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Ethiopian Sugar Industry Group
እምቅ አቅምን ማልማት! Tapping the Potential!

ቀን Date መስከረም 2 0 2018
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ESIA Review, Study and Validation for Kuraz Sugar Development Project

FINAL REPORT

Submitted to: FDRE Sugar Corporation

By

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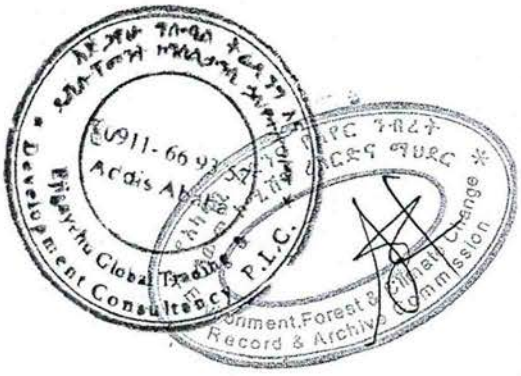
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Major Lists of Abbreviations, Units & Acronyms

ADB	Africa Development Bank
A/O	A For Hydrolysis ,O For Oxic
BP	Bank Procedure
CITES	Convention on International Trade in Endangered Species
CoPAI	Code of Practice for Agricultural Investment
CSA	Central Statistics Agency
CoEFCC	Commission of Forest, Environment and Climate Change
EAIEPA	Ethiopian Agricultural Investment and Environmental Protection Agency
ECWC	Ethiopian Construction Works Corporation
EEPCO	Ethiopian Electric Power Corporation
EMP	Environmental Management Plan
EMSs	Environmental Management Systems
EPA	Environmental Protection Authority
ESIA	Environmental and Social Impact Assessment
EWCA	Ethiopian Wildlife Conservation Authority
FDRE	Federal Democratic and Republic Ethiopia
FGD	Focus Group Discussion
GTP	Growth and Transformation Plan
Ha	Hectare
HHs	Households
ICOMS	International Council on Monuments and Sites
ILO	International Labor Organization
K	Potassium
MoA	Ministry of Agriculture
MoLSA	Ministry of Labor and Social Affairs
Movie	Ministry of Water ,Irrigation and Electricity

Masl	Meters Above Sea Level
MW	Mega Watt
N	Nitrogen
OP	Operation Policies
P	Phosprus
PLC	Private Limited Company
SNNPRS	Sothern Nation Nationalities People Regional State
TCD	Total Crushing Capacity per Day
UNEP	United Nations Environment Program
UNESCO	United Nations Education Science Culture Organization
UNIDO	United Nations Industrial Development Organization
WB	World Bank





1. EXECUTIVE SUMMARY

Omo Kuraz Sugar Development project is one of the sugar projects to be developed by FDRE Sugar Corporation declared in 2010 GC, GTP One, so as to achieve the main goals such as industrialized the areas, minimized the local sugar shortages, stopped importing and at large to export sugar. The location of is between $5^0$8'14''- $6^0$17'3''N and $35^0$43'44''-$36^0$13'39''E within the ranging of 373 to 477 masl, Lower Omo Valley, SNNPRS, Ethiopia.

As of any project, Environmental and Social Impact Assessment (ESIA) and other feasibility studies conducted to fulfill the requirements of the project. However, the implementation of the project has met many challenges to go as to the plan due to financial constraints, poor project management (including contract administration), partial areas of the project taken by government for other agricultural investmentand others. To ascertain more the sustainability of the projectdevelopment, in addition to the aforementioned facts, caused to decide theCorporation to revise the main feasibility study documents including the ESIA.

Ejigayehu Consultancy plc, behalf of the JVs of ABEL, Ejigayehu, and Hydro Land Consulting plcs, signed an agreement to prepare the ESIA Review, Study and Validation for Kuraz Sugar Development.

The existing status of the project indicates that it is under the implementation and operation stages.

The total proposed revised irrigation lands are net 100,000 ha. The cultivated/prepared lands for sugar plantation have been 27,312 ha for Kuraz 1, 2, and 3 factories, and none for Kuraz 5 factory (under tendering). The remaining 72,688 ha are under implementation process such as land clearing and others. The Kuraz 2 and 3 factories are at operational; Kuraz 1 factory at correction/adjustment; and Kuraz 5 factory at underimplementation phases. The annual anticipated total production of sugar by four factories will be 1,390,000 tons ; and from its byproducts 130,810 meter cube ethanol and 300 megawatt electric power can be generated (100MW will be used in the project areas and the remaining 200 MW will go to the national power grid).

The study has been following up mainly the guidelines of FDRE Commission of Forest, Environment, and Climate Change and World Bank. It used both primary and secondary data sources by adopting qualitative and quantitative methodologies/techniques with remedy solutions for the limitations, described in the chapters of approaches/methodologies and information/knowledge gaps.

The ESIA assessed/ analyzed information on the project, physical, biological and socioeconomic environment facts of the project. The following section describes the basic findings of the impacts and recommended mitigation measures:-

(I) The positive impacts of the project in local, regional and national aspects are much outweighed compared to the adverse ones and consensus the same by all stakeholders whom the study team contacted including the community. The major benefitsinclude

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Addis Ababa

- no displacement(currently no body settled in the project compound); currently 5000individuals directly employed and expected to absorb more than 10,000 employees at full capacity working ;creating jobs for more than 7000 out growers ; and changing the live hood of the community (currently 30% of employed are indigenous). Developing urbanization (creates thousands jobs in trade, hotel and other activities, in the created more than 5 towns and 27 villages) andincreasing national sugar and sugar related products. Generating electricity (300MW) and fertilizers; moderating the downstream flooding; developing road networks; improving socio-cultural relations and integrations; encouraging modern agriculture in local areas ;transforming skills and technologies ;reducing indigenous women burdens; industrializing the areas; and cooling the local climatic conditions. More than four times of the earlier, above 2000 kms (including the asphalt road from Kangate to Kuraz Omo 5, 75km), expanded the road networks in the area. These road net works enhance the tourism and researches on World Heritage formations. The sugarcane plantations are excellent reclamation crop being resistant to water logging and salinity/alkalinity and creating green areas throughout the year (for detail see 6.5 and 7.1).

The study team appreciates the commitments of the Corporation to work with the stakeholders including surrounding indigenous people. Of them, down sized of the project, revising the major feasibility studies, set up institutional structures for public participation, and healthy and safety and environment units can be mentioned. The infrastructure developments(packages) such as schools, health posts, animal health clinics, police stations, irrigation canals, milling houses, roads and water points being developed for the surrounding settlement villages and even for the people far away from the project.The works completed in 7 settlement areas and under process in the remaining 5 settlement villages. Besides, 250 ha irrigation farming lands and social institution setups(packages) developed in Maki area for Mursi indigenous people, which used for around 250 HHs of pastoralists.These and even faraway areas have a promising advantages to get electricity sourced from the project. The promising ethanolfactories will have also significant contribution in providing ethanol for the HHs energy purpose, which inurn reduce deforestation caused by the residents. These factories create jobs for surrounding communities and others too.

The project has developed farming lands and modern beehives for out growers (1 ha to each settler (0.75 ha for canes and 0.25 for maize, sorghums, banana, moringa, papaya, vegetables and others). The out growers in the settlement villages are 2205 HHs (factory one and surroundings) , 2122 HHs (factory two and surroundings) and to be embraced more than 3000 HHs in factory 3 and 5 surrounding settlements.Students attending at elementary school in the settlement villages of Omo (factory) 1 and Omo (factory) 2 are 436 and 104 respectively.

The project is committed to createa good integration with the communities and administrators by employing permanent and seasonal workers, and enhancing civilizations and working culture of the community. Served also in securing markets for their products in the factory and domestic residents(transport service for their products to sale at Hanna/Jinka towns) ; providing different services (transport, health, school, farming machineries, labor ,milling, bridge, water, road networks and other infrastructure facilities and water ponds for their live stock); and protecting wild animals and vegetations.

(ii) The potential impacts :- (i) Socio economy(a)Even though the settlers issues have been handled by the regional government/wereda , thestudy advise theproject to assist them in some technical aspects since it indirectly affects the sustainability of the project, most of the communities, administration officers and concerned stakeholders request technical assistants from the project. (b) The national labor laws/collective agreements and health and safety regulationsas any project shall be effective in the labor and working conditions of the project. (c) The project could not be a threat to the World Heritages or Formations found in the project surrounding area. The facts behind this are the down sized of the project (avoid landscape fragmentation and visual intrusion). The sheet and gully erosion (vegetation loss) and soil/irrigation water salinity levels, project site boundary, and heritage impactsidentified, not at risk level. Even the designed drainage systems and other mitigation proposed measures can also control efficiently the salinity/water logs/ flooding and other potential impacts toward these formations. Besides, the nearest physical distance of the expected buffer zone of the formation from the project border is 35km, significantly fulfill even the UNESCO standards.

(iii) The potential of the factory effluents, air pollutions, fertilizers, chemicals and otherscannot bea threat for the surrounding areas since the proposed mitigation measures minimize them at tolerable level.

(iv) The physical impacts:-the proposed physical mitigation measures can handle all the adverse sourced from the physical impacts. The downsized of the project together with the adjusting operational factors (effective water utilizations and others) increase the water balances released to the down streams by more than double compared to earlier EIA estimations. Thus, the project decreases its water consumptions (considering full cultivation) from 5.2 BM^3 to 2.16 BM^3. The impact due to the project upon the Lake Turkana level is very insignificant, below 1.1 %. The dominant cause of the decreasing of Omo river level is Gibe III,EEPCO expected to releasetimely to the downstream areas in order to protect the indigenous farming and other live hood activities.The project impact on the Omo river is relatively low it can be managed bydifferent mechanisms as stated in the mitigation measurements.

(v) Biological Environment: As far as the project found near by the parks, the impacts expected. However, the Omo Park still has sufficient areas, more than 3000 km^2, to accommodate the wild animals. The proposed mitigation measures can also manage the impacts efficiently. The projectexpected to work with the Omo Park and Federal Wildlife Conservation Authority, by such as establishing technical assistances, involving in different mechanisms to set up the habitats of the wildlife in the existing parks' boundaries and others stated in the mitigation measures. The damages caused by losses of vegetations (commonly bushes) are not crucial since the sugar plantations can serve as a better environmental balancing and economic benefits. Besides, the recommended mitigation measures can manage them.

The total proposed annual and three years' budgets(not including the operational works) are birr 6.4 million and birr 19.1 million ,respectively ; see the summary of the break downs(including EMP, Monitoring and training & related) in table 40.

Finally, this ESIA review concludes that the implementation of the project is more advantageous in socio-economic developments of the project area, the region and the nation as a whole than that of the expected occurrences of ecological and social adverse impacts caused by the project. The proposed mitigation measures stated in the EMP minimize the adverse impacts. In short, the project is viable from environmental resources and socio economy aspects.

2. INTRODUCTION

2.1 Background

The existing capacities of the sugar factories found in the nation supply sugar below the demands of the nation so that the importing amount is significant. FDRE Sugar Corporation has a plan to increase the local production to minimize the local sugar shortages, to stop importing and at large to export sugar.

During the period of GTP1 (2010), FDRE Sugar Corporation in collaboration with the Ministry of Water Irrigation and Electricity identified a gross area of 1.5 million ha of irrigable land that is suitable for large scale sugar development so as to establish ten new sugar factories including Tana Beles(3), Wolkait(1) and Lower Omo Kuraz (5) sugar development projects.

In Lower Omo Valley ,SNNPRS, that uses Omo River, the government has an aiming at developing sugarcane plantations on net land of 175, 000(revised to 100,000) hectares and establishing 5 (revised to 4) sugar factories in order to address the existing the nation sugar constraints.

The development of Kuraz Sugar Project has its own roles in boosting the economy of the country. Of them, saving /gaining foreign currency i.e. import substitution/export rising ;narrowing the local demand and supply gap of the products; creating job opportunities(improving incomes); transferring technologies; generating steams and electricity (baggasse) , productions of ethanol(uses for industrial, medicine, fuel (by mixing with petrol) and drinking purposes), and for livestock feed are the major ones.

The implementation of the project has met many challenges such as financial constraints, poor project management (including contract administration); partial areas of the project took by government for other agricultural investment and others. There are some appropriate actions that have been taken so as to mitigate the problems such as downsized the project, creates awareness about the project (international wide), reviewing the former EIA ,management changes are among others. The annual anticipated total production of sugar ,as to the revised plan, will be 1,390,000 tons ; and from its byproducts 130,810 meter cube ethanol and 300 megawatt electric power can be generated (100 will be used in the project areas and the remains (200) megawatts will go to the national power grid).

2.2 Project Screening

On side-by-side of the economy benefits of the project, giving attention on the environmental, health and social activities are also crucial for the areas/nation. Environmental friendly project reduces international political/water conflicts such as on Omo River, promotes indigenous community interactions/reducing local conflicts, protect cultural/heritages, create better working and labor conditions including health& safety issues , moderates flooding, creates environmental friendly designs ,constructions and operations of the factory and plantation processes ,and encourage settlement and infrastructure development of the area.

The ESIA guideline of Ethiopia describes the screening process of the project (EPA, 2000). As to the guide line, the Kuraz Sugar Development Project requires full EIA study since the project consists of large surface water fed irrigation/ plantation lands and sugar factories' constructions, aiming at developing net 100 000 hectares by using diverting Omo River.

2.3 Objectives

2.3.1 General Objective

The general objective of the ESIA review is to ensure environmental sustainability of the proposed project area through eliminating or minimizing possible negative impacts by using appropriate mitigation measures in the project design, construction and implementation phases.

