning and management/ Intersectoral coordination and Stakeholder engagement and participation is as follows:

- **+++ Strong coordination:** If there is strong coordination and integration among sectors and agencies, with well-established mechanisms for integrated planning and management, ensuring efficient and effective soil and water conservation efforts. If there is active and meaningful engagement of all relevant stakeholders, ensuring their participation in decision-making processes, and fostering collaboration and consensus-building.
- **++ Medium coordination:** If there is some level of coordination and integration among different sectors and agencies, with mechanisms in place to support integrated planning and management for soil and water conservation. If there is

some level of stakeholder engagement and participation, with mechanisms in place to enable their input and involvement in decision-making processes related to soil and water conservation.

- **+ Weak Coordination:** If there is a lack of coordination and integration among different sectors and agencies involved in soil and water conservation, resulting in fragmented or contradictory approaches. If there is no coordination or collaboration among sectors and agencies, or if there is a complete lack of planning and management mechanisms. If there is limited or no involvement of relevant stakeholders in decision-making processes related to soil and water conservation, or if there is resistance or lack of interest from stakeholders. If there is complete exclusion of stakeholders from decision-making processes, or if there is active opposition or conflict among different stakeholder groups.

5.5.1 Hakim Gara Catchment/ Harar Region

This section provides an analysis of the Hakim Gara catchment/ Harar region IGA, SWC, and Reforestation governance processes. The table below shows the general assessment per sub- and main indicators, while a comprehensive paragraph demonstrating the results of the analysis of each indicator will follow. A full descriptive table of the governance assessment for SWC, and Reforestation, and IGA can be found in Table 27 and Table 28 respectively in the Annex.

SWC and Reforestation

Table 21. SWC and Reforestation Governance Assessment Hakim Gara catchment/ Harar

SWC & Reforestation	Rating
Indicator 1: Legal and institutional framework 1.1: Regional Legal Framework 1.2: Existence of specific legal frameworks/ guidelines 1.3: Presence of authorities and regulatory bodies 1.4: Enforcement and Implementation 1.5: Institutional Capacity	++
Indicator 2: Land administration and Ownership 2.1: Conflict resolution 2.2: Permitting and Licensing Efficiency	++
Indicator 3: Integrated planning and management/ Intersectoral coordination 3.1: Cross-Sectoral Collaboration 3.2: Cross-Sectoral Water and Environment Decision-making: 3.3: Policy/ legal framework alignment 3.4: Resource Integration	+
Indicator 4: Stakeholder engagement and participation 4.1: Participation Levels /Communication Effectiveness 4.2: Inclusivity 4.3: Feedback Incorporation	+

The analysis reveals several gaps in the Harar region's water and land governance, particularly in the legal and institutional framework. Despite adopting national water and land proclamations and developing an environmental proclamation, a comprehensive legal framework tailored to local environmental challenges is lacking. This gap hinders effective implementation and may result in decisions that are not environmentally friendly or water-wise. Closing this void requires the creation of sector-specific legal instruments for better decision-making aligned with environmental considerations. Additionally, challenges in fully implementing the national proclamation arise due to capacity issues in institutions responsible for water and land administration, constituting another major gap.

Further evaluation by implementers and responsible bodies including governmental institutions themselves selves of these institutions is necessary, emphasizing continuous improvement in functionality and coordination to enhance overall governance. Strengthening enforcement mechanisms through initiatives such as capacity-building, increased monitoring, and the introduction of incentives or penalties is crucial for rigorous compliance with laws.

In land administration and ownership, a gap is identified in permitting and licensing efficiency, this is due to the Woreda offices not considering or aligning with the regional agriculture office. In the process they neglect environmental impacts and communal land ownership, posing challenges for SWC projects. Addressing this requires improved training and communication strategies, a comprehensive review of institutional roles, and a revision of permitting procedures for more sustainable initiatives. Integrated planning and management/intersectoral coordination reveal gaps in horizontal coordination mechanisms, affecting collaboration across water and land administration agencies. Cross-sectoral decision-making lacks integration of water-wise and environmentally friendly measures, necessitating legal instruments mandating such considerations. Coherence in policies and regulations across sectors is lacking, requiring a comprehensive review and revision of legal frameworks. Weak collaboration between cross-sectoral institutions highlights the need for mechanisms supporting resource integration and improved data management systems for optimal efficiency in soil and water conservation.

Stakeholder engagement and participation gaps exist in the extent of community involvement in SWC and reforestation initiatives. Broadening stakeholder engagement throughout the entire SWC and reforestation process is crucial, emphasizing continuous communication and collaboration for enhanced effectiveness. The recognized gap in sustaining the engagement of vulnerable groups underscores the need for mechanisms ensuring long-term benefits and meaningful participation. Closing the feedback incorporation gap involves establishing structured mechanisms for stakeholders to contribute to decision-making processes related to land and water governance, ensuring their input is systematically integrated.

5.5.2 Upper Dabena Catchment/ Oromia Region

This section provides an analysis of the Oromia region Upper Dabena catchment IGA, SWC, and Reforestation governance processes.

Table 23 below shows the general assessment per sub- and main indicators, while a comprehensive paragraph demonstrating the results of the analysis of each indicator will follow. A full descriptive table of the governance assessment for SWC, and Reforestation and IGA can be found in Table 29 and Table 30 respectively in the Annex.

SWC and Reforestation

Table 22. SWC and Reforestation Governance Assessment Upper Dabena catchment/ Oromia region Bedele

SWC & Reforestation	Rating
Indicator 1: Legal and institutional framework 1.1: Regional Legal Framework 1.2: Existence of specific legal frameworks/ guidelines 1.3: Presence of authorities and regulatory bodies 1.4: Enforcement and Implementation 1.5: Institutional Capacity	++

Indicator 2: Land administration and Ownership 2.1: Conflict resolution 2.2: Permitting and Licensing Efficiency	++
Indicator 3: Integrated planning and management/ Intersectoral coordination 3.1: Cross-Sectoral Collaboration 3.2: Cross-Sectoral Water and Environment Decision-making: 3.3: Policy/ legal framework alignment 3.4: Resource Integration	+
Indicator 4: Stakeholder engagement and participation 4.1: Participation Levels /Communication Effectiveness 4.2: Inclusivity 4.3: Feedback Incorporation	++

The legal and institutional framework for SWC and Reforestation in the Oromia region is well established, in consideration of the local environmental setup and challenges. These comprehensive legal frameworks focus on reforestation, SWC, and Sustainable land management with respect to the national proclamations and IWRM principles. However, further development is needed in implementing proclamations and legal instruments to ensure water-wise and environmentally friendly decisions across various sectors by the responsible bodies from governmental institutions. Challenges in enforcing existing laws are attributed to institutional capacity issues, emphasizing the critical importance of addressing these gaps for effective governance. Recommendations to address these gaps will be included in the practical catchment management plan that will be prepared by Acacia Water in consultation with the regional and woreda experts and WVE.

Regarding land administration and ownership, the governance structure exhibits both strengths and challenges. Conflict resolution mechanisms are partially in place but require further development for full effectiveness. Existing permitting and licensing procedures need substantial improvement, particularly in considering environmental impacts. This gap is not only because of land administration but also because of the weakness in intersectoral coordination.

According to different research, the integration of water-wise and environmentally friendly measures into decision-making processes is not strong. On the other hand, the cross-sectoral coordination horizontally (institutions at the same level) as well as vertically (from higher-level institutions to kebele level) is underperforming resulting in making decisions that are not environmentally friendly. The other main reason for this is mandate overlap with the institutions. The weak alignment between policy and legal frameworks, coupled with inadequate resource integration, underscores the necessity for enhanced collaboration and organizational efforts.

Stakeholder engagement and participation emerge as areas requiring improvement, with both formal and informal mechanisms for community involvement being weak. This necessitates the establishment of enhanced communication channels. While measures exist to increase the involvement of vulnerable groups, efforts need to be more effective to ensure sustained and meaningful participation. The ongoing work in progress involves incorporating stakeholder feedback into decision-making processes, highlighting the need for continuous efforts toward full integration.
Oromia region.

5.6 Conclusion and Recommendation

This chapter contains the general summary of the findings of the governance assessment followed by recommendations to support the burqa phase II initiative implementers to tackle the identified gaps during the implementation of the interventions and afterward for the sustainability of the interventions.

5.6.1 Conclusion

The governance assessments of the Hakim Gara Catchment in the Harar region and the Upper Dabena Catchment in the Oromia region reveal a range of common challenges along with some unique differences in their legal and institutional frameworks, capacity issues, coordination mechanisms, and stakeholder engagement.
Both catchments face a significant need for the development of sector-specific legal instruments that address local environmental challenges. Enhancing the capacity of institutions responsible for water and land administration is crucial to facilitate the effective implementation of national proclamations. Training and communication strategies are necessary to improve permitting and licensing efficiency, especially with regard to environmental impacts and communal land ownership. Furthermore, integrating water-wise and environmentally friendly measures into cross-sectoral decision-making processes requires a thorough revision of existing legal frameworks to ensure coherence in policies and regulations.

Coordination and data management systems in both regions need strengthening to optimize efficiency in soil and water conservation efforts. Improved collaboration and resource integration are vital, as is the development of robust data management systems to support coordinated activities. Stakeholder engagement is another area with notable gaps, emphasizing the importance of continuous communication, collaboration, and structured mechanisms for community involvement in decision-making processes. Enhancing engagement with vulnerable groups necessitates improved communication channels and more effective participation efforts.

In the Hakim Gara catchment, a more pronounced emphasis on environmentally friendly and water-wise decision-making in their legal instruments is needed. Training, communication strategies, and a comprehensive review of institutional roles are particularly critical for improving permitting and licensing efficiency in this region. On the other hand, the Upper Dabena Catchment possesses well-established legal and institutional frameworks for Soil and Water Conservation (SWC) and reforestation, aligning with national proclamations and Integrated Water Resources Management (IWRM) principles. However, challenges remain in implementing these frameworks effectively. The governance structure for land administration and ownership in Upper Dabena exhibits strengths, but conflict resolution mechanisms and permitting procedures require further development.
Addressing the identified gaps in both catchments is essential for achieving effective governance, environmental sustainability, and community involvement in decision-making processes. By developing sector-specific legal instruments, enhancing institutional capacity, improving coordination, and strengthening stakeholder engagement, both the Hakim Gara and Upper Dabena catchments can progress towards sustainable management and utilization of their water and land resources.

5.6.2 Recommendation

Based on the governance baseline analysis, several critical gaps have been identified in both project areas. These gaps pose challenges to the successful implementation and sustainability of the project's interventions. While the implementers cannot develop legal instruments or frameworks, some recommendations can enhance the project's effectiveness and contribute to its long-term success.

- **Collaboration with relevant governmental bodies:** Since the implementers cannot develop legal frameworks, collaboration with relevant governmental bodies and advocacy for the creation of sector-specific legal instruments addressing local environmental challenges should be prioritized. Building partnerships with government entities can facilitate the development of supportive legal structures. Collaboration with governmental bodies for a comprehensive review of institutional roles, enhanced training, and improved communication can address capacity constraints and overlapping mandates. The implementers should advocate for environmentally conscious permitting procedures within existing legal frameworks. Collaboration with government agencies for the establishment of coordination mechanisms and advocacy for policies supporting integrated initiatives are crucial. The implementers can contribute by showcasing successful models and best practices as Burqaa phase I, influencing policy discussions and resource allocation.
- **Capacity Building:** To address these capacity challenges, the suggested approach involves targeted capacity-building activities. This includes tailored training programs, workshops, and resources aimed at bolstering the specific areas of expertise required for effective water and land administration. This capacity building activities involve training programs and strategic measures to enhance institutional capabilities, ensuring effective implementation of legal frameworks including technical, legal, agricultural/agronomic, institutional, and community engagement capacities. Technical capacity building may involve understanding hydrological processes and sustainable land use planning, while legal capacity encompasses knowledge of permits, regulatory requirements, and effective enforcement of related laws. Agricultural/agronomic capacity focusing on implementing sustainable agricultural practices and optimizing land productivity. While institutional capacity involves enhancing coordination, communication, and data management within water and land administration institutions. Both AW and WVE used this strategy in Burqaa Phase I, and it is crucial to carry it out further in Phase II as well.
- **Develop Community-Centric Engagement Strategies:** Implement community-focused strategies to broaden stakeholder engagement throughout the entire SWC and reforestation process. Establish continuous communication channels, ensuring communities are involved in the planning, implementation, and evaluation stages. This grassroots approach fosters sustained involvement and collaboration. This approach was implemented during Burqaa phase I by WVE and the results were excellent, following the same approach during the second phase as well is crucial.
- **Targeted Inclusivity Initiatives:** Shift the focus from numerical equality to mechanisms (such as affirmative action, awareness and sensitization, developing youth and gender mainstreaming guidelines, etc.) ensuring long-term benefits and

sustained engagement of vulnerable groups. Develop targeted strategies addressing the unique needs of vulnerable communities, ensuring meaningful and ongoing participation. This ensures inclusivity goes beyond representation to real and sustained engagement.

- **Structured Feedback Mechanisms:** Establish structured mechanisms for stakeholders to provide feedback and actively contribute to decision-making processes. This involves creating platforms where diverse perspectives are considered, ensuring that stakeholder input is systematically integrated. This step enhances transparency and inclusivity in governance.
- **Establish Robust Monitoring Systems**: Implement robust monitoring and evaluation systems to track the progress of the project, assess the effectiveness of interventions, and identify areas for improvement. By Conducting a regular review of the project's performance against set indicators, adapting strategies as needed to address emerging challenges and capitalize on successes and will assist in developing exit strategy and Guidelines.
- **Guideline Development:** Following a comprehensive gap analysis of the Burqa Project, critical deficiencies in the governance processes related to soil and water conservation (SWC), reforestation, and income-generating activities (IGA) have been unveiled. To address these gaps, the implementation of a strategic and well-defined set of guidelines becomes imperative for guiding the project's trajectory. Given the constraints faced by implementers in developing a legal framework, the proposed guidelines will specifically target key areas such as SWC, reforestation, IGA, inclusiveness, intersectoral coordination, and community ownership. In the realm of SWC and reforestation, the guidelines will focus on delineating best practices, introducing step-by-step procedures for planning and implementation, and incorporating measures for assessing environmental impacts. Simultaneously, for Income-Generating Activities, the guidelines will be designed to empower communities through licensing, training, market access facilitation, and subsidy distribution, with particular attention to the needs of vulnerable groups. The inclusiveness and intersectoral coordination guidelines will emphasize mechanisms for community involvement, collaboration, and coordination at every project stage. Lastly, the community ownership guidelines will seek to instill a sense of ownership, promote active participation, and empower local communities for sustained project maintenance.
- **Exit Strategy Development:** An integral component of the overall project framework is the development of a comprehensive exit strategy to ensure the sustainability of outcomes beyond the implementation period. The exit strategy will be outlined in phases, strategically designed to uphold the progress achieved during the project's tenure. Roles and responsibilities will be clearly defined for community members, local institutions, and relevant stakeholders to ensure a smooth transition and continued success post-implementation. To monitor and evaluate the impact of the exit strategy, robust mechanisms will be established, allowing for ongoing assessment and identification of areas requiring sustained support. The exit strategy will not only focus on project outcomes but will also encompass the broader community and institutional capacity building, aiming for a self-sustaining and resilient system. By delineating responsibilities, incorporating