2.3.2 Specific Objectives

The major objectives of ESIA are, but not limited to-

- ensure that environmental considerations are explicitly addressed and incorporated into decision making process;
- incorporate environmental issues into project design, execution and operation;
- identify that biophysical and social impacts ;
- anticipate and avoid, minimize or offset the adverse significant biophysical, socio economy and other relevant effects;
- enhance the positive impacts of the proposed project;
- protect the productivity and capacity of natural systems and the ecological processes , which maintain their functions;
- promote development that is sustainable and optimizes resource use and management opportunities,
- hydrological and river basin modeling studies that assess the water balance in the Omo-Turkana basin;
- environmental and social impacts as a result of hydrological changes;
- impact on cultural and archaeological assets;
- impacts on national protected areas and wildlife corridors; etc

2.4 Scoping

As stated in the scoping document as well as in the TOR, the major components of it are biological,physical and socio economic environments:

- **Bio-physical environments:** includes Conservation, Biodiversity, and Natural Resources Managements such as topography, fauna and flora, water bodies, land use and land cover, soil, micro catchment, effluents, air pollutions, mitigation measures, environmental management plan and monitoring, etc

- **Socio economic environments:** includes demography, ethnicity, religion, settlement pattern, education, health, community attitudes, gender issues, tribe conflicts, agronomy, livestock, infrastructure and services, culture and heritages, labor and working conditions and other related Issues.

2.5 Justifications of the Project

Kuraz Sugar Development Project has its own role in boosting the contribution of the sugar sector to the economy of the country; creates job opportunities to thousands of citizens and others.

Environmental degradation is one of the major environmental aspects in the World and our country today. Heavy soil erosion during rainy season and irrigation process aggravates siltation. Deforestation also increases carbon dioxide concentration in the atmosphere. Water bodies are drying and/or diminishing in their water volumes. The sugar factories' pollutions, without mitigation tools, are not underestimated. Therefore, it is mandatory balancing of the economic issues with environmental protections in order to accelerate the development of the country.

To that end, the Commission of Forest, Environment and Climate Change encourages such an integration project to use Environmental Management Systems (EMSs) that improve compliance, pollution prevention, and other measures of environmental performance with a voluntary approach to improving environmental performance which is expected from the sugar development project.
By considering the above facts plus the project itself needs the EIA to bring sustainable development in the area by protecting biophysical and social environs.

2.6 Project Location

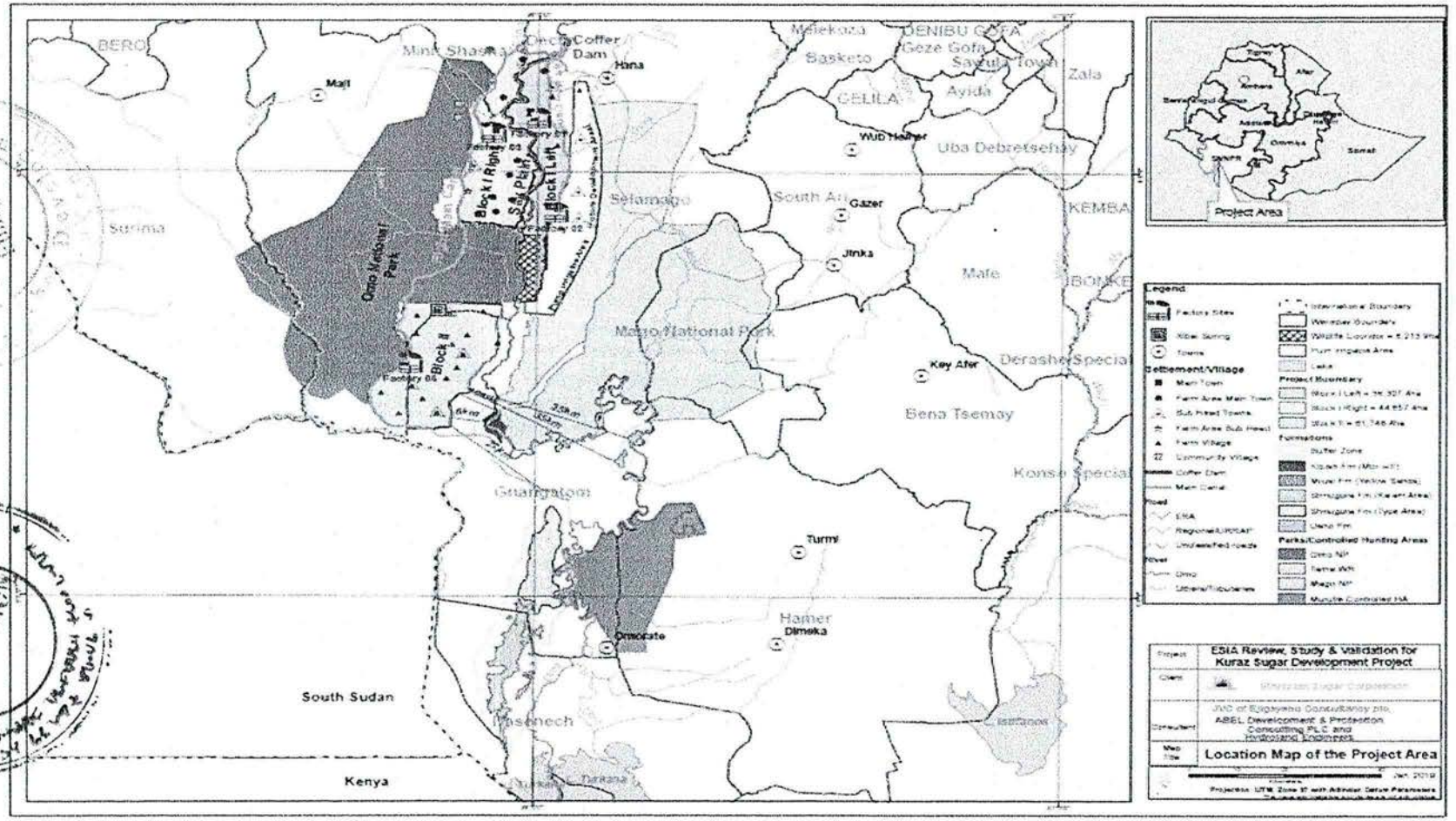
The location of Omo Kuraz sugar development project is between $5^0$8'14''- $6^0$17'3''N and $35^0$43'44''-$36^0$13'39''E within the ranging of 373 to 477 masl, SNNPRS, Ethiopia. The project command areas lie in Selamago, Nyangatom, Decha, Menit Shasha and Maji (Omo Park) Weredas. Selamago Wereda (Hana town) is on the left side of Omo River course. It is accessible by a dry weathered road (under construction of asphalt road) from Jinka, the capital of South Omo Zone.
Nyangatom, Decha, Menit Shasha and Maji Weredas found on the right side of Omo River. Their Capitals accessed through Jima-Mizan-Jemu-Tum-Kibish and Kangaten towns (figure 1).There is an alternative way to arrive at Kangaten,through Hanna (Selamago wereda) -Kuraz 1 &3 -Omo Park, and Kuraz 5, asphalt road from Kuraz 5 to Kangaten.

Project areas, not accessible during rainy season, are-

- Decha Wereda: From the Wereda town to Weresite is about 30 km;

- Menit Shasha Wereda: Jemu Town to Kirer, Heduba, Darger, Sabie, Chirue and Kente Kebeles along Omo River on the right side opposite of Selamago Wereda;
- Maji Wereda: Tum Town to Alkut and Key Kokeb kebeles of Sa'i Plain areas of Omo National Park and
- Burma Wereda: Kibish Town to Nyangatom Wereda, especially in Burma – Kibish and Nyangatom-Kibish areas.

Figure 1: Location Map of Kuraz Sugar Development Project



Source : Own based on Sugar Corporation Data(2018)

2. 7 Major Team Compositions

Table 1: Major Professionals Team Composition in EIA Review and Additional Studies

No	Professionals
1.	Team leader /Senior environmental economist/ Senior ESIA Consultant in Socio-Economics
2	Senior Water Resources Modeler/ Hydraulic Modeler / Environmentalist/ Chartered Engineer /Civil Engineer
3.	Senior Natural Resource/Water/Soil/forestry/Wetland /Assistant Team Leader
4.	Senior Natural Resource/forestry/Wetland / Hydraulic Engineering, Land and Water Development Specialist /
5.	Senior environmentalist
6.	Senior Archeologist
7.	Senior Sociologist
8.	Senior remote sensing and GIS expert/Geologist
9.	Senior Water Resources Modeler/Hydraulic Modeler / Environmental Engineer/ Hydrologist /Civil Engineer

2.8 Report Structure

The organization this report follows the guideline of a regulatory body, CoFECC. It also full fills the international standards of the ESIA. Executive summery consists of the summarized points of the study. Chapter 1 is an introduction part, which includes background, screening, objectives, significance, scoping, location and others. Chapter 2 describes the methodologies and approaches used in the study. Chapter 3 summarizes the policy, legal and administrative framework. Chapter 4 explains the major knowledge/information gaps and remedies solutions. Chapter 5 describes baseline information on the proposed project (project main components etc), and environments including physical, biological and socioeconomic environmental components including public, focal group and stakeholders' consultations, etc. Chapter 6 and 7 provide positive and negative impacts of the project with their mitigation measures and project alternatives, respectively. Environmental Management and Monitoring Plan, Environmental Budget and Environmental Reporting are also the parts of the Chapters ranging from eight to ten. Finally, Chapter 11 concludes the report with conclusion and recommendations. Attached as annexes, study tools, ToR, lists of consulted persons, study team composition and their CVs, discussion minutes and photographs, hydrology (water balance) study, congested soil and land suitability report, license of the company, and others.

3. APPROACHES AND METHODOLOGIES

3.1 General Approach

The methodologies to carry out the study explained in the ToR and scoping report. The more specific approaches that used in this assessment were review of the relevant previous studies, relevant policies and guideline documents, primary data collected through field survey, secondary data obtained from relevant local offices, and consultations with experts, key stakeholders and members of the local community.

3.2 Field Survey and Consultation with Stakeholders

The Kuraz sugar development project affects both the project and surroundings and the downstream areas.

Stakeholders/public consultations therefore included all the relevant stakeholders or communities who concern about the environments of the project as well as the downstream areas.

The consultations considered the stakeholders'/community's knowledge, perception and attitude towards project benefits and potential impacts. The methodologies used were as follows:-.

Review Relevant Studies: Reviewed the EIAs of Gibe-III hydro power project and EIA of Kuraz Sugar Development Project, papers presented internationally about Omo –Gibe Rivers' issues and others.

Federal Stakeholders: Contacted all relevant stakeholders found at federal level.

Field Trip: Field trips were taken to regional, zones, weredas, communities , and project sites including the reservoir ,farm, factories ,settlements and related sites ,and the downstream areas in order to collect views and attitudes of the concerned stakeholders. Field trips conducted for 20 days. The field trip of Lake Turkana were conducted in the years 2012 and 2013 GC.

Key Informant Discussions: Structurally or none structurally discussions held with stakeholders such as client's management bodies and workers; government officials; Federal, Regional, Zone and Wereda sector offices' heads and experts; and others.

Group Discussions: Structurally or none structurally group discussions held with the project-affected population in such a way to incorporate and represent attitudes and views of the communities and officials, with different sex and age categories.

Meetings/Consultations: Meetings and discussions held with the residents of the community, and their leaders, sector's offices at regional, zone and wereda levels.

Household Survey: A random sampling household survey/interview conducted in the project area to fill the information gap if any.

Consultations/household survey were facilitated by the team of experts comprising socio-economists, environmentalist and others having rich experiences in the field.

Amharic language used for consultations since the language is familiar by the majority of the population. Local languages used to conduct discussions with the community and individuals by using local interpreters.

*Illustrative pictures:*Illustrative photographs taken at different places as required.

3.2.1 Stakeholders Identification

Stakeholders from Federal, Regional, Zonal, Wereda and project Kebele level were identified for data collection, discussions, consultations and personnel interviews regarding the project and its environmental aspects.

- FDRE Sugar Corporation, Ethiopian Construction Works Corporation ,Foreign Affair Minister , Commission of Forest, Environment and Climate Change, Ministry of Water ,Irrigation and Electricity , Ministry of Culture and Tourism(Authority for Research and Conservation of Cultural Heritages) , and Ethiopian Wildlife Conservation Authority (EWCA) .
- Regional Bureaus of Forest, Environment and Climate Change and Cultural and Tourism.
- South Omo, Bench-Maji and Keffa Zones' Administrations, Culture and Tourisms, Agricultural and Pastoralists Development, Environment and Climate Change, Trading and Industry, Investment and Finance and Economy Development Offices.
- Selamago and Nyangatom Weredas of Administrations, Culture and Tourisms, Agricultural and Pastoralists Development, Finance and Economy Development, Revenues, Urban Development, Trading and Industry, and Kebeles' Managers.
- Project area Keels' residents of Selamago, Nyangatom, Maji, Surma and Menit Shasha Weredas and migrant workers were identified for a random household survey to be interviewed.
- Project area Kebeles' residents of Selamago and Nyangatom weredas including kebele councils, leaders, tribe leaders, women, and youth representatives and other household community members, directly affected by the project, were selected for discussions.

3.2.2 Major Reviewed Relevant Studies

The study team reviewed Omo-Gibe Basin Master Plan; Gibe III Hydropower Studies; EIA, Agronomy, Soil and Hydrology studies of Kuraz Sugar Development Project(2013-15) ; and other relevant published and unpublished documents stated below:-

Hydrology and Water Resources: Omo River is the only major river of the project area. Rivers such as Mago or Neri, Sara, Berso and Maki rivers join Omo River above the proposed project area (WWDSE, 2010; Sugar Corporation EIA Study (2013)). The Omo–Gibe Basin Master Plan

Study indicates that the total amount of water available seems more than enough, as concluded from the projected need for irrigable land, food and annual water requirements for irrigation purpose in Lower Omo Valley (MoWR, 1995: Sugar Corporation Hydrology Study (2013)). The possible growth of irrigated agriculture of the basin, predicted based on the projected food needs, together with the associated irrigation water requirements of the basin estimated at 14.46 BCM at 75% reliability (MoWR, 1993: Sugar Corporation Hydrology Study (2013)).

Health Problems of the Area: Malaria was a major health problem of lower Omo areas that needs attention (MoWR, 1995: Project Zones' Reports (2018): Project site (2018)). Influx of labor forces into the area due to the development activities can pose additional health risks. Adequate potable water supply, sanitation facilities and health services are proposed.