feedback loops, and implementing rigorous monitoring, the exit strategy will act as a roadmap for a seamless transition, ensuring that the positive impacts of the Burqa Project endure and flourish.

6 Baseline assessments recommendations

The objective of the baseline assessments was to gain a clear insight into the current status quo in both project catchments; the Upper Dabena Catchment at Bedele and the Hakim Gara plateau with Harar City. The purpose of the various baseline components (biophysical, socio-economic and governance) was to first obtain a complete picture of each individual component and then look at the cross-linkages and thus form an integrated picture of the situation. Also, the baseline data could be used during monitoring and evaluation of impact analysis.

6.1 Main recommendations from the baseline assessments

Reviewing available information and reports and using Remote Sensing techniques, the biophysical baseline assessed main parameters such as topography, slope, climate, land use/land cover, soil, hydrology and geology per catchment. This resulted in an analysis of the current land degradation and therefore verifying the erosion vulnerability. If you reverse this, you can also translate it into opportunities or potential for landscape restoration, reforestation and SWC measures that can reverse the negative effects of erosion and soil loss. Please note: so far this is only from a purely biophysical perspective. The erosion vulnerability map on the one hand and the SWC potential map on the other were the two most important outputs of the Biophysical baseline assessment.

The socio-economic baseline had a focus to improve the effectiveness and sustainability of water compensatory measures, with support from residents as a key factor. In addition, it has been established that local food security is threatened by climate change and rainfall variability. Deficiencies in calorie intake and consumption among lower-income groups, and significant variations in land use, market and nursery accessibility were also examined. It should be highlighted that for the nutrition analysis, nationwide census data was used, which might not perfectly reflect the specific situation in Bedele and Harar. Three main recommendations are made from this:

1. When reforesting, especially (local/endemic) nut and fruit varieties should be considered in agroforestry or silvo-pastural systems, as this covers two of the four nutrition groups that are currently under-consumed. Moreover, reforestation with sustainable timber/wood management can reduce or alleviate the impact of fuel wood gathering.
2. Interventions addressing malnutrition from a value chain perspective should target meat, dairy and egg production, including the (improved) dairy processing, post-harvest efficiency and cooling aspects to make more efficient use of the source product and prolong shelf life.
3. Cultivation of pulse-producing plants (e.g. lentils or peas) can yield benefits beyond nutrition, as they also play a crucial role in soil health by fixing nitrogen, thereby improving soil moisture retention.

The governance baseline analysis identified several critical gaps in both project areas which pose challenges to the successful implementation and sustainability of the proposed interventions. It is believed that the following recommendations can enhance the project's effectiveness and contribute to its long-term success:

1. Collaboration with relevant governmental bodies and advocacy for the creation of sector-specific legal instruments addressing environmental challenges should be prioritized;
2. Capacity building through tailored training programs, workshops, and resources aimed at the specific expertise for effective water and land administration.
3. Develop community-centric engagement strategies to broaden stakeholder engagement throughout the entire SWC and reforestation process.

In addition, there are specific recommendations regarding: targeted inclusivity, structured feedback mechanisms, robust monitoring systems, catchment or SWC guideline development, and an exit strategy development. More details about this can be read in Chapter 5.

As Figure 25 shows, the specific baseline components are integrated into a shortlist of low-hanging fruits for water compensation interventions. By integrating the bio-physical, governance and socio-economic baseline components effectiveness and sustainability of interventions is expected. The next paragraphs present the results which are project area and location-specific recommended interventions that are considered low-hanging fruits.

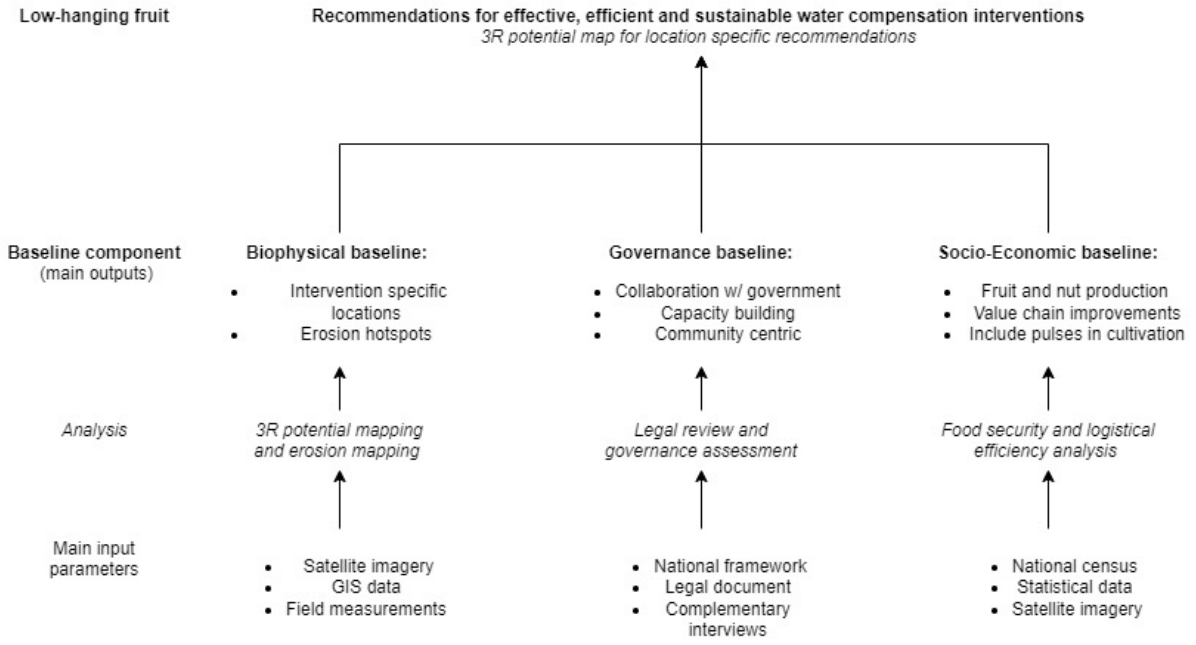

Figure 25. Integration of the baseline components for short listed low hanging fruits in the form of 3R potential maps

6.2 Shortlist of interventions and low-hanging fruit

For Burqaa water balancing work, several intervention measures were proposed and implemented during Burqaa phase I. In Burqaa phase II, an integrated and systematic methodology were developed using a SWC and water balancing suitability analysis (based on the 3R approach[1]) with a consideration of socio-economic aspects.