Crop Production and Adaptability: The Omo Gibe Basin Master Plan study identified crops that can adapt to lower Omo agro-ecology. Depending on the study cereals (millet, maize, sorghum and rice), legumes and oils seeds (cowpea, sunflower, safflower and sesame) and root and industrials crops (cotton, sweet potato, cassava and sugarcane) identified to adapt to the agro-ecology (EVDSA, 1993, Vol. II: Project Zones' Reports (2018)). Cotton and sugarcane was identified to be one of the major industrial plantations that can adapt to the thermal agro-ecology of the project area.

Soils: The soils of lower Omo area are under seasonal flooding and sedimentation, which stratified with alluvial sands and loams with occasional saline characteristics (EVDSA, 1993, Vol. II: Sugar Corporation Soil Study (2015)).

Siltation: The Omo Gibe Master Plan Study indicates that Omo River picks most of its silt content from Wabe and Gorombo rivers before joining with Gojeb River. Gojeb River is less silt laden than Omo River. Sedimentation and the other environmental aspects of Omo River mostly start at the middle course that can have serious impacts on downstream and the project area by creating siltation problems (EVDSA, 1993, Vol. II: Sugar Corporation Hydrology Study (2013)). However, as the farm uses pump with screen, the problem may not be serious.

Salinity and Water Logging: One of the most serious environmental hazards caused by large-scale irrigation schemes is loss of valuable land caused by salinity (EVDSA, 1993, Vol. II: Sugar Corporation EIA (2013)). Salinity decreases productivity of arable land and pasture that can ruin the land forever unless properly managed.

Wildlife Resources: Omo National Park is the major environmental aspects related to wildlife resources of the project area. Mago Park, Tama Wildlife Reserves and Murulle hunting area are outside the project area (EVDSA, 1993, Vol. II: Project Zones' Reports (2018): Sugar Corporation EIA (2013)). The project does not have direct impact on the later parks.

Fish Resources: The common fish species of Omo River are Nile Perch, Barbus and Tilapia (EVDSA, 1993, Vol. II: Project Zones' Reports (2018)).

3.2.3 Public /Stockholders Consultation

The consultations conducted by introducing the project to identify project benefits, possible project threats and recommendations on mitigation measures to harmonize the threats with the planned development activities. Participants freely discussed on the above main agendas. Minutes of meetings and consultations, lists of individuals contacted and institutions visited, illustrative pictures attached at annex document.

Table 2: Number of Stakeholders Contacted

Number of Stakeholders Contacted

S/N	Organization	Method/s followed	Number of Consulted Individuals	Distribution (%)
1	FDRE Sugar Corporation including factories	Consultation	15	8.4
2	Ethiopian Wildlife Conservation Authority (EWCA)	Consultation	2	1.1
3	Foreign Affair Minister	Consultation	3	1.7
4	Ethiopian Construction Works Corporation	Consultation	1	0.6
5	Commission of Forest, Environment and Climate Change	Consultation	2	1.1
6	Authority for Research and Conservation of Cultural Heritages	Consultation	1	0.6
7	Regional Sector Stakeholders	Consultation	2	1.1
8	Zone Administration and Sectors	Consultation	19	10.7
9	Wereda Administration and Sectors	Consultation	17	9.6
10	OMO National Park	Consultation	11	6.2
11	Project area Kebeles' Communities	Consultation	34	19.1
12	Project Area Women's Consultations	Consultation	10	5.6
13	A Random Household Survey	Interviews	61	34.3
	Total		178	100.0

3.2.4 Cross Sectional Household Sampling (Quantitative) Survey

This tool is very crucial to gather adequate information or to fulfill the data gaps, which not gained by other data gathering methods.

Before reaching at the decision of the final numbers of sampled households to be incorporated in the ESIA study, an appropriate, relevant and a mixture of various household sampling methods were examined, the survey areas' conditions ; in such way, stratified and random sampling techniques were chosen to decide sampling size or type. This approach saves time, financial and other resources; and considers the geographical location of the project site, which in turn reduces sampling errors; and the surveyed data would be more valuable.

The employees in the project areas and surroundings (pastoralists employed and out growers) have homogenous natures (most of them are employed, living together, migrants and others). To attain our purpose, to be more realistic, the study had a plan to take, by considering permanent residents in the project area (93% migrants) and indigenous people, 55% from migrant employees and 45% from indigenous people including out growers.

Besides, by considering qualitative data sources, the availability of secondary data, homogeneity level of the area, and the budget constraint, the household survey sample size (quantitative data) was determined to be 6% of total permanent household residents in the project area (1140), 68 household heads. In order to confirm whether the determined sample size statistically acceptable or not, the statistical formula which is normally applied for variables with binomial distribution was used (Kothari, 1995 and Fisher et al, 1991)[1] and proved that the acceptance of the sample size, which is 51.

After short training given to the enumerators, the household survey was conducted within one day; and the professional residents , together with the supervisor , were selected as enumerators (bachelor/diploma holders) since they are very familiar with the society/area in general.
The data was analyzed using SPSS soft ware. In case of some missing or extremely high or low values, the study took different actions such as excluding the missed values and substituting extremely high or low values by average ones.

The total numbers of actual respondents were 61(47.5% indigenous), 18% female. Their ages ranged from 22 to 45, the mean was 30. The respondents' school levels were 14.8% for Illiterate, 3.3% for read and write, 9.8% for elementary and 71% for high school and above.

3.2.5 Water Sampling Survey

The project has utilized Omo River as a source of water /for drinking (after conventional way of treatment using like "Wha Agar") and irrigation/. As to the project health worker, the drilled water quality is very poor, not recommended for drinking. The study has used the irrigation water analyses done by the Kuraz sugar development project including the downstream areas. As to the plan of the project, each factory will have its own water treatment plant for the purposes of

1 This basic equation has been applied for the calculation of the minimum sample size(n) is

Degree of accuracy (d) usually set at 0.05 = 0.05. Standard normal deviate (z) = 1.645.The proportion of the targeted population (households) that have homogenous economic, social, ethnic and cultural nature (p) =.95. Design effect, k (set at 1 first doing a strata to compensate for the random sampling method)

drinking and steam production. Currently, the factories 2 &3 have water treatment plants but not commissioned.

3.2.6 Soil Survey

The project conducted a detail soil survey to identify the crop suitably areas so that it can provide information on the detail soil natures of the project area, it can be used for environmental study consumption.

3.2.7 Tree Species Composition and Density

The project area is very large so that the coverage of each vegetation type was delineated by GIS specialist with the supports of observations of the sites.

4. MAJORASSUMPTIONS /KNOWLEDGE/INFORMATION GAPS AND REMEDY SOLUTIONS

The major limitations or information gaps the ESIA encountered with their remedial solutions are:-

- Pastoralists dominantly live in the area so that they do not have permanent settlements in specific places. Currently, the government has tried to settle them in certain places. The study team had gone the settlement places but we could not get them except few. However, by contacting their representatives such as tribe leaders, kebele chairperson, elders and wereda experts, we collected what we need information. Besides, we consulted very nearby kebeles like Omo Hana to get better information about the areas.
- The neighboring parks such as Omo Park are complaining on their borders. The study team took the boarder or the boundary map of the project from the sugar corporation. Besides, officially final demarcation done in 2010 GC by SNNPRS, a composition of different committees including the Parks. As a result, we conducted the ESIA based on the accredited maps from the Sugar Corporation.
- Both Nyngatom and Selamago Weredas do not have sufficient organized data in relation to socio economic, land use, incomes, expenditures, etc of the project area; but the study conducted a household sampling survey, key informant and residents' discussions to reduce the data gap.
- The study had had a plan to conduct focus group discussion with women but it could not be except Selamago due to few women. However, the study incorporated the Wereda's and Kebele's Women in the community and sector office discussions, and a house hold survey (includes gender issues) to minimize the information gaps.
- Regarding climatic conditions of the lower Omo including the project area there are limitations in accessing the updated data. Therefore, the only means is to transform the data based on the most nearest availed data in the nation. The project has its own a metrology station in the upper project area; however, it has not served for the whole project area since the up and down areas of the project, weather conditions are varies. Second problem is the data has covered only for the last five years, not enough; therefore, the study used them just as general indicators.

5. RELEVANT POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORKS

5.1 Policy Frameworks

5.1.1 Environmental and Related Polices and Strategies

5.1.1.1 Conservation Strategy of Ethiopia

The Conservation Strategy of Ethiopia (CES) sets out detailed strategies and action plans as well as institutional arrangements required for the implementation of sectoral as well as cross-sectoral interventions for the management of Ethiopia's natural, man-made and cultural resources.

5.1.1.2 Environmental Policy

The Environmental Policy of the FDRE (EPE) supports constitutional rights through its principles. The principles are guiding all the development proposals in the country.

It emphasizes among others early recognition and incorporation of environmental issues and mitigation plans in project design and implementation, public participation in EIA process, development of EIA tools and capacity building at all levels of administration.

The governmental environmental responsible body, EPA, harmonizes Sectoral Development Plans and implements an environmental management program for the country.

5.1.1.3 Water Resource Management Policy

The Ministry of Water, Irrigation and Electricity produced, in 1998, the Federal Water Resource Management Policy for a comprehensive and integrated water resource management.

It enhances and promotes all national efforts towards the efficient and optimum utilization of the available water resources for socio-economic development on sustainable basis.

It establishes institutionalized environment conservation and protection requirements as integral parts of water resources planning and project development.

5.1.1.4 Wildlife Policy and Strategy

The major objectives of the Wildlife Policy and Strategy (MoA, 2005) are:

- properly developing and administering the country's wildlife resources;
- capacitate the sector to contribute fully to the nation economy development process;
- protecting the wildlife resources and their habitats and
- maintaining the balance of nature for posterity in accordance with international wildlife conventions and agreements to which the country is a signatory.

5.1.1.5 National Policy on Biodiversity Conservation, Research and Development

The policy contains directives with regard to the need to explore, collect, characterize, evaluate, conserve and utilize biodiversity.

The policy provides guidance towards effective conservation, rational development and sustainable utilization of the country's biodiversity and contains comprehensive policy provisions for the conservation and sustainable utilization of biodiversity.

The government of Ethiopia has developed a National Biodiversity Strategy and Action Plan (NBSAP) in 2005 as a required action under the Convention on Biological Diversity to put in practice the biodiversity policy.

Besides, the study reviews National Population Policy, Health Policy, National Policy on HIV/AIDS, National Policy on Women and other relevant policies.

5.2 Legal Frame Works

5.2.1 Constitution of the FDRE

The major residents in the project and surrounding areas are pastoralists. Article 40(5) of the constitution indicates that Ethiopian pastoralists have the right to free land for grazing and cultivation as well as the right not to be displaced from their own lands.

People have the right to full consultation and the community has the right to express their views in the planning and implementation of environmental policy and to deal with the projects that directly affect them.

The displacement of people or adversely affect the livelihood of the local population shall give the right to commensurate monetary or other means of compensation including relocation (resettlement) with adequate State assistance.

All these aspects have to be considered in factory and irrigation projects as to explicitly stated in the EIA Legislation (EPA, 2002) and EIA Guideline Document (EPA, 2000).

5.2.2 Environmental Legislative Framework

5.2.2.1 Environmental Impact Assessment Proclamation

This Proclamation (Proc. No. 299/2002) aims to make an EIA mandatory for specified categories of activities undertaken by either the public or private sectors and is the legal tool for environmental planning, management and monitoring.

Categories of projects have been defined that will require full EIA, partial EIA or for which study of EIA is not called for.

EPA has issued Procedural and Technical EIA Guidelines that provide details of the EIA processes and its requirements.

5.2.2.2 Environmental Assessment Guidelines

EPA issued Technical and procedural EIA guidelines in 2000/2003. They guide developers, competent agencies and other stakeholders in carrying out EIA.

It describes the categories of projects (schedule of activities) to the requirement of EIA by project types.

The other valuable document is the Guideline for Reviewing EIA Reports (2003).This is a generic guideline prepared to facilitate the EIA report reviewing and decision-making processes and it includes the review approaches and outlines with a minimum report structure and information requirements.

5.2.2.3 Environmental Pollution Control Proclamation

This Proclamation (Proc. No. 300/2002) focuses on the right of each citizen to have a healthy environment as well as on the obligation to protect the environment of the country.

Its primary objective is to provide relevant ambient environmental standards applicable to Ethiopia, and punish for those violate these standards.

a) Proclamation on Industrial Pollution Control

The Proclamation on Industrial Pollution Control No. 159/2008 focuses on the Proclamation on Environmental Pollution Control No. 300/2002, as well as on the obligation to protect the environment of the Country. The primary objective of the Industrial Pollution Control is to prevent or, if that is not possible ,shall minimize to the generation of every industrial pollutant to an amount not exceeding the limit set by the relevant environmental standard and dispose of it in an environmentally sound manure .

b) Standards and Guidelines

The prepared national provisional standards and guide lines for pollution control considers the standards of some developing countries such as Bangladesh, Pakistan, India, Jamaica, China, Thailand, Uganda, Nigeria, Zambia, and Kenya. The relevant information obtained from The World Bank, United Nations Environment Program (UNEP), United Nations Industrial Development Organization (UNIDO), European Union and the United States Environmental Protection Agency.

The regional states can establish more stringent standards taking into consideration particular ecological conditions in their localities if these present standards are used as the minimum. Therefore, the study team strictly followed up the federal guidelines and standards of industrial pollution control.

c) Proclamation on Solid Waste Management

This proclamation (No 513/2007) is about solid waste management that has to be undertaken during collection, transportation, storage, recycling or disposal of solid wastes.

5.2.3 Sectoral Legislative Framework

5.2.3.1 Ethiopian Water Resource Management Proclamation

This Proclamation (Proc. No. 197/2000) provided legal requirements for Ethiopian water resources management, protection and utilization.

The aim of the proclamation is to ensure the protections and utilizations of water resources in the nation for the highest social and economic benefits. The proclamation defines the ownership of water resources, powers and duties of the supervising body, inventory of water resources and registry of actions, permits and professional licenses, fees and water charges.

5.2.3.2 Proclamation on Conservation, Development and Utilization of Forests

Conservation, Development and Utilization of Forests Proclamation (Proc. No. 94/1994) focuses on the conservation, development and utilization of forests.

The objective of this proclamation is to provide basis for sustainable utilization of the country's forest resources and ensure conservation of existing forests and establishment of State Forests.

The proclamation categories types of forest ownerships (State, Regional and Private Forests).One of the objectives for the establishment of State Forests are to conserve forest resources within their ecosystems. The law prohibits felling of *Hagenia abyssinica*, *Cordia Africana*, *Podocarpus gracilior*, *Juniperus procera* and *Olea europaea* ssp. *Cuspidate* from their natural habitats. It provides the power for designation, demarcation, and registration of forests to the former Ministry of Agriculture and Regional Governments.

The proclamation then goes on to give some specific direction for the utilization of State and Regional Forests and lists prohibited activities within protected forests.

5.2.3.3 Genetic Resource Proclamation

It (Proclamation № 482/2006) states that the rights of local communities over their genetic resources and community knowledge shall be protected as they are enshrined in the customary practices and norms of the concerned communities. Besides, it obliges an access permit guarantee to respect the laws of the country particularly those relating to sanitary control, bio-safety and environmental protection.

5.2.3.4 Wildlife Development, Conservation and Utilization Proclamation

This proclamation considers the 2005 Wildlife Policy and Strategy. The Proc. No. 541/2007 consists:

- wildlife resources development, protection and administration of protected areas;
- conservations of endemic and threatened wildlife, wildlife resources utilization in promoting ecotourism and marketing of wildlife resources;
- encouraging investors especially private ones to participate in the conservation of wildlife;
- Strengthening research, education and training on wildlife; and establishing a network to compile and disseminate information to national and international users.

The proclamation (2008) by Council of Ministers that is cited as Wildlife Development, Conservation and Utilization Regulations, No. 163/2008.

Proclamation No. 575/2008 declared the establishment of Ethiopian Wildlife and Development Authority. The Authority is responsible to execute the proclamation, and reports to the Ministry of Culture and Tourism.

5.2.3.5Land Tenure/ Proclamation on Rural Land Administration and Land Use

The general principles of land tenure system are the same all over the country as to stated in the Constitution.

Article 40 states that ownership of both urban and rural land vested in the state and the people, and is common property, which is not subject to sale.

Rural Land Administration and Land Use Proclamation (Proc. No. 456/2005) came into effect in July 2005. The objective of the proclamation is to conserve and develop natural resources in rural areas by promoting sustainable land use practices, in order to encourage farmers and

pastoralists to implement measures to guard against soil erosion, the proclamation introduces a rural land holding certificate, which provides a level of security of tenure.

SNNPRS Bureau of Agriculture has issued the regional Rural Land Administration and Use Proclamation (Proc. No. 66/2007).

The Proclamation also considers landholding right, land re-distribution, land holding procedures and minimum land holding and conditions leading to deprivation of holding rights.

5.2.3.6 Proclamation on Expropriation of Land Holdings and Payment of Compensation

The Proclamation Proc. No. 455/2005 deals with appropriation of land for development works carried out by the government and determination of compensation for a person whose landholding expropriated.

It includes provisions on power to expropriate landholdings, notification of expropriation order, and responsibility for the implementing agency and procedures for removal of utility lines. According to the proclamation, the power to expropriate landholdings mainly rests on wereda or urban administration authorities.

5.2.3.7 Health Policy

The health policy (1993) gives emphasis on the preventive aspect of health services. The policy takes into account population dynamics, food availability, acceptable living conditions and other requisites essential for health improvements. The objectives of the policy in relation to environment are " to promote proper waste management system with regard to the collection , transportation and disposal of any domestic, commercial, agricultural, industrial and mining wastes including hazardous, liquid, solid, infectious and radioactive wastes. Establish community based hygiene education promotion; advocate and promote the availability of excreta disposal facilities at household level and develop a latrine culture; and ensure sound and effective waste management system (collection, storage, transport and disposal)."

Agriculture, agro-industries including sugar and livestock development are the major areas identified through the EIA for development of appropriate safeguards to ensure a healthy environment in line with this policy. There would also be issues, and are addressed in the EIA, of waste management, avoid favorable site for breeding of mosquito, health cares against occupational diseases including HIV AIDS during the construction phases and implementation phases of the Project.

5.2.3.8 Women's Policy

The women policy (1993) contains basic principles regarding the scale and scope of women's rights to equality with their male counterparts in every area and at all levels. This policy is particularly important to ensure that women in the arid, semi-arid and dry sub-humid areas are empowered through equal entitlements to land and other natural resources as well as receiving other benefits such as credit.

The impacts of the project expected to have a direct and beneficial impact on women, as there will be increased food security leading to improved nutrition levels and increased employment opportunities in the project area.

5.2.3.9 Investment Policy

The saving culture of the people of Ethiopia has been improving in the period of 2011-2020 but still not as to the desire of the nation. As a result, the Ethiopian investment policy focuses on foreign direct investment (FDI) without under estimating the local one. Available investment opportunities/privileges in the nation such as favorable working conditions, political stability, corruption status , health macro economy indicators , market potential , availability of land and labors ,incentives ,tax regulations ,subsides and others are important to attract the investors. The Ethiopian government has given priority for industrial crops including palm oil, cotton, sugar cane, oil crops, etc.

Therefore, integrated sugar agro industry is one of the favored sectors by the government. The owner of such a project is responsible to protect the environment impacts of the project up on the ecology and human beings staring from conducting ESIA to implementing mitigation measures.

5.2.3.10 Energy Policy

The Federal Democratic Republic of Ethiopia has clearly put in its Energy policy document (1994) that it envisages for transforming the energy consumption pattern from the traditional to modern fuel and energy conservation in all types of uses. It has also stressed rational development and exploitation of indigenous energy sources such as hydroelectric power, natural gas ,coal etc. To ensure the goals, capacity building, research and development, and private participation are stated as the means.

Land degradation caused by deforestation stands out as the most important environmental problem in Ethiopia. As stated in World Bank (1984);

> *"The most important issue in the future of Ethiopia is the supply of fuels, the related massive deforestation, and the resultant and insidious depletion of agricultural resources on which so much economic activity depends."*

The extent of agro forestry practices has remained at very unsatisfactory levels in relation with the extent of the problem. Furthermore, supply of the alternative source of energy, i.e., the modern sources of energy, has remained at a low level.

Energy conservation projects are by definition mitigations of the effect of deforestation. The energy consumption in the project area is expected to be high and may be a cause to deforestation; however, the sugar project has used its by products for energy sources for both the factories and inhabitants which in turn protect the deforestation and land degradation.

Enforcement will often need to take term of providing alternative measures for in habitants particularly in the environmentally sensitive areas. Some of the alternative means are fuel-efficient stoves, tree-planting schemes, with a mix of species including eucalyptus and nitrogen fixing species e.g. acacia and solar energy.

5.2.3.11Proclamation on Research and Conservation of Cultural Heritage

The ARCCH Proclamation (Proclamation No. 209/2000)

Proclamation No.209/2000 of Ethiopia regulates research and Conservation of Ethiopian Cultural Heritage. The Proclamation defines "Cultural Heritage" as anything tangible or intangible which is the product of creativity and labor of man in the pre-history and history times, that describes and witnesses to the evolution of nature and which has a major value in its scientific, historical, cultural, artistic and handicraft contents. According to the same Proclamation, "Cultural Heritage" is divided into tangible and intangible heritage[2].

"Tangible Cultural Heritage" is defined as "cultural heritage that can be seen and felt and includes immovable or moveable historical and manmade cultural heritage". "Immovable Cultural Heritage" means "cultural heritage attached to the ground with a foundation and which can be moved only by dismantling. It include: sites where cultural heritage have been discovered, paleontological historic and pre-historic archeological places; buildings, memorial places, monuments and palaces; remains of ancient towns, burial places, cave paintings, and inscriptions as well as church, monastery, mosque or any other places of worship".

On the other hand, "Movable Cultural Heritage" defined as "cultural heritage not attached to the foundation and that can be moved from place to place easily. They handed down from the past generation such as parchment manuscripts, stone paintings and implements sculptures and statues made of gold, silver, bronze, iron, copper or of any other mineral or wood, stone, inscriptions of skin, ivory, horn, archaeological and bone or earth or of any other material, and also paleontological remains; written and graphic documents or cinematographic and photographic documents or sound and video recordings; coins made of gold, silver, bronze, copper or of any other materials; and ethnographic implement, ornament or any other cultural object of nations, nationalities and peoples".

Protection and conservation of cultural heritage from manmade and natural hazards is one of the duties and responsibilities of the Authority for Research and Conservation of Cultural Heritage (ARCCH). Article 42 of the same proclamation states under 'Reserved Area':

> 1) *The Council of Ministers may, upon the recommendation of the Minister, declare any area as a reserved area and publish same in the Negarit Gazeta, where an assemblage of immovable Cultural Heritage is situated or where such an area is deemed an archaeological site.*

[2]"Intangible Cultural Heritage" means any cultural heritage that cannot be felt by hands but can be seen or heard and includes different kinds of performances and show, folklore, religious, belief, wedding and mourning ceremonies, music, drama, literature and similar other cultural values, traditions and customs of nations, nationalities and peoples". Proclamation No 209/2000

2) Unless otherwise specifically decided by the Council of Ministers, no person may, without a permit issued by the Authority, carry out building or road construction, excavations of any type or any operation that may cause ground disturbance in an area declared reserved pursuant to Sub-Article (1) of this Article.

3) Any person who holds permit to conduct construction works in a reserved area and who discovers Cultural Heritage in the course of construction activities shall stop construction and shall forthwith report same in writing to the Authority.

These indicate that the Authority has the power of issuing building permission for any work carried out in an area declared reserved by the Council of Ministers. It stated that the removal of any cultural ruins carried out under strict supervision of the responsible authority, the ARCCH.

5.2.3.12 Labor Proclamation

This Labor Proclamation No. 377/2003 covers standard topics such as freedom of association and the right to collective bargaining and to strike and brings the legal code closer to international norms, based on the ILO's Freedom of Association and Protection of the Right to Organized Convention of 1948 (No. 87). Occupational Safety and Health Directive (2008)administered by MoLSA, which has an Occupational Safety, Health and Working Environment Department.

The responsible government ministry is the Ministry of Labor and Social Affairs with Bureaus of Labor and Social Affairs at regional level and corresponding offices at zonal and wereda levels.

The Labor Proclamation (377/2003) made provision for the establishment of a Tripartite Labor Advisory Board, with responsibility for studying and examining matters concerning employment service, working conditions, the safety and health of workers, labor laws in general and giving advice to the Ministry.

5.2.3.13 International Policies and Safeguards, World Bank Safeguards

The World Bank (WB) divides its environmental and social safeguards into a number of Operational Policies (OP) and Bank Procedure (BP).

World Bank Safeguard Policies –

1	Environmental Assessment (OP/BP 4.01)
2	Natural Habitats (OP/BP 4.04)
3	Forests (OP/BP 4.36)
4	Pest Management (OP 4.09)
5	Physical Cultural Resources (OP/BP 4.11)
6	Indigenous Peoples (OP/BP 4.10)
7	Involuntary Resettlement (OP/BP 4.12)
8	Safety of Dams (OP/BP 4.37)
9	Projects on International Waterways (OP/BP 7.50)
10	Projects in Disputed Areas (OP/BP 7.60)

5.2.3.14Pesticides

Pesticides administered under the Pesticide Registration and Control Council of State Special Decree No. 20/1990. Under the decree, a Pesticide Registration Council established. This registers pesticides and issues provisional permits for importation and use of non-registered pesticides especially for use in the new floriculture industry and other huge mechanized farms.

An inter-agency National Pesticide Advisory Committee established to advise Ministry of Agriculture on implementation of the special decree.

5.2.4 International Environmental and Social Agreements

Ethiopia has ratified the following international conventions on natural resources and environmental management:

- Convention on International Trade in Endangered Species (CITES) (ratified through Proclamation No. 14/1970);
- Framework Convention on Climate Change (UNFCC: ratified through Proclamation No. 97/1994);
- Convention on Biological Diversity (ratified through Proclamation No. 98/1994);
- The UN Convention to Combat Desertification (ratified through Proclamation No. 80/1997);
- The Cartagena Protocol on Bio-Safety to the Convention on Biological Diversity (ratified through Proclamation No. 362/2003);
- Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), ratified in 1977;
- International Treaty on Plant Genetic Resources for Food and Agriculture;
- Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their disposal (Basel Convention): ratified in 2000;
- Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention): ratified in 2002 and
- Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention): entered into force 01 January 2010 together with the Agreement on the Conservation of African-Eurasian Migratory Water birds.

5.3 Administrative and Institutional Framework

5.3.1 Federal and Regional Administration

The Federal Democratic Republic of Ethiopia comprises the Federal Governments and the state members. There are nine National Regional States and two City Administrative Councils that are the members of the Federal Democratic Republic of Ethiopia.

Both the Federal Government and the Regional States have legislative, executive and judicial powers.

A policy of decentralization of authority to regional administration pursued since 1991. The powers and functions of the Federal Government defined in the constitution under article 51.
The regional governments have legislative, executive and judicial power over their administrative areas, except in matters of defense, foreign relations, citizenship, etc, which fall under the jurisdictions of the Federal Government. The administrative structures in regional governments are zone, wereda and kebele.

5.3.2 Environmental Council

Environmental council established by provision of Environmental Protection Organs Establishment proclamation No. 295/2002. The environmental council consists of representative from prime Minster office, Federal and regional governments, Ethiopian chamber of commerce, local environmental non-government organizations, the confederation of Ethiopian Trade Unions and the director general of EPA.
The Council is responsible to:

- review proposed environmental policies, laws and issue recommendations to the government;
- evaluate and provide appropriate advice on the implementation of the environmental policy of Ethiopia and
- Review and approve directives, guidelines and environmental standards prepared by EPA.

5.3.3 Environmental Protection Authority

The Federal Environmental Protection Authority (EPA) (nowCoEFCC) established under the Proclamation No. 295/2002 as an autonomous public institution of the Federal Government of Ethiopia entrusted with the protection and conservation of natural resources in the country.
The Authority (EPA) is the competent environmental agency with one of its objectives : *"to ensure that all matters pertaining to the country's social and economic activities are carried out in a manner that will protect the welfare of human beings as well as sustainably protects, develops and utilizes the resources base on which they depend for survival."*
The Federal EPA is the key national level environmental agency with a mandate to address environmental issues.