[1] '3R' stands for the Retention, Recharge and Reuse of (rain)water.

Based on Biophysical controlling factors, intervention measures were proposed for specific target kebeles. Generally, selection of intervention measures is developed as follows:

1. Determine the location of your focus area on the map. This can be a woreda or kebele, a micro catchment, or any other specific area or location.
2. Mapping the area of interest based on biophysical factors that constitute land use, land cover, slope, soil and Agro climatic zones. In socio economic mapping, the market based (income generating) and reforestation (environment) intervention is considered.
3. Determine and short list possible interventions which are possible and present in your focus area. Often you will find more than one intervention measures within a focus area
4. Look up in the intervention table, to decide which interventions are recommended for water balancing, carbon sequestration and socio-economic activities.

There are possible ways of interventions, including '**low-hanging fruit'** [2], that are readily applicable, both technically and economically. These interventions are typically:

- Low-tech
- Low-cost
- usually managed by the community; and
- easy to implement through participatory activities with minimum follow up and supervision.

For example, improved efficient water agricultural practices will help to improve food security and water balance. Planting trees with economic values can improve carbon sequestration and socio-economic activities. During Acacia's field visit late June/early July 2024, it was observed that the interventions are scattered sparsely. Multiple intervention types and integrated coordination from stakeholders, proper planning and decision making is important. For the success of the work and achieve the objectives of Burqaa phase II, we recommend possible alternatives to include in the implementation plan.

6.2.1 Bedele target kebeles

The following Figure 26 shows Bedele target area kebeles - SWC/ water balancing intervention suitability mapping based on biophysical parameters reclassified based on slope, land use land cover and agroclimatic zones. In Bedele target kebeles, the area receives a high amount of rainfall compared to Harar and is considered a moist agroclimatic zone. Due to magnitude of runoff and soil vulnerability to erosion land degradation were seen at highland parts of the target areas. As a result, soil fertility is low and vulnerable to termites. During Acacia's June/July '24 field visit it was observed large gullies are seen in the area. During the rainy season, the area is vulnerable to erosion which results in strong land degradation. While the catchment area in Bedele is mostly (rain)forest, soil loss and runoff magnitude as a result of agricultural landuse change and land degradation is still high. Therefore, as a recommendations gully plug and SWC measures are important. Additionally, sustainable land management and improved

2 **Low-hanging fruit** refers to interventions that are easily applicable, with minimum work task while resulting high impact.

agricultural practices could be possible alternative solutions to implement as landscape restoration interventions.

The land use and land cover are mostly classified as crop lands and forest. The top of plateau ridges like Gole Kora, Gole Seka and Gole maya are classified as crop and forest land. However, the areas are vulnerable to erosion and considered as erosion hot spots, where SWC measures are recommended. Additionally, income generating activities are possible for implementation.

Based on the 3R suitability mapping, the possible intervention measures are depicted in the look up table. The recommended intervention measures are recommended as water balancing and/or improved agriculture for livelihood improvement. The target area is mostly described with the green color that shows forestland while purple is a cropland with mixed farming. The possible interventions are soil/stone bunds, gabion check dams, planting fruit trees, cow fattening and poultry farm.

Additionally, the area has good potential for fish farming in low slopes and wetlands areas. Also, the community can work on fishing activities using artificial ponds. Please read the map and look up possible intervention measures shown in Table 23 for specific target kebeles.

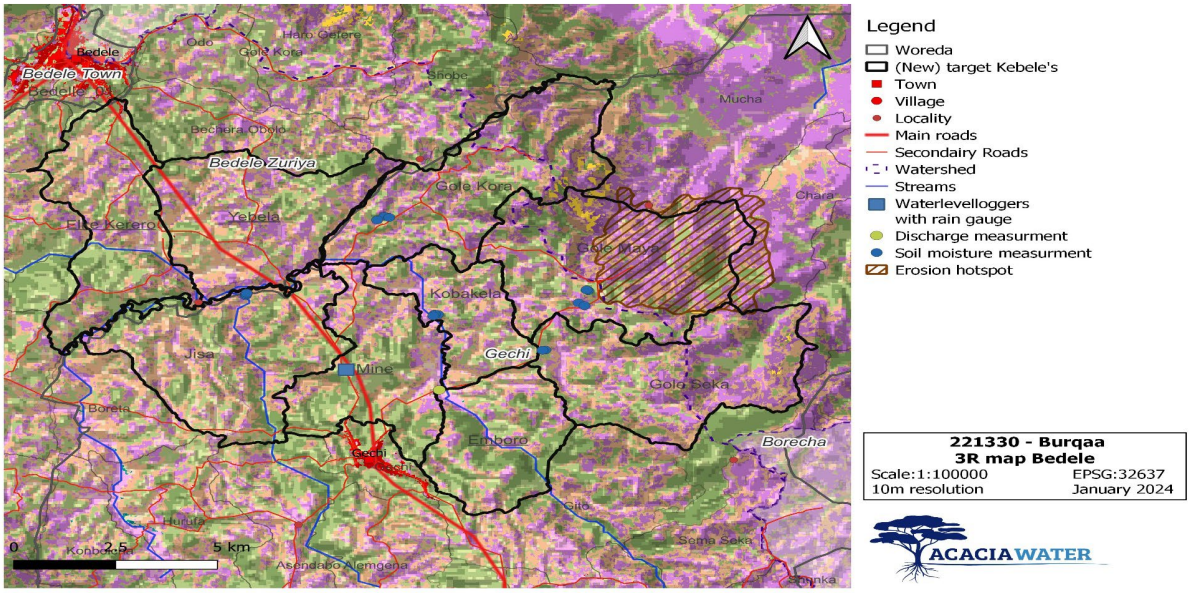

Figure 26. Biophysical 3R/ water balancing intervention suitability map - Bedele target area

6.2.2 Harar target kebeles

Harar target area kebeles - SWC/ water balancing intervention suitability mapping based on biophysical parameters reclassified based on slope, land use land cover and agroclimatic zones. In Harar target kebeles, the area receives low amount of rainfall compared to Bedele and considered as a dry agroclimatic zones. The land use and land cover are mostly classified as crop lands and followed by range lands. The top of plateau ridges like Hakim Gara plateau, Awumer and Harawe are classified as rangeland. Based on the 3R suitability mapping the possible intervention measures are depicted in the look up table. The map shows purple color – croplands, light yellow – rangelands and red color - urban areas/ homestead. The target area is mostly characterized with croplands, followed by rangelands. Also, the Harar city (homestead) areas have impacted the

downstream kebeles flood way drainage. In this case it is reccommended to use water treatment and Cutoff drains. Its agroclimatic zone is considered as and dry and its slope ranges between (5 to 30) %. At the ridges of the plateaus for Hakim Gara, Awumer and Harawe it is reccommended to practice soil and water conservation interventions. In addition to cash crops, it is recommended income generating trees in the rangelands. The range lands are favorable for beekeeping. Combination of different interventions will improve the water balances and livelihood improvements. Please read the map and look up possible intervention measures shown in Table 23. During Acacia's June/July '24 field-work mission it was observed that SWC and sustainable land management work are in practice in Hakim Gara catchment. Even though the Hakim Gara catchment is in a water stressed zone, water harvesting, and protection of springs are not properly in place. It is important for the community to support water harvesting, spring protection and efficient water use. It is recommended and possible to work on construction of artificial ponds and rooftop water harvesting that improve water availability.