5.3.4 Sectoral Environmental Protection Unit

Proclamation No. 295/2002 requires at the Federal level each Sectoral ministry to establish in-house Environmental Protection Unit to ensure harmony with respect to implementation of the environmental proclamations and other environmental protection requirements.
The duties and responsibilities of these Sectoral Environmental Units are to co-ordinate and follow up of the integration of environmental requirements in a proactive manner to ensure environmental sustainability of sectoral development efforts. Based on this provision different ministry such as Ministry of Water, Irrigation and Electricity, Ministry of Mines and Petrol, Ministry of Agriculture, etc has established sectoral environmental units. Recently the federal EPA has delegated its power to review EIA to these institutions.

5.3.5 Regional Environmental Protection Agencies

The Environmental Protection Organs Establishment Proclamation (Proc. № 295/2002) requires regional states to establish or designate their own regional environmental agencies.

The regional environmental agencies are responsible for coordinating the formulation, implementation, review and revision of regional conservation strategies and for environmental monitoring, protection and regulation.

Regarding EIA, specifically, the Environmental Impact Assessment Proclamation (Proclamation Nr. 299/2002) gives regional environmental agencies the responsibility to evaluate EIA study reports on projects that licensed, executed or supervised by regional states and that are not likely to entail inter-regional impacts. Regional environmental agencies are also responsible for auditing and regulating the implementation of such projects.

The responsible body for environmental protection in SNNPRS is structured independently, Forest, Environment and Climate Change Bureau.

At zonal level, environmental bodies structured independently.

The environmental protection offices of the project areas are structured independently in South Omo ,. Bench-Maji and in Keffa Zones.

5.4 Ethiopian Guide Lines and Standards Applicable to the Sugar Project

The EPA of FDRE has prepared national environmental quality standards for air, water, noise, etc. The following emission limits values for discharges to the receiving water in the case of effluents and to the atmosphere for gaseous emissions from sugar plants, and noise pollution standards.

Table 3: Ethiopian Quality Standards of the Sugar Processing Factory

Limit Values for Effluents	
Parameter	Limit Value
Temperature	40 °C
pH	6 – 9
BOD_5 at 20°C	90% removal or 60 mg/l, whichever is less
COD	90% removal or 250 mg/l, whichever is less
Suspended solids	50 mg/l
Total ammonia (as N)	15 mg/l
Total nitrogen (as N)	80% removal or 40 mg/l, whichever is less
Total phosphorus (as P)	80% removal or 5 mg/l, whichever is less
Oils, fats, and grease	15 mg/l
Mineral oils at oil trap or interceptors	20 mg/l
Hydrogen chloride (as HCl) (at a mass flow of 0.3 kg/h or more)	30 mg/l

Limit Values for Emissions to Air			
Parameter		**Limit value**	
Total particulates		100 mg/Nm3	
Limit Values for Noise Pollutions			
		Limits in dB (A) Leq	
Area Code	Category of area	Day time1	Night time2
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45

Source: EFDRE Environmental and Protection Authority, Industrial Pollution Control Standards and Guidelines

1: Day time reckoned to be between 6.00 am to 9.00p.m

2: Night time reckoned to be between 9.00p.m. to 6.00am

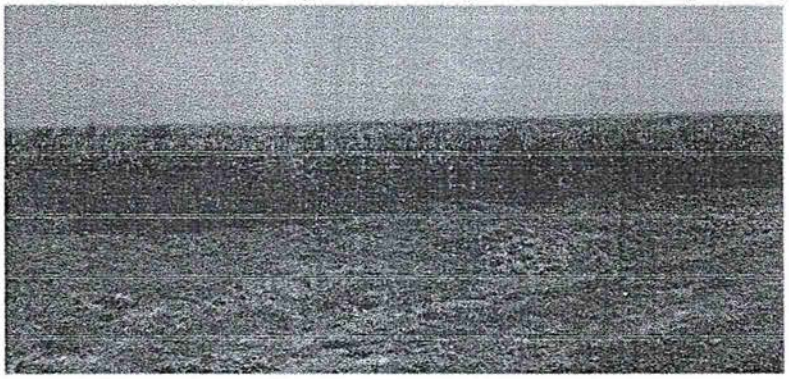
6. ASSESSMENT

The crucial objective of ESIA is to integrate environmental considerations as early as possible to take measures alternatives as of other feasibly studies. The selected project alternatives shouldbe socially acceptable and environmentally sound and sustainable. There was conducted ESIA earlier time but due to changes of some major issues such as downsized the project, financial constraint to implement the proposed plan as whole, creates awareness about the project (international wide), poor project management (including contract administration), partial areas of the project took by government for other agricultural investment are among others. Hence, the Corporation has decided to be revised the ESIA to bring more sustainable development. The baseline of environmental conditions consists of four major categories, namely about the proposed project, physical, biological and socio economy environments.

6.1. Baseline Information on the Kuraz Sugar Project

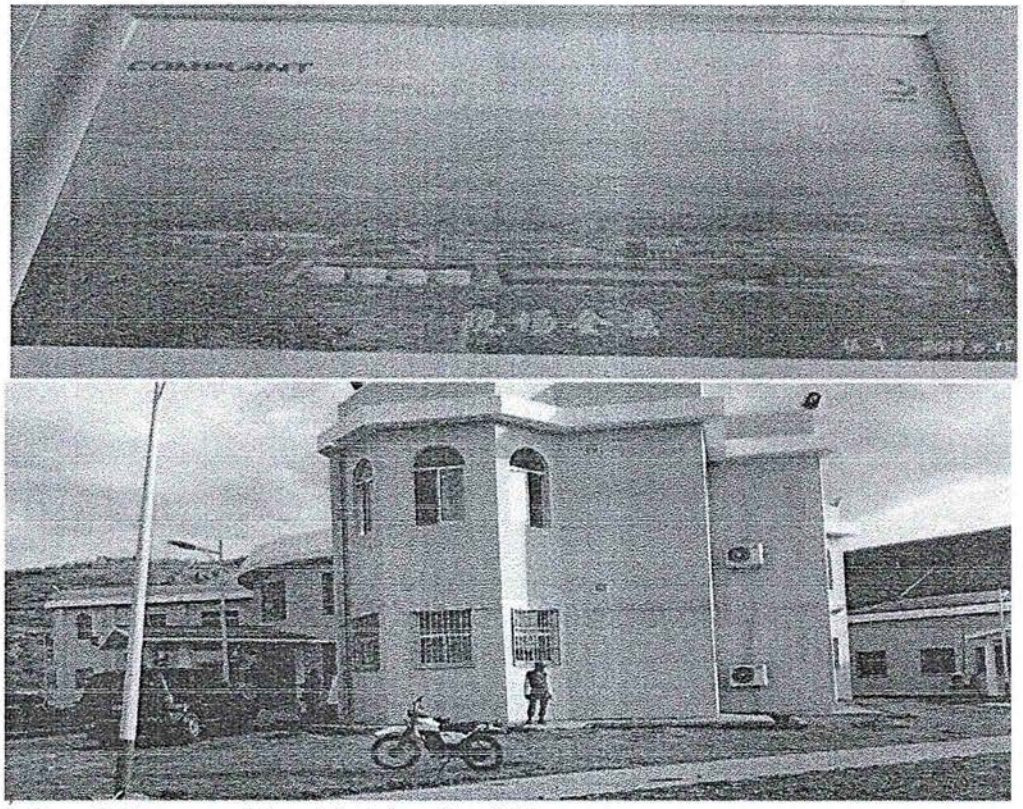
6.1.1 Background of the Project

The project has already started doing its duties starting from 2011 GC. The existing status of the project indicates that it is under the implementation and operation stages. The total irrigable lands of the project are net 100,000 ha. The total cultivated/prepared lands until now are 39,382 ha for (Kuraz 1, 2, and 3 factories), and zero for Kuraz 5 factories. The remaining 60,718 ha are under implementation process such as land clearing and others. The annual anticipated total production of sugar by four factories will be 1,390,000 tons ; and from its byproducts 130,810 meter cube ethanol and 300 megawatt electric power can be generated (100 will be used in the project areas and the remaining (200) megawatts will go to the national power grid).

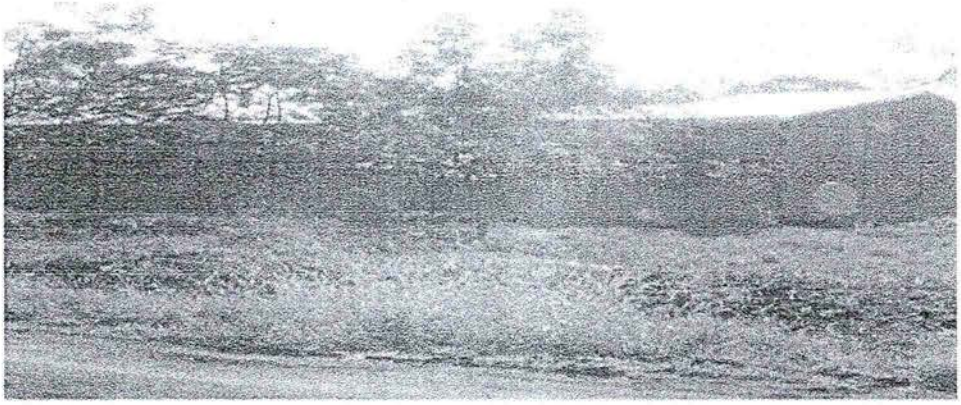


Picture 1: Parts of the Sugarcane Farm, Omo 2

The project has mobilized machineries. Most of the established campsites consider the standards of the Agricultural Investment Environmental Code of Practice of the Ministry of Agriculture and the CoFECC. The project camp (villages of workers) sites, factories including administration buildings and others shown in the location map, and the samples of them presented in the following pictures.



Picture 2: Omo 3 Factory and its Administration Office



Picture 3: Parts of Residents for Permanent Workers at Omo 1 Factory

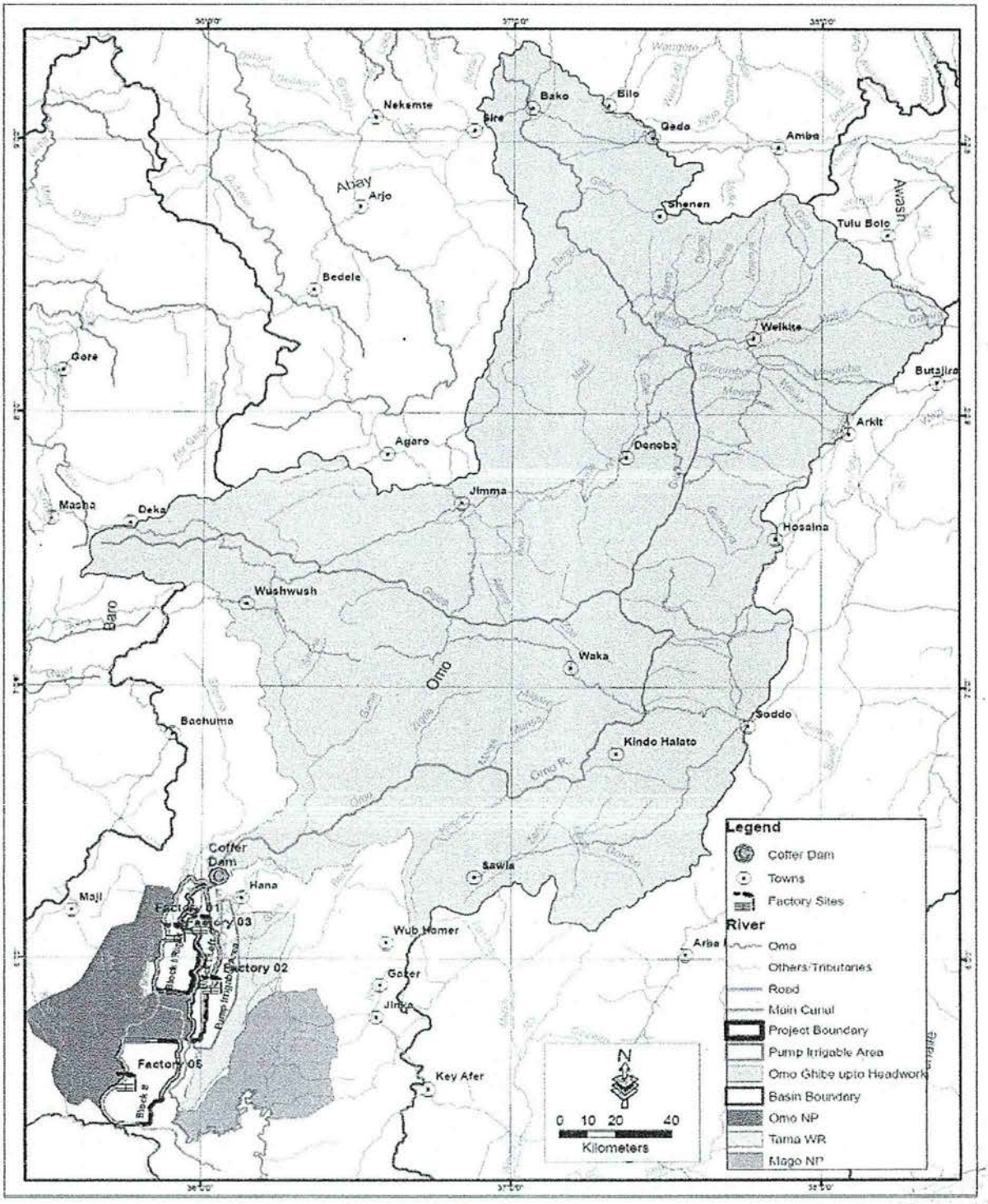
6.1.2. Watershed /Catchment's Area

- Catchment's area up to the confluence of Lake Turkana :79 000 Km^2;
- Catchment's area up to Weir Site: 48 520 Km^2

The word watershed has a similar concept with the catchment. It is a stream system drain the total land area at some point, in this project case to the diversion point. It used for a physical, biological and socio-economic-political unit for planning and management of natural resources.Two major rivers drain the catchment area: Gojeb River, originating at Deka town and flowing from the west to east direction and Gibe River originating at around Bako town and flowing from the north to south direction forming the Omo River.

Figure 2 shows the watershed area of Kuraz Sugar Development Project.

Figure 2: Project Watershed Area

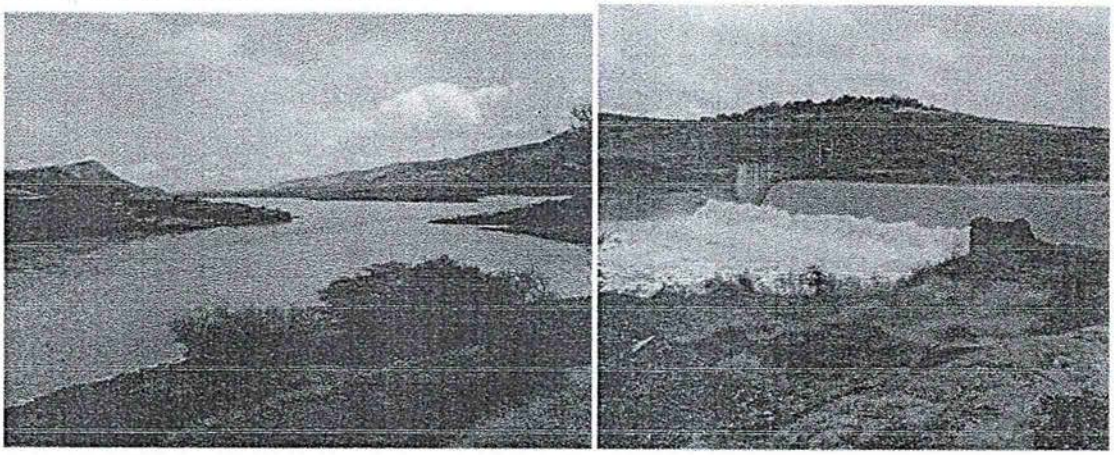


Source: Own based on Sugar Corporation Hydrology Study (2013) and EIA Study (2013))

6.1.3 Major Project Components

6.1.3.1 The Head Work / Diversion Weir Site

The project uses surface water diversion. The diversion site is located at coordinates of 173 678 East and 656 859 North. The weir would have a height of 16.30 m and a length across the river channel of 378 m and would maintain a water level ("pond level" upstream) of 477.723 masl.
The diversion weir site can be seen as shown in the location map (figure 2) with consisting of left and right main cannels. There is no as such a significant environmental impacts identified (see the hydrology part) at the weir site.



Picture 4:Diversion Weir Site at the Top of the Project Area(Decha)

6.1.3.2 Farm Layouts

Water from the secondary canals delivered to standard size irrigation plots by unlined tertiary canals.
The basic irrigation unit (BIU) varies from area to area, generally it would be rectangular 100 m by 200 m and served by one field ditch. In some cases, one ditch may be able to serve two plots.
The recommended irrigation method is furrow irrigation. Length of each furrow on the contour ranges from 100 to 200 m with an average width of about 200 m.

6.1.3.3 Irrigation and Drainage Canals

There would be main canals on both sides of the project command areas. The right main canal is about 172 kms long carrying about 234 m^3/sec design discharge. The length of the left main canal is 62 kms carrying about 62 m^3/sec design discharge. The right side main canal crosses Omo National Park that stretches for about 35 km.
Secondary canals, which take irrigation, water from the main canals into the command area that will run for 24 hours/day. Secondary canals will serve irrigation units of 700 ha to 2 000 ha and will operate for 24 hours/day.

Drainage is required to accelerate removal of water during flood events, maintain groundwater levels sufficiently low to avoid water logging of plant roots and drain surplus irrigation water. The command area would be drained by a system of drainage canals that evacuate excess water from quaternary units which in turn discharge in to tertiary drains which in turn discharge to collector drains and lastly to the river system.

6.1.3.4 Road Networks in the Project Compound

To properly implement construction and operation work of the proposed project both surfaced and un surfaced roads would be provided with the following width and standard.

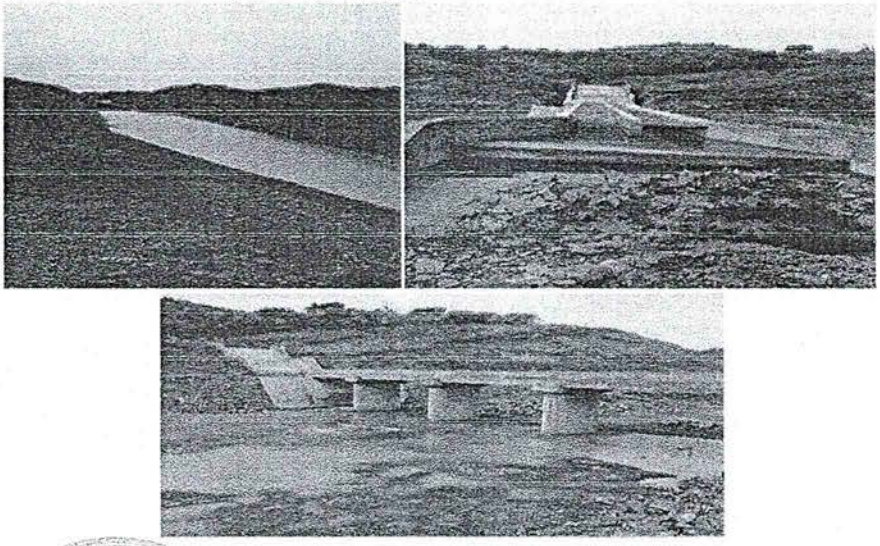
- a 12 m wide surfaced Service roads along Right and Left Main Canals with a RR 50 standard;
- a 10 m wide surfaced service roads along secondary canals with RR 50 standard;
- an 8 m wide surfaced service roads along tertiary canals with RR 30 standard and
- A 5 m wide, surfaced roads along flat irrigation tube with RR 30 standard.

6.1.3.5 Drainage and Other Structures

Either Cross-drainage structures provided as canal-inverted siphons or drain inverted siphons to pass flood flows under the main canal.

Cross Regulators with crossing culverts are provided at locations where secondary canals off take irrigation water.

Sufficient number of flow control and regulation structures would be provided in addition to conveyance structures like bridges and box/ pipe culverts.



Picture 5: Parts of Cross-Drainage Structures on the Right Main Cannel at Factory 3

6.1.3.6 Pump Scheme

Four pumping stations would be built on the left bank main canal with a total command area of about 33 000 hectares.

6.1.3.7 Sugar Factories with Associated Facilities

Four sugar factories are constructed (two number of 12 000 TCD capacity on the left bank, one number with a capacity of 12 000 TCD and one number with a capacity of 2 X 12 000 TCD in block two) with associated facilities including offices, residential houses and other social services.

6.1.3.8 Villages and Other Infrastructure and Services

In addition to the housing and office units in the factory there would be facilities with residential houses and other services. There would also be six agricultural villages for one factory with various facilities and social service facilities to be built.

In addition to the facilities for the work forces, the farms and factories require settlement villages for people of the project area and surroundings to be resettled/partially settled whose number would depend on the proximity of their farm land to be provided with various social and other services (see location/topographic maps).The electricity, water supply, social services and sewerage systems are partially completed /under implementation process.

6.1.3.9 Operation and Maintenance

Regular maintenances of the entire irrigation and drainage systems are essential. The major maintenance activities include removal of silt, vegetation, repair of side slopes, and maintenances of road banks and flood dykes and other structures.

6.1.4 Main Plantation Components

6.1.4.1 Sugar Cane Varieties

The project cultivates the following sugar cane varieties.

Table 4: Major Sugar Cane Varieties Coverage in the Kuraz Sugar Development Project

Cane varieties	B52-298**	C-86/12	Mex54-245***	N-14	N-52	NCO-334*
Percent Share (%)	44.38	1.59	1.52	0.56	0.45	51.5

Source: Sugar Corporation (2013)

- NCO -334*: Its holds the dominant share (51.5%). It grows well in all soil types and cutting. Its performance is declining as the number of rations increases. It is ranked in the highest positions in the field sugar and field yield as compared the existing varieties;

- B52-298**: It grows in all soil types and cutting (44.38% share). The performance of the variety is quiet extraordinary except cane amount per hectare. It is ranked the second in all parameter among the existing varieties. Its best characteristics is that its performance never decline as the number of raton crop increases;
- Mexico 54-245***: it is cropped in the1.5% of the area. It is the highest cane /ha producer in all soil types and cuttings. However, it is amongthe least in field yield performances.

6.1.4.2 Seed Production System

There are three seed production systems primary seed, secondary seed and commercial seed productions.

Primary (Breeders') Seed Production

Primary seed production prepared in scientifically supervised farms of the sugar industry. Heat treatment is important to set the well-maintained seed nurseries. After treatment, the sets are soaked in a fungicide solution (0.1 per cent MBC) for 10 - 15 minutes and planted in a well-prepared field, where sugarcane not cultivated during the previous year. The recommended agronomical practices are:

Secondary (Foundation) Seed Production

Setts from primary seed nursery used for planting secondary seed nursery. All the required agronomic practices followed including seed plots inspected at regular intervals as of the prescribed standards. The crop harvested at 8 to 10 month age and setts used for planting commercial seed nurseries.

Commercial Seed Production

Commercial seed plots need to be in appropriate site that avoids transport of bulky seed to long distances. The crops harvested at 8 to 10 month age and supplied as commercial seed.

6.1.4.3 Land Preparation

There are generally two important considerations in preparing the land for sugarcane production. First, sugarcane is a deep-rooted plant and second, germination is favored by well-prepared land. Therefore, when preparing the land, the aim should be to attain rapid germination of the cane points/sett as well as root penetration.

Land preparation includes uprooting, sub soiling, ploughing, harrowing, leveling and furrowing executed before planting. The operation period is usually between mid of October to end of February, dry period of the project area.

6.1.4. 4Planting

Planting is an important operation in sugarcane production where efforts made to produce seed cane and land preparation to attain the objective of producing cane for milling. Sugarcane planted manually. Planting furrows have to be dug straight and 6 – 7 cm deep in the middle of the furrow.

6.1.4.5 Germination and Tillering

Commercial sugarcane is propagated by cuttings of the stalk (seed cane) containing usually two or more nodes with buds. The bud, a miniature stalk with its growing point and root and leaf primordial, forms the new shoot. With favorable condition, germination occurs between 7 to 10 days after planting.

Tillering, or development of secondary shoots, increases the rate of canopy closure that aids in weed control. Varieties differ greatly in their tillering capability and the ultimate number of tillers present at harvest.

6.1.4.6 Manures and Fertilizers Use

Use of organic manures: The project land is virgin and fertile with natural wood leaves composed. The bush land and its residues may improve the level of organic content of the soil of the farm.

Use of chemical fertilizers: The farm project is not using any kind of fertilizers now. Nevertheless, if their productivities are below the expectation, the project will use fertilizers based on the MoA's rules and regulations or the research center guideline as far as fulfill the national requirements.

6.1.4.7 Major Insect-Pests and Disease Management

Black beetles, termite, white cane grubs, and stalk borer are common insect pests. Black beetle controlled by the application of Basudin or Ethiozenon at the rate of 43 ml in 10 liters of water per 100 m of furrow. If the black beetle appears again after first application of insecticide, second time application will be carried out.

Termites are like grubs that affect sugarcane and causes great damage. It damages sugarcane by feeding on roots and underground stems. The first symptom is a yellowing (chlorosis) of the leaves.

Smut, the most economically disease in the farm, is controlled by roughing and burning and /or burying of the disease cane crop outside the farm area.

6.1.4.8 Irrigation Water Management

Irrigation Depths and Intervals

Irrigation interval is mainly dependent on the evapo-transpiration and water holding capacity of soil or soil type. Soil of the estate categorized into four irrigation classes based on moisture holding capacity, which ranges from 120 mm to 143 mm per one-meter soil depth.

Hand Feel Method

Estimation of soil moisture and irrigation intervals is very difficult. It should be supplemented by hand feel method together with auguring at 30 and 60 cm soil depth two or three days before the virtual intervals to determine the moisture contents gravimetrically. Feel methods used forcrosschecking of the gravimetric moisture determinations.

Soil Penetration Depth

Even ifthe proper amount of water given to the field, not all the water may reach up to the required root depth. In mechanized farming due to repeated cultivation and haulage operation, a hard pan occurs and causes to hinder downward water movements. So monitoring of water movement is very important.

Dry off Periods

After sugarcane reaches at maturitystage,providing water is not necessary for specific period before harvesting.

6.1.4.9 Cane Pushing

Cane pushing is a pushing of matured canes to set the borderline (from four border sides) of sugar canes in the field by daily laborers. Pushing of cane is important to make the farm roads free for transportation, to protect the cane from other boarder field fire during cane burning time, to make easier the workers' movements in the inner blocks' quarter cannels and others.

6.1.4.10 Cane Burning

Burning occurs at pre-harvesting stage. A process takes place prior to harvesting to avoid trashes and leaves from cane in order to facilitate harvesting process.

6.1.4.11 Harvesting

Improper method of harvesting, under-aged or over-aged of canes, leads to yield loss, poor sugar recovery, poor juice quality, and causes to milling problem. Therefore, avoiding the cutting of canes in either over-matured or under-matured periods is mandatory.

Planting time, commonly practiced, is from Mid December to end of February i.e., the driest period. However, harvesting carried out from early October to the beginning of July. The average sugar cane age is 12 months. The age of the cane is dependent up on variety, cane type, climate, agronomic practices and factory demand. Relatively the younger cane fields could be harvested when the factory faced with cane shortage.

Harvesting of sugarcane at a proper time i.e., peak maturity, by adopting right technique is necessary to realize maximum weight of the mill able canes (thus sugar) produced with least possible field losses. Harvesting of sugar cane considers-

- Cutting cane to ground level so that the bottom sugar rich internodes which add to yield and sugar;
- De-topping at appropriate height so that the top immature internodes are eliminated;
- Proper cleaning of the cane i.e., removing the extraneous matter such as leaves, trash, roots etc if the cane is not properly burnet and
- The harvested canes should go tothe factory in proper way. Cane harvesting after burning (commonly done manually using machete) performed with in 24 - 48 hours or less time and delivered to the factory to within this time. Harvesting carried out from 15 October to the beginning end of July.