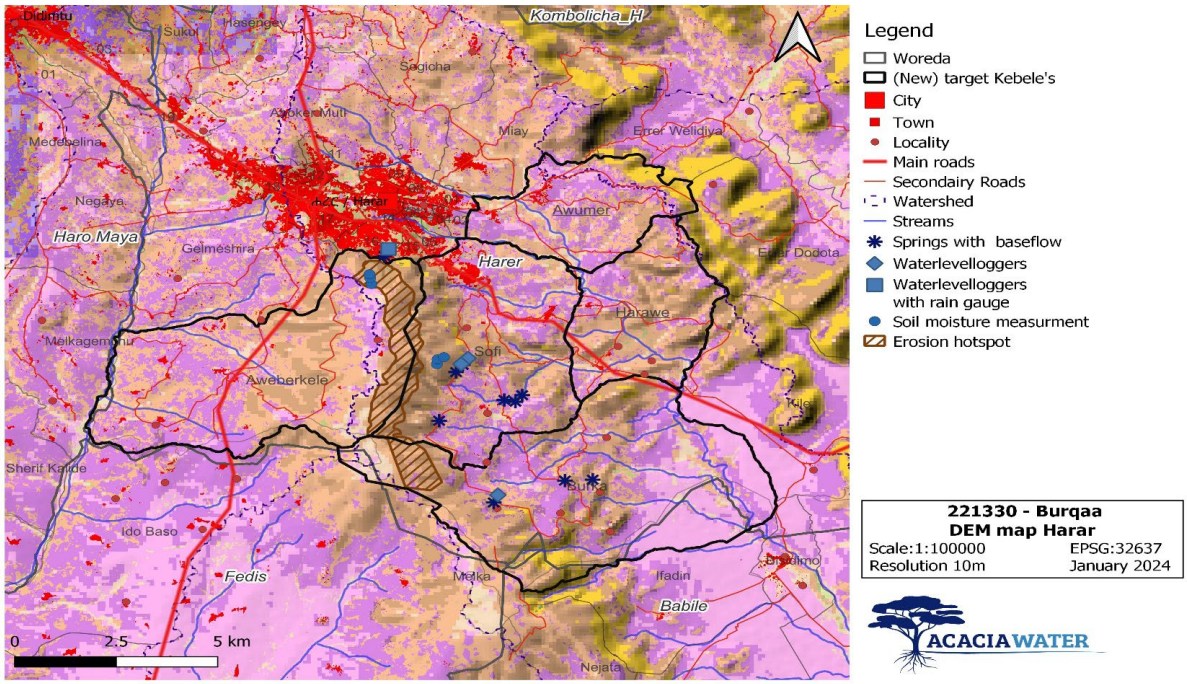

Figure 27. Biophysical 3R/ water balancing intervention suitability map - Harar target area

Table 23. Look up interventions – Bedele target areas – Burqaa Phase II

Biophysical controlling factors				Recommended water balancing, Agro-forestry, and livelihood improvement interventions			
Land cover	Agro-Climate	Slope class	Legend	Water balancing interventions		Improved Agriculture and Agroforestry	Livelihood improvement interventions
				Soil and Water conservation measures (SWC)	Water harvesting/recharging interventions		
Open forest	Dry	Flat (<5%)		Micro basins (Half-moons) Tie ridges/ grass strips Zai pits	Sand dams (On-stream) Harvesting surface run off Retention ditches	Reforestation Agro-forestry practice Seedlings Nursery sites	Bee hives Plantation of drought resistant fruit trees
		Low slope (5-15%)					
		Medium slope (15-30%)		Gabion check dams (on-stream) Soil /stone bunds Bench terraces	Runoff retention basinInfiltration ponds		
		High slope (>30%)		Area closure Bench terraces			
	Moist	Flat (<5%)		Micro basins (half-moons) Grass strips	Sand dams (On-stream) Harvesting surface run off Roof top water harvesting	Reforestation Agro-forestry practice Seedlings Nursery sites	Bee hives Plantation of fruit trees
		Low slope (5-15%)		Fanya Juu Stone/soil bunds			
		Medium slope (15-30%)		Check dams (On-stream)			

		High slope (>30%)		Area closure Bench terraces	-		-
Crop lands and mixed farming	Dry	Flat (<5%)		Pre-season ploughing Water conservation tillage Mulching Field bunds Fanya Juu Stone/soil bunds	Roof top water harvesting Construction of artificial pond (Off - stream) Sand dams (On-stream) Water retention ponds	Crop rotation Low tillage Compost Organic manure seedlings, providing drought resistant crops	Production of vegetables and crops Poultry farming Bee hives
		Low slope (5-15%)					
		Medium slope (15-30%)					Bee hives
		High slope (>30%)		Area closure Bench terraces			Bee hives
	Moist	Flat (<5%)		Field bunds Grass strips Tie ridges Fanya Juu Stone/soil bunds	Construction of artificial water retention ponds Roof top water harvesting	Improved varieties for seedlings, nursery sites Improved and hybrid breedings	Fish farm Vegetables and food crops Poultry farming Pig farming Cow fattening Dairy farm
		Low slope (5-15%)					
		Medium slope (15-30%)					
		High slope (>30%)		Gabion check dams Area closure			
Range lands	Dry	Flat (<5%)		Grass strips Zai pits Micro basins	Sand dams Infiltration ponds		Cow fattening and dairy farm Poultry farming Bee hives
		Low slope (5-15%)					

	Moist	Flat (<5%)		Micro basins Stone /soil bunds Gabion check dams	Sand dams Infiltration ponds		Pig farming Poultry farming Dairy farming Cow fattening Fish farming
		Low slope (5-15%)					
		Medium slope (15-30%)					
		Very steep (>30%) & Leptosols		Bench terraces Area closure			
Urban area/homesteads				Roof top water harvesting			
Permanent water/wetlands				Fish farming, pig farming, wetlands, and flood plain protection			
Wurch (elevation > 3,200 m asl)				Area closure and forestation			

Table 24. Look up interventions table – Harar target areas – Burqaa Phase II

Biophysical controlling factors				Recommended water balancing, Agro-forestry, and livelihood improvement interventions			
Land cover	Agro-Climate	Slope class	legend	Water balancing interventions		Improved Agriculture/ Agroforestry	Livelihood improvement interventions
				Soil and Water conservation measures (SWC)	Water harvesting/recharging interventions		
Open forest	Dry	Flat (<5%)		Micro basins (Half-moons) Tie ridges/ grass strips Zai pits,	Sand dams (On-stream) Harvesting surface run off Retention ditches	Reforestation Agro-forestry practice Seedlings Nursery sites	Bee hives Plantation of drought resistant fruit tree
		Low slope (5-15%)					
		Medium slope (15-30%)		Gabion check dams (on-stream) Soil /stone bunds Bench terraces	Runoff retention basin Infiltration ponds		
		High slope (>30%)		Area closure Bench terraces			
	Moist	Flat (<5%)		Micro basins (half-moons) Grass strips	Sand dams (On- stream) Roof top water harvesting Harvesting surface run off	Reforestation Agro-forestry practice Nursery sites Seedlings	Bee hives Plantation of fruit trees Bee hives
		Low slope (5-15%)		Fanya Juu Stone/soil bunds			
		Medium slope (15-30%)		Check dams			
		High slope (>30%)		Area closure Bench terraces			-