6.1.4.12 Cane Haulage or Transportation

Manually harvested canes collected and loaded to carts/trailers by Grab loader (80 - 90 hp). Caterpillar machine (80 - 90 hp) or others do the shunting operation (pulling of carts or trailers from harvest road to farms and from farms to harvest road). Then, tractors (140 hp) take these carts/trailers of cane to factory. Tractors are required to transport 50 000 qt of cane from farm fields to factory gates.

6.1.4.13 Cropping Cycles and/ or Patterns

After harvesting of plant cane, ratoon crops are growing. Growing of 4^{th} -9^{th} ratoons and sometimes up 10^{th} cycles is possible depending up on the soil fertility status.

6.1.4.14Crop Rotation

Mono cropping system has disadvantages in both soil nutrient depletions and in enhancing build up of resistances of pests. Therefore, the project shall use this agricultural practice, crop rotation at least in every seven years, through rotating with other crop or using intercropping system depending on existing need on the farm.

6.1.4.15 Cultivating Performances/Plans

Table 5: Cultivating Performances/Plans

Project	Total cultivating/land prepared including irrigation infrastructures /plan/	To date Performance /2018/	2020	2020	2021	2022	2023	2024 and onwards
Omo Kuraz 1	18000	10692	1,000	1,000	2,500	2,500	308	
Omo Kuraz 2	18000	6120	1,400	2,000	3,000	4,000	1,480	
Omo Kuraz 3	18000	10500	2,500	2,500	1,500	1,000		
Omo Kuraz 5	46000	-	2,000	5,000	5,000	6,000	7,000	21000
Total	**100,000**	**27312**	**6900**	**10500**	**12000**	**13500**	**8788**	**21000**

Source: Computed based on KurazSugar Project (2018/19)

6.1.5Major Sugar Manufacturing Components

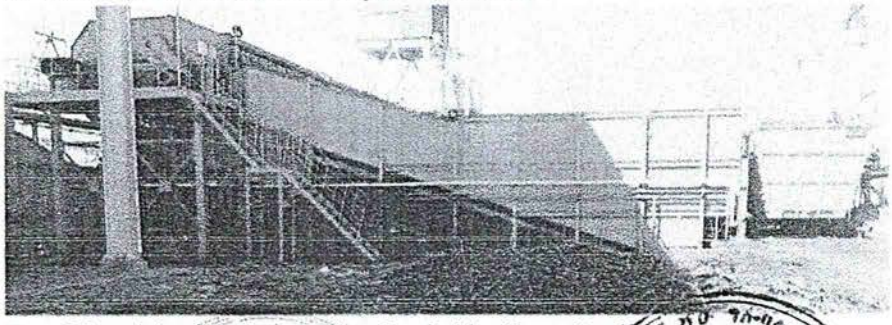
The major portion of world's sugar production is raw sugar, which produced commonly from sugarcane. The setting up of sugar factories for producing raw sugar in developed countries were importing raw sugar from their colonies and refining them in their own countries.

6.1.5.1Major Raw materials or Inputs for the Production of Sugar Process

Raw materials and inputs are required to produce the final raw, white, or refined sugars. The major raw materials or inputs that used in the Omo Sugar Manufacturing Factories are sugar canes, waters, energy,chemicals and raw sugar for the refined sugar. Inthis project, lime is an indispensible for all types of planed sugars including raw sugar, white and refined sugars. There is a tracing amount of sulphr dioxide added only in the case of white sugar process. Refined sugar process needs an independent plant starting from raw sugar as input (see figure3: raw sugar process and figure4: refinery sugar process).

Sugar Canes

Sugarcanes are the main raw materials for the sugar-manufacturing factory. The canes came to the factories from owns' and out growers' plantation farms. The four factories found in the Kuraz Sugar Development Project have a crashing capacity total of 60, 000 tons per day (TCD), factory 1,2 and 3 each 12,000TCD; and factory 5 24,000TCD.



Picture 6: The Raw Materials, the Cane Stalks Carried by Cane Carriers at Factory

Water

Water is a predominant input for the sugar factories. Huge volumes of water ,about 200 m3/hr, initially used for cleaning of the burned blankets of the sugar canes (cane crushing process) for a factory a capacity of 12,000TCD.Sprays of water on the blanket of bagasse is called imbibitions or maceration process. The source of raw water is Omo River. The characteristics of the raw water or concentrated one is explained in 6.2.9 and 7.2.1.1, Table 14 and 33.There is a water treatment plant in the factory to produce the required quality and quantity of water for factory, domestic and steam productions.

Energy

Bagass and furnace used as fuel to produce steams. As to the project site/factory 3 a capacity of 12,000TCD,the steams can produce 60MW megawatt energy/electricity, for the consumption of the factory (20 MW) as well as to the national grid (40MW). Total four factories a capacity of 60,000 TCD can produce 300MW megawatt energy/electricity, for the consumption of the project (100MW) as well as to the national grid (200MW). Currently, factory 2 and 3 generate for their own consumption estimated to be 40 MW.

Cogeneration plant@ factory a capacity of 12,000TCD	
Technology	Moving grate/pulsating/slash dumping grate, high pressure
Main fuel	Bagasse
MCR Rating	170 tones/hr
Quantity of boiler	4 Nos (2nos for each phase)
Steam Pressure	67 bar(a)
Steam Temperature	515°C
Feed Water Temp	160 °C
Efficiency :-With bagasse GCV With bagasse NCV	70%+1% @87%+1%
Particle emission	55mg/Nm^3
RO Plant	7200cu/day(Phase I & II)
Pressure reducing and Desuper -heating	234 ton/hrs@67to 1.5 bar (a) 40 ton/hrs@67to 8 bar(a) 40 ton/hrs@67to 22bar

Source: Sugar Corporation (2018)

Minerals/ Chemicals

Clarification conducted using chemicals and heat as clarifying agents. Heating and filtering removes the colloids, which cause turbidity in juice. Addition to milk of lime and SO_2 (in case of white sugar), CO_2 and adfloculant are needed.

6.1.5.2 Sugar Manufacturing Processes

There are four sugar factories are constructed in the project area (two number of 12 000 TCD capacity on the left bank (factory 1&2), one number with a capacity of 12 000 right bank (factory3) and one number with a capacity of 2 X 12,000 TCD (factory 5) in right bank of block

two).All factories follow in general similar manufacturing process as to the ISO4001 state of art international standards, may varies their capacities. ESC-COMPLANT, Chinese Company, has installed all factories.

Collecting the Cane Harvest

Canes harvested at ground level, its leaves removed by burning plantations and trimmedoff the tip at the last matured joint. Thenthe canes placed into large piles and picked up, tied and transported to the sugar factory.

Cane Preparation

The first process in a sugar factory is the preparation of cane, before sent for crushing. Cane carrier carries the cane stalks. The cane stalks broken into chips by first and second set of revolving knives (first and second cane knives)and torn into shreds.



Picture 7: Canes at Preparation Stage at Factory 3

Cane Crushing/Diffusion

The cane crushing (extraction) technology adopted in the Kuraz sugar factory project is diffuser. The process uses heavy-duty electric motors to derive the moving parts of the diffuser as well as the dewatering mills. In diffusion process, the extraction is about 65 to 70 % of the sugar content and the diffuser extracts the remaining sugar in bagasse. This bagasse contains 85 % moisture, reduced to about 48 to 50 % before it used as fuel in the boilers. The adjusted bagasses or crushed canes contain wood fibers with thestated moisture, used as fuel, andfor manufacture of paperboard or paper.

The bagasse coming out of the diffuser contains large quantity of residual juice which is squeezed out by passing residual juice extracted by the dewatering mills is screened and milk of lime added to bring the pH of the juice to 9.0 heated to 80^0C and sent to the clarifier for settling the suspended impurities. Operation of the diffuser is fully automatic with minimum manual supervision.

Imbibitions

Sprays of water or thin juice doneon the blanket of bagasse as it emerges from the diffuser and this process known as imbibitions or maceration.

Mixed Juice Extraction

Adoption of modern methods in imbibitions enables extraction of over 93 % of sugar in cane known as sugar extraction or simply extraction. The removal process of mixed juice contains particles ofbagasse conducted before the juice goes for clarification.

Raw or White Sugar Process

There are different types of sugar processing processes or stages depending on the types of sugars produced (raw and white sugars) (see figure 3). The raw or white sugars pass through clarification, sulphitation (for white sugar), carbonation (for all), evaporation under vacuum, sugar boiling and crystallization, and centrifuging processes.

Raw sugar is manufactured from cane juice in the usual manner by defecation except that the massecuite during centrifuging is not completely washed with the result that the film of molasses surrounding the crystals is allowed to remain as such, imparting brown color to the sugar with a purity of 97 to 98 %. Producing raw sugar helps in increasing crushing capacity by about 25 % and the molasses produced becomes edible because sulphur not applied in raw sugar processing.

Clarification

The juice from the mills is turbined, dark green in color, acidic in character and contains both soluble and insoluble impurities. Clarification is necessary using chemicals and heat as clarifying agents. Heating and filtering removes the colloids, which cause turbidity in juice. Lime treatment removes gums, pectins, organic and inorganic acid salts by precipitation. Coloring matter removed by treatment with sulphurdioxide (for white sugar). The juice extracted by the mills passed through a metal strainer to remove suspended purities. Use of clarifying agents like milk of lime and sulphurdioxide(for white sugar) helps in precipitating non-sugars as mud whose removal is essential to prevent interference later on in separation of sugar crystals from the mother liquor. The separation process of mud from clear juice conducted, by sedimentation in clarifiers and or filtered with the help of rotary drum vacuum filters.

The precipitate from the juice formed press cake. It used as fertilizer and in preparation of other by-products while the clarified light juice sent to evaporators.

Sulphitation

Milk of lime added to the raw juice to neutralize the acidity of juice and to keep the juice alkaline up to pH 9.0 - 10.5. Passing sulphurdioxide (for white sugar) gas neutralizes excess lime. Sulphurdioxide used as the chief bleaching agent to make the juice brilliant and light in color.

Carbonation

In this process, passing carbon dioxide gas resulting in precipitate of calcium carbonate neutralizes excess of lime. The limestone mixed with coke burnt in a special kiln to obtain burnt lime as well as carbon dioxide. Carbonization is a costlier process than sulphitation as the requirement of lime is high. The whole juice after treatment is filtered using plate frame type filters. However, the latest system is to have continuous clarification in a single tray-type clarifier with vacuum filters.

Evaporation under Vacuum

The clarified juice contains about 85 % water, two thirds of which evaporated. The technologies adopted in the project has less impact and insures that the steam being recycled as a condensate reduces the chemicals as well as raw water consumption compared to the direct steam applications.

The juice thus becomes more and more concentrated and in the last evaporator turns sugar into syrup containing about 60 - 65% solids and the rest water.

Sugar Boiling and Crystallization

The evaporated syrup is black in color. Sulphurdioxide passed through this syrup to bleach the coloring matter in the process of white sugar. The sulphured syrup then evaporated until it saturated with sugar crystals and as the water evaporates, syrup further added. The concentration of syrup and formation of crystals occurred inthe vacuum pans. Pan boiling is an important and skilled operation as the size and color of crystals of the final product sugar determined by the quality of pan boiling. When formation of new crystals ceases, the final concentration formed and the massecuite called strike then discharged into crystallizers.

Centrifuging

The massecuite from the crystallizers pumped into a revolving machine called centrifuge. Washing with water and then stemming under high speed, the centrifugal force of the centrifuges is increased expelling molasses into the casing of the machine, retaining sugar crystals on the perforated sheet. Spinning continuesuntil the sugar crystals are practically free from molasses. Such separation called as purging or curing.

The final molasses, which is heavy and viscous, contains about one-third sucrose, one-third reducing sugars and the rest non-sugars. It serves as raw material for production of industrial alcohol and yeast and is useful as cattle feed.

Generally, the main by-products in the manufacture of sugar are bagasse, molasses and filter cake besides furnace ash - all of which form about 40% of the weight of cane crushed.

Refined Sugar Process

Refinery sugar process requires a huge processing plant starting from raw sugar as input. In the refining process, the raw sugar passes through softening the film of molasses and centrifuging the mixture of sugar crystals and syrup. Then the boiled and crystallized out as a refined sugar. During crystallizing and centrifuging, all coloring matter and ash removed resulting in the production of refined sugar of 99.95 % purity as against 99.5 % of white sugar produced in India, which may very rarely go up to 99.8 %. The refinery sugar process use also stalk gas to generate CO_2 and it could be considered this as one of mitigation measures for air pollution (see figure 4 for detail refinery sugar process).

Grading, Packing and Storing

Grading

Grading of sugar conducted in sugar grades of vibrating type with different decks fitted with various meshed and sugar from each deck collected through separate chutes into bags directly. Besides, sugar also classified based on their colors. Presently, there are only two colors 20 and 30 the latter being superior to the former. Recently, under new gradation, different country governments, reducing the existing five-grain sizes to three grades (large, medium and small) the two color series remaining as they are. The gradation has come into force from 1984 - 85 crushing session.