Crop lands and mixed farming	Dry	Flat (<5%)		Stone/soil bunds Pre-season ploughing Water conservation tillage Mulching Field bunds Fanya Juu	Roof top water harvesting Construction of artificial pond (Off -stream) Sand dams (On-stream) Water retention ponds	Crop rotation Low tillage Compost or organic manure Seedlings Drought resistant crops	Production of vegetables and crops Poultry farming Bee hives
		Low slope (5-15%)					
		Medium slope (15-30%)				-	Bee hives
		High slope (>30%)		Area closure Bench terraces		-	Bee hives
	Moist	Flat (<5%)		Field bunds Grass strips Tie ridges Fanya Juu Stone/soil bunds	Construction of artificial water retention ponds Roof top water harvesting	Improved varieties for seedlings, nursery sites, Improved and hybri breedings	Bee hives vegetables and food crops Poultry farming Cow fattening/ Dairy farm
		Low slope (5-15%)					
		Medium slope (15-30%)					
		High slope (>30%)		Gabion check dams Area closure			-
Range lands	Dry	Flat (<5%)		Grass strips Micro basins	Sand dams Infiltration ponds		Cow fattening and dairy farm Bee hives Poultry farming
		Low slope (5-15%)					
	Moist	Flat (<5%)					

				Micro basins Stone /soil bunds Gabion check dams	Sand dams Infiltration ponds		Pig farming Poultry farming Fish farming Cow fattening Dairy farming
		Low slope (5-15%)					
		Steep slope (15-30%)					
		High slope (>30%)		Bench terraces Area closure			
Urban area/homesteads				Roof top water harvesting			
Permanent water/ Wetlands				Fish farming, pig farming, wetlands, and flood plain protection			
Wurch (elevation > 3,200 masl)				Area closure and forestation			

6.3 Two inspirational case studies

Case studies are proposed for intervention possibilities in the target areas. This case study leaflet serves as inspiration and as quick search for possible intervention used by stakeholders. For example, environmentalist, natural resource conservatist, implementers, policy makers, engineers and agricultural sector could use this leaflet during feasibility stage that proceed to next phase of implementation. The case studies show the procedure how to practically apply 3R /SWC suitability mapping and search for possible interventions in the look up table. The intervention is applicable on the catchment approach and, there is possibility to consider kebele as input entity. To improve water balance SWC and water recharging measures are possible in addition to agroforestry and reforestation measures which could improve livelihood of the society.

Case studies are proposed in target areas with intervention possibilities. It shows the detail description of biophysical parameters and shown with 3R mapping. For water balancing and livelihood improvement possible priorities are presented in detail. Case study 1 represents Awumer kebele and case study 2 focuses on high land parts of Bedele catchment.

In case study 1, in Awumer kebele of Harari Region, the slope is from flat to moderate and covered with croplands like chat and sorghum. several alternative intervention measures were proposed to implement like restoration eroded lands, cow fattening, poultry farming and controlled grazing.

In case study 2, highlands of Gole kora kebele of Bedele zone is highly vulnerable to erosion. Therefore, restoration of eroded lands, promotion of sustainable agricultural practices and area-controlled grazing practices are recommended respectively in priority set up. Both cases are shown in the following diagram case study 1 and case study 2.

[INSERT CASE STUDY 1: HARAR TARGET AREAS AWUMER KEBELE HERE AS PDF AND ON A3 FORMAT!]

[INSERT CASE STUDY 2: CATCHMENT APPROACH FOR HIGHLANDS - BEDELE HERE AS PDF AND ON A3 FORMAT!]

6.4 Towards practical catchment strategies and monitoring

With the practical SWC potential map created, with socioeconomic and governance aspects integrated and quick-scan of low-hanging fruits for catchment restoration identified, Objective 1 and part of Objective 2 of Acacia Water's services is largely concluded. The remaining activities under Objective 2 'Increasing water balance activity measures' include:

- Activity 2.4. Development of practical catchment management strategies
- Activity 2.5. Collect strategies in practical catchment management guidelines
- Activity 2.6. Joint development and validation workshop of the catchment management guidelines

Hence, in the coming weeks (i.e. in Q3 of 2024) Acacia Water will initiate together with key stakeholder the joint or co-development of catchment management strategies for each catchment based on the 'water balancing suitability assessment' or baseline assessments as presented in this report (i.e. Objective 1). Subsequently, the outcomes of this activity and the strategies formulated will be collected into practical catchment management guidelines which are relevant and applicable to local authorities and implementers, including clear, practical and contextualized procedures for effective governance and coordination. Since Acacia Water does not claim to influence or even take over the formulation of local policies and procedures, the suggestion is to further co-develop and validate the formulated catchment management strategies & guidelines with the key stakeholders during a joint, one-day workshop per catchment which will conclude Objective 2.

In addition, SWC implementation by WVE is currently taking place (early 2024) in both catchments. It is therefore also important to look with some urgency at setting up and strengthening the monitoring network, including the associated approach and strategy. All this is part of Objective 6 'Undertaking sound MEAL and reporting mechanisms', of which the emphasis in the coming weeks (i.e. in Q2 of 2024) will mainly be on the following components:

- Re-evaluate and re-formulate the setup and division between telemetric and manual monitoring and instruments into a revised strategy/approach (Q2 2024).
- Continue and expand (doubling) of Hydrological monitoring network (Q3 2024)
- Monitoring the impact of landscape restoration measures on water availability, using:
    - Telemetric/manual hydrological monitoring at strategic locations
    - Telemetric /manual soil moisture measurements in each intervention + reference plot
    - In-plot infiltration/runoff measurements
    - Auxiliary impact assessment through Remote Sensing to support on-the-ground results and validation
- Making sure that all monitoring activities are in line with and contributing to the 'Volumetric Water Benefit Accounting' (VWBA) method, developed by the World Resources Institute (WRI, 2019), which is a method for implementing and valuing water stewardship activities.

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Annex

Annex 1: Governance Assessment

Legend		
	Indicators 1 and 2	Indicators 3 and 4
++++	Formulated and fully functional in all aspects/ including legal frameworks designated for that specific area	
+++	Formulated but not fully implemented due to different reasons	Strong coordination
++	Formulated but it is not being implemented there is a plan/ no specific legal framework for that area/ action to go forward with it	Acceptable coordination
+	The legal framework/institution arrangement does not exist and there is no plan to develop it	Weak Coordination

Hakim Gara Catchment/ Harar

Table 25. SWC and Reforestation Governance Assessment Hakim Garar Catchment/ Harar region

SWC and Reforestation							
Indicator 1: Legal and institutional framework		In place implemented	In place and partly implemented	In place but not implemented	Not in place	Description/ Evidence	Rating
Sub-indicators	1.1: Regional Legal Framework Existence of a regional water and land management legal framework. Adoption of national proclamations or development of separate regional proclamations. Development of legal instruments ensuring water-wise and environmentally friendly decisions in other sectors.		X			Harar region adapted the national water and land proclamation and developed an environmental proclamation. However, a designated legal instrument for Harar in consideration of the environmental issues and challenges and considering the situation in the area has not developed. The national proclamation as well is not fully implemented due to capacity and other challenges in the institutions.	++
	1.2: Existence of specific legal frameworks/ guidelines Are legal frameworks or instruments developed to ensure that decisions taken in other sectors are water-wise and environmentally friendly?				X	There are no specific legal frameworks or instruments developed in the region to ensure that decisions taken consider environmental impacts except for the proclamation developed by the environmental office	
	1.3: Presence of authorities and regulatory bodies Existence of institutions responsible for land and water governance including land and water management authorities, and regulatory bodies up to the lower level	X				Institutions responsible for water and land administration exist from regional to kebele level	

	1.4 Enforcement and Implementation: Enforcement and implementation of water and land management laws.		X			The legal framework is being implemented but not effectively.	
	1.5 Institutional Capacity: Do institutions have adequate autonomy, staff, and budget to carry out their functions?			X		even though the institution arrangement exists from higher to lower levels the capacity of staff, subsidy, and autonomy from higher to lower levels is in inadequate.	
Indicator 2: Land Administration & Ownership							
Sub-indicators	2.1: Conflict resolution Examination of mechanisms in place for resolving legal disputes related to the initiative. Assessment of the effectiveness and accessibility of alternative dispute resolution methods. Evaluation of the legal framework's ability to handle conflicts among stakeholders.			X		even though the legal framework exists the institutional arrangement at different levels is lacking due to capacity and miscommunication as well as mandate overlap	++
Sub-indicators	2.2 Permitting and Licensing Efficiency: Analysis of the efficiency and transparency in the issuance of necessary permits and licenses. Tracking the time required for stakeholders to obtain legal approvals for project activities. Evaluation of the accessibility and clarity of information regarding permitting processes.			X		the permitting and licensing took place in the woreda offices how however this permits/ ownership of land didn't consider environmental impact as well as communal land. One of the main challenges in Harar is land ownership since land ownership certificates are given by the woreda offices even though the land is supposed to be common land. Because of this every time any initiative for SWC is in place it is hard to find land that is not owned by a community.	
Indicator 3: Integrated planning and management/ Intersectoral coordination		Strong coordination	Medium coordination	Weak Coordination			
Sub-indicators	3.1: Cross-Sectoral Collaboration Horizontal coordination mechanisms at each level. (Is the water, and land administration system harmonized, integrated, standardized, and coordinated across relevant agencies and responsible authorities across relevant governance scales?)			X		No cross-sectoral coordination	+
Sub-indicators	3.2: Cross-Sectoral Water and Environment Decision-making: Integration of Water-Wise and Environmentally Friendly Measure Evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.			X		There is no integration of Water-Wise and Environmentally Friendly Measures or evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.	
Sub-indicators	3.3: Policy/ legal framework alignment The degree to which policies and regulations across different			X		The policies and regulations across different sectors are not aligned to support the overall objectives of the integrated initiative.	

	sectors are aligned to support the overall objectives of the integrated initiative.					
	3.4: Resource Integration The extent to which resources, both financial and human, are integrated and shared among different sectors to optimize efficiency and effectiveness in implementation. Data and projections on water and land demanded from agriculture, industry (including energy) and households available and used to guide decisions on competing uses now and in the future?			X	Since the integration between cross-sectoral institutions is weak the extent to which resources, both financial and human, are not well integrated and shared among different sectors to optimize the efficiency and effectiveness of SWC and Reforestation activities. also, the availability of data on future water and land demand projections is not well organized.	
Indicator 4:Stakeholder engagement and participation						
Sub-indicators	4.1: Participation Levels /Communication Effectiveness Are there formal and informal mechanisms to engage stakeholders?			X	communities are involved in SWC implementations in community mobilization how ever their involvement ends in that.	+
	4.2: Inclusivity Are there measures designed to increase the involvement and benefits for vulnerable groups?		X		the institutions put in the effort to increase the involvement of vulnerable groups however it needs improvement Mostly, they just focus only on making sure the number of participants is equal not on developing other mechanisms to ensure the sustainability of their involvement.	
	4.3: Feedback Incorporation Are stakeholders involved in land and water governance processes and decision-making?			X	there are no mechanisms developed to involve stakeholders in the decision-making process	

Table 26. IGA Governance Assessment Hakim Garar catchment/ Hara region

IGA							
Indicator 1:Legal and Institutional framework		In place implemented	In place and partly implemented	In place but not implemented	Not in place	Description/ Evidence	Rating
	1.1 Presence and Capacity of Institutions: Existence of institutions responsible for licensing, providing training and subsidy, and facilitating market access		X			cooperatives are well formulated and functional however when it comes to training the community, facilitating market access, and subsidy there is a shortage in capacity.	+++
Indicator2: Land administration & Ownership							

Sub-indicators	2.1: Conflict resolution Examination of mechanisms in place for resolving legal disputes related to the initiative. Assessment of the effectiveness and accessibility of alternative dispute resolution methods. Evaluation of the legal framework's ability to handle conflicts among stakeholders.			X		even though the legal framework exists the institutional arrangement at different levels is lacking due to capacity and miscommunication as well as mandate overlap	++
	2.2 Permitting and Licensing Efficiency: Analysis of the efficiency and transparency in the issuance of necessary permits and licenses. Tracking the time required for stakeholders to obtain legal approvals for project activities. Evaluation of the accessibility and clarity of information regarding permitting processes.			X		the permitting and licensing took place in the woreda offices however these permits/ ownership to land didn't consider environmental impact as well as communal land	
Indicator 3: Stakeholder engagement and participation		Strong coordination	Medium coordination	Weak Coordination			
Sub-indicators	3.1 Participation in Decision-Making Level of community involvement in planning and decision-making for income-generating activities. Existence of mechanisms for community feedback and suggestions.			X		the community is not involved in decision-making	++
	3.2 Social Inclusivity Representation of different demographic groups in income-generating initiatives. Measures in place to ensure marginalized groups' participation and benefit.		X			the institutions put in the effort to increase the involvement of vulnerable groups however it needs improvement Mostly, they just focus only on making sure the number of participants is equal not on developing other mechanisms to ensure the sustainability of their involvement.	
Indicator 4: Integrated planning and management/ Intersectoral coordination							
Sub-indicators	4.1: Cross-Sectoral Water and Environment Decision-making: Integration of Water-Wise and Environmentally Friendly Measure Evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.			X		There is no integration of Water-Wise and Environmentally Friendly Measures or evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.	++
	4.2 Environmental Sustainability: Resource Management Practices: Adoption of sustainable resource management practices. Mitigation measures are in place for environmental impact. Climate		X			Some of the side-generating activities being implemented focus on reforestation, animal feed, integrating livestock with crop farming, and beekeeping which are environmentally	

	Resilience: Implementation of climate-resilient practices in income-generating activities. Adaptation measures in response to changing climatic conditions.				friendly but still need more work to ensure income-generating activities are environmentally friendly	

Upper Dabena Catchment/ Bedele

Table 27. SWC and Reforestation Governance Assessment Upper Dabena catchment/ Oromia region Bedele

SWC and Reforestation							
Indicator 1: Legal and institutional framework		In place implemented	In place and partly implemented	In place but not implemented	Not in place	Description/ Evidence	Rating
Sub-indicators	1.1: Regional Legal Framework Existence of a regional water and land management legal framework. Adoption of national proclamations or development of separate regional proclamations. Development of legal instruments ensuring water-wise and environmentally friendly decisions in other sectors.		X			The Oromia region has partially implemented a regional legal framework for water and land management, incorporating elements of national proclamations. However, there is ongoing work needed for full implementation, particularly in developing separate regional proclamations and legal instruments for environmentally friendly decisions.	++
	1.2: Existence of specific legal frameworks/ guidelines Are legal frameworks or instruments developed to ensure that decisions taken in other sectors are water-wise and environmentally friendly?			X		While legal frameworks exist, their implementation is lacking in ensuring water-wise and environmentally friendly decisions in other sectors.	
	1.3: Presence of authorities and regulatory bodies Existence of institutions responsible for land and water governance including land and water management authorities, and regulatory bodies up to the lower level		X			Authorities and regulatory bodies exist, but there is ongoing work needed for full implementation and coordination across relevant governance scales.	
	1.4 Enforcement and Implementation: Enforcement and implementation of water and land management laws.			X		The legal framework is in place, but there are challenges in its effective implementation, requiring improved enforcement mechanisms.	
	1.5 Institutional Capacity: Do institutions have adequate autonomy, staff, and budget to carry out their functions?				X	Institutional capacity is weak, requiring attention to enhance autonomy, staff, and budget for effective functioning.	
Indicator 2: Land Administration and Ownership							
Sub-indicators	2.1: Conflict resolution Examination of mechanisms in place for resolving legal disputes related to the initiative. Assessment of the effectiveness and accessibility of alternative dispute resolution methods.		X			Conflict resolution mechanisms are partially in place, with ongoing efforts needed for full implementation and effectiveness.	++

	Evaluation of the legal framework's ability to handle conflicts among stakeholders.						
	2.2 Permitting and Licensing Efficiency: Analysis of the efficiency and transparency in the issuance of necessary permits and licenses. Tracking the time required for stakeholders to obtain legal approvals for project activities. Evaluation of the accessibility and clarity of information regarding permitting processes.			X		Permitting and licensing procedures are in place but face challenges in effective implementation, particularly in considering environmental impacts and communal land ownership.	
Indicator 3: Integrated planning and management/ Intersectoral coordination		Strong coordination	Medium coordination	Weak Coordination			
Sub-indicators	3.1: Cross-Sectoral Collaboration Horizontal coordination mechanisms at each level. (Is the water, and land administration system harmonized, integrated, standardized, and coordinated across relevant agencies and responsible authorities across relevant governance scales?)			X		Cross-sectoral collaboration mechanisms are weak, requiring improvement in harmonization and coordination across relevant agencies and governance scales.	+
	3.2: Cross-Sectoral Water and Environment Decision-making: Integration of Water-Wise and Environmentally Friendly Measure Evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.		X			Integration of water-wise and environmentally friendly measures is not fully implemented, indicating the need for further efforts in incorporating these practices into decision-making processes	
	3.3: Policy/ legal framework alignment: The degree to which policies and regulations across different sectors are aligned to support the overall objectives of the integrated initiative.			X		Policy and legal framework alignment is weak, requiring improvement for better support of integrated initiatives.	
	3.4: Resource Integration The extent to which resources, both financial and human, are integrated and shared among different sectors to optimize efficiency and effectiveness in implementation. Data and projections on water and land demanded from agriculture, industry (including energy), and households available and used to guide decisions on competing uses now and in the future?			X		Resource integration is weak, necessitating improved collaboration for efficient resource utilization and better-informed decision-making.	
Indicator 4: Stakeholder engagement and participation							

Sub-indicators	4.1: Participation Levels /Communication Effectiveness Are there formal and informal mechanisms to engage stakeholders?			X	Mechanisms for stakeholder engagement exist but require improvement in both formal and informal channels to enhance communication effectiveness.	++
	4.2: Inclusivity Are there measures designed to increase the involvement and benefits for vulnerable groups?		X		Efforts have been made, but there is a need for more effective measures to ensure meaningful involvement and benefits for vulnerable groups	
	4.3: Feedback Incorporation Are stakeholders involved in land and water governance processes and decision-making?		X		Stakeholders are partly involved, and ongoing efforts are needed for the full incorporation of feedback into land and water governance processes and decision-making.	

Table 28. IGA Governance Assessment Upper Dabena catchment/ Oromia region Bedele

Indicator 1:Legal and Institutional framework		In place implemented	In place and partly implemented	In place but not implemented	Not in place	Description/ Evidence	Rating
	1.1 Presence and Capacity of institutions: Existence of institutions responsible for licensing, providing training and subsidy and facilitating market access		X			Institutions are in place for licensing, training, subsidy provision, and market access facilitation. However, there is a capacity gap that needs assessment and improvement	+++
Indicator2: Land administration & Ownership							
Sub-indicators	2.1: Conflict resolution Examination of mechanisms in place for resolving legal disputes related to the initiative. Assessment of the effectiveness and accessibility of alternative dispute resolution methods. Evaluation of the legal framework's ability to handle conflicts among stakeholders.			X		There is a lack of clarity and mechanisms in resolving legal disputes related to income-generating initiatives. The legal framework's effectiveness in handling conflicts is not well-established	++
	2.2 Permitting and Licensing Efficiency: Analysis of the efficiency and transparency in the issuance of necessary permits and licenses. Tracking the time required for stakeholders to obtain legal approvals for project activities. Evaluation of the accessibility and clarity of information regarding permitting processes.			X		The permitting and licensing process lacks efficiency, transparency, and consideration for environmental impacts and communal land ownership, impacting the sustainability of initiatives.	
Indicator 3:Stakeholder engagement and participation		Strong coordination	Medium coordination	Weak Coordination			

Sub-indicators	3.1 Participation in Decision-Making Level of community involvement in planning and decision-making for income-generating activities. Existence of mechanisms for community feedback and suggestions.		X		There is limited community involvement in planning and decision-making for income-generating activities. Mechanisms for community feedback and suggestions are not well-established	++
	3.2 Social Inclusivity Representation of different demographic groups in income-generating initiatives. Measures in place to ensure marginalized groups' participation and benefit.		X		Efforts are made to increase the involvement of vulnerable groups, but the focus on equal representation needs improvement. Comprehensive strategies are required for sustained and meaningful involvement	
Indicator 4:Integrated planning and management/ Intersectoral coordination						
Sub-indicators	4.1: Cross-Sectoral Water and Environment Decision-making: Integration of Water-Wise and Environmentally Friendly Measure Evaluate the existence of legal frameworks or instruments ensuring that decisions in various sectors consider water-wise and environmentally friendly practices.		X		There is an absence of integration of Water-Wise and Environmentally Friendly Measures in decision-making processes across sectors. Legal frameworks for such considerations are lacking.	++
	4.2 Environmental Sustainability: Resource Management Practices: Adoption of sustainable resource management practices. Mitigation measures in place for environmental impact. Climate Resilience: Implementation of climate-resilient practices in income-generating activities. Adaptation measures in response to changing climatic.		X		Some income-generating activities focus on environmentally friendly practices, but additional efforts are needed for all activities to align with environmental sustainability principles.	

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