Packing and Weighing

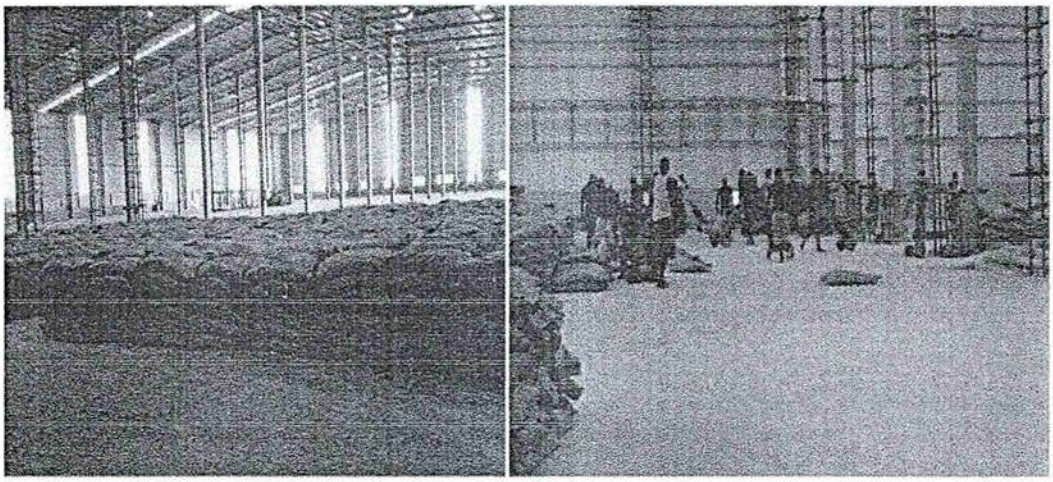
The packing process of sugar conducted mostly in 100 kg or 50 kg bags. Sugar for export packed in 50 kg special gunny bags having polythene lining to withstand multiple handling and transportation to long distances.

Storing

In many of the factories stacking is now being done by conveyor belts and stacking equipment. The storing periods of raw or refined sugars are short or deteriorate very fast though they are very comfortable for edible for sulphur is not used in their sugar processing.

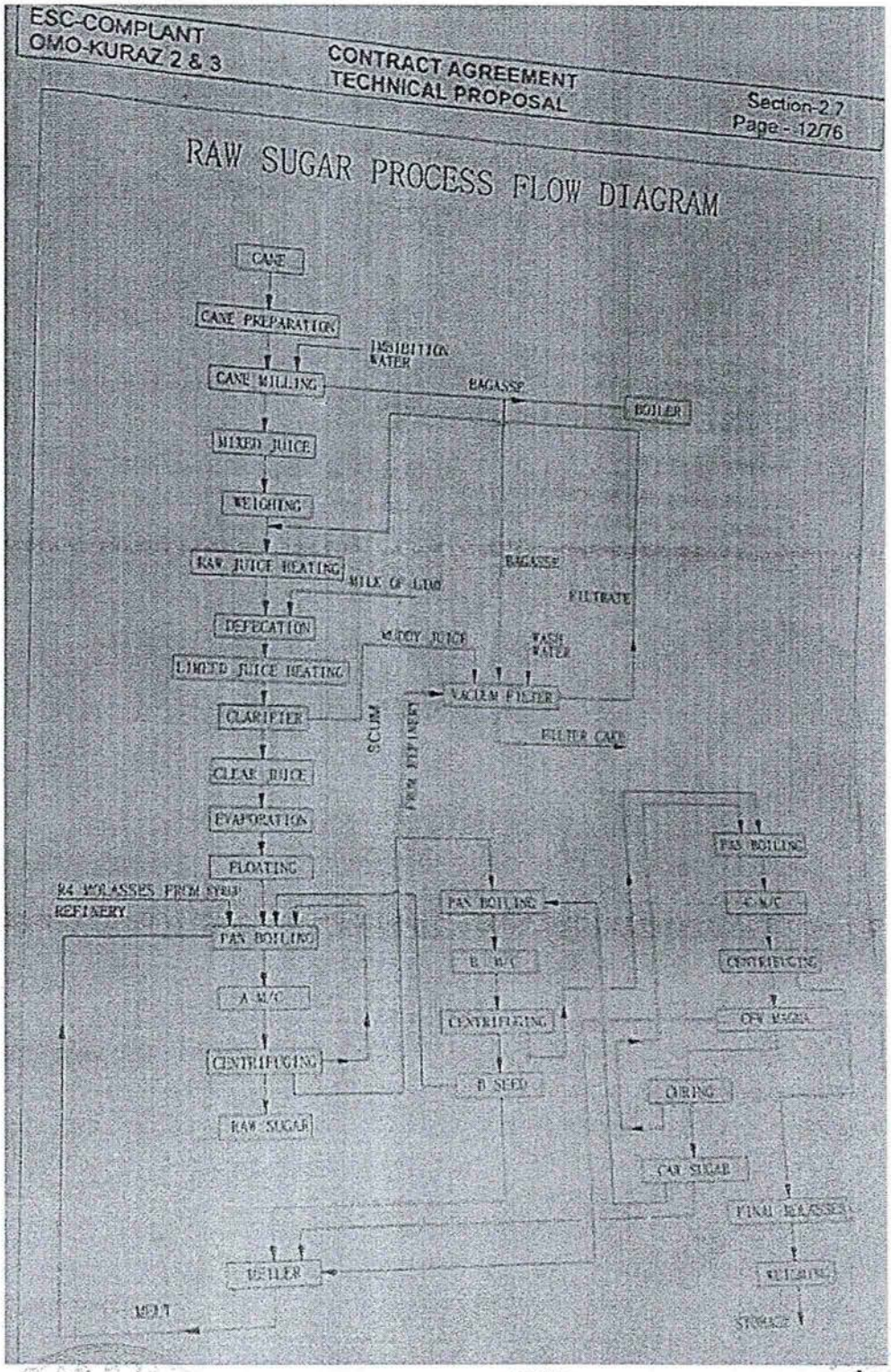






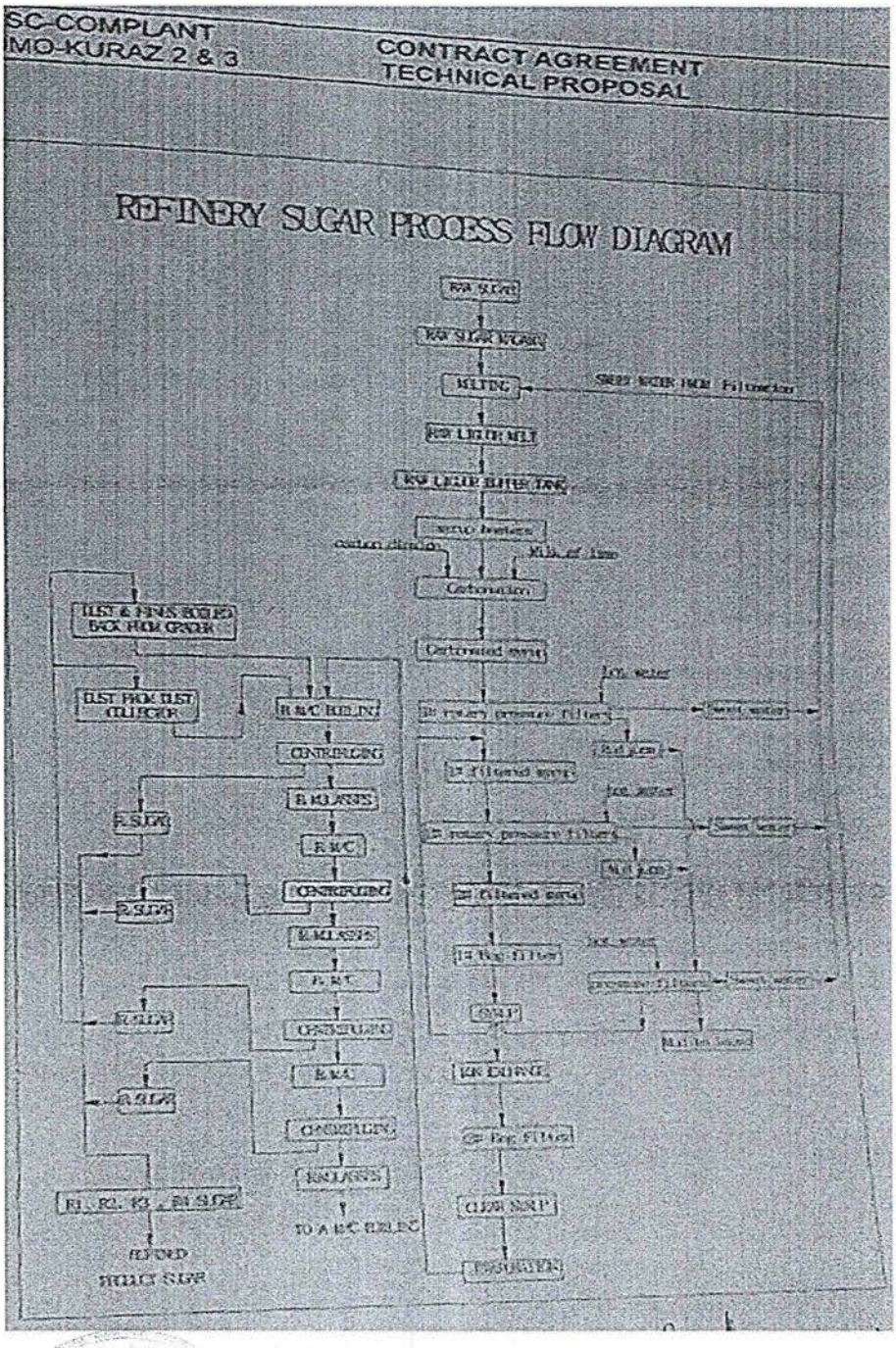
Picture 8: Raw Sugar Packing, Weighing and Storing at Factory 3

Figure 3: Raw Sugar Process Flow Diagram



Source: Sugar Corporation (2018)

Figure 4: Refinery Sugar Process Flow Diagram



Source : Sugar Corporation (2018)

6.1.5.3 Integrated Sugar Cane Process by-Products

i) Cane Tops

The removed cane tops consist of 25% to 30% of harvested cane and serve as good fodder for cattle. The main by products in the manufacture of sugar are bagasse, molasses and filter cake besides furnace ash - all of which form about 40% of the weight of cane crushed. Each of these by-products serves as source material for manufacture of several industrial products, which are in great demand. Development of sugarcane by-product industries and their ancillaries improve profitability of sugar industries and reduce production costs of sugar. Several sugarcane producing countries like Australia, Brazil, Cuba, Philippines, South Africa and Taiwan have developed numerous industries utilizing the by-products of the sugar industry as source material.

ii) Bagasse

Bagasse, 30 – 35 % of cane harvested, used as a renewable source of energy in the sugar industry. In fact, power from bagasse in addition to the potential use of alcohol from molasses as a source of fuel indicates cane sugar industry as a most remunerative industry in the country. In terms of its price and energy potential, it is very advantageous.

Bagasse contains 20 - 27 % pith, 5 % non-fibrous epidermis and the rest is fiber. The depithed bagasseused as an excellent raw material for production of all types of high-grade paper.

The surface of cane stalk separated into rind, pith and epidermis and this separation helps in processing new wood fiber for pulp and paper for use in panel boards. Pith utilized also for production of furfural, which used in industries. The bagasse ash used in the manufacture of chemical resistant glass.

iii) Molasses

Molasses forms 3 to 5 % of weight of cane crushed. It is the mother liquor in the final stage of manufacture of sugar in a sugar factory. The products from molasses include alcohol used for industrial purposes, citric acid, oxalic acid and lactic acid for industrial application and carbon dioxide used in production of dry ice. Sugars found in the molasses can be utilized for production of cattle feed, edible syrup, solvents and chemicals like ethanol (rectified spirit), absolute alcohol, etc., which can be mixed with petrol in certain proportion which is then called power alcohol.

Molasses usually contains potash (7.5 % K_20), P_2O_5 (0.5 %) and Nitrogen (0.2 %) and can be used after proper dilution with water as a fertilizer particularly for reclaiming alkaline soils.

iv) Distillery Effluent

Distillery effluent or spent wash or spillage is the liquid left over after the alcohol removed during fermentation and distillation. The effluent used for commercial production of methane, which serves as fuel and fertilizer.

V) Filter Cake or Press Mud

Filter Cake or Press Mud forms 2.5 to 3.5 % of cane crushed in sulphitation factories and 7 % in carbonation factories. Sulphitation filter cake contains 20 - 25 % organic matter and about 45 % lime on dry basis. It is useful as manure because it contains small quantities of nitrogen, phosphate and potassium. It is important in the reclamation of alkaline soils, and serves as a basal dose replacing farmyard manure. The recent report from Cuba indicates fresh and stored press mud can produce.

vi) Cane wax

Cane wax presents on the surface of sugarcane stalk as a whitish deposit. It extracted from sulphited filter cake, which contains about 3 % wax. Crude cane wax used directly in the manufacture of carbon paper, in polish industry as protective coating on fruits and for preparation of waxed papers.

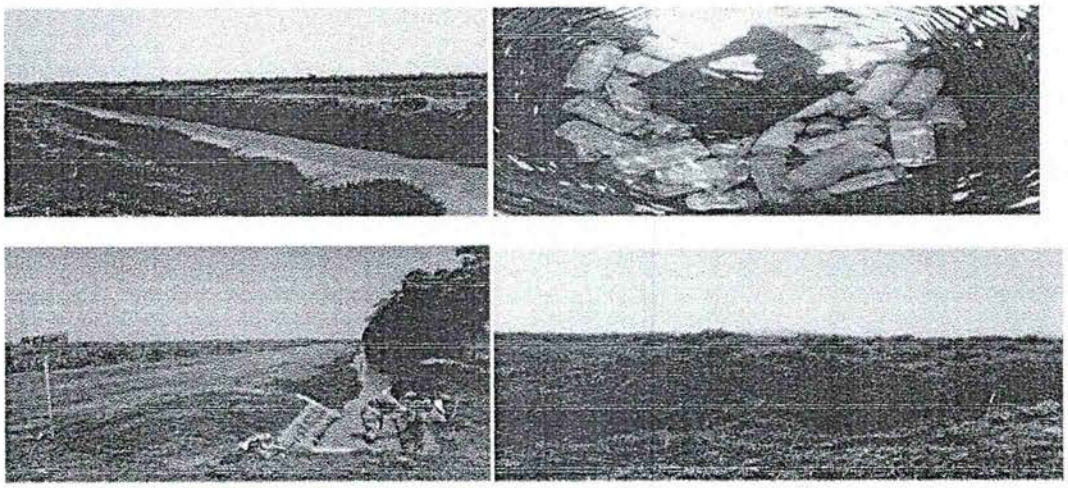
6.1.6 Lessons Learnt from Similar Projects

6.1.6.1 In house experiences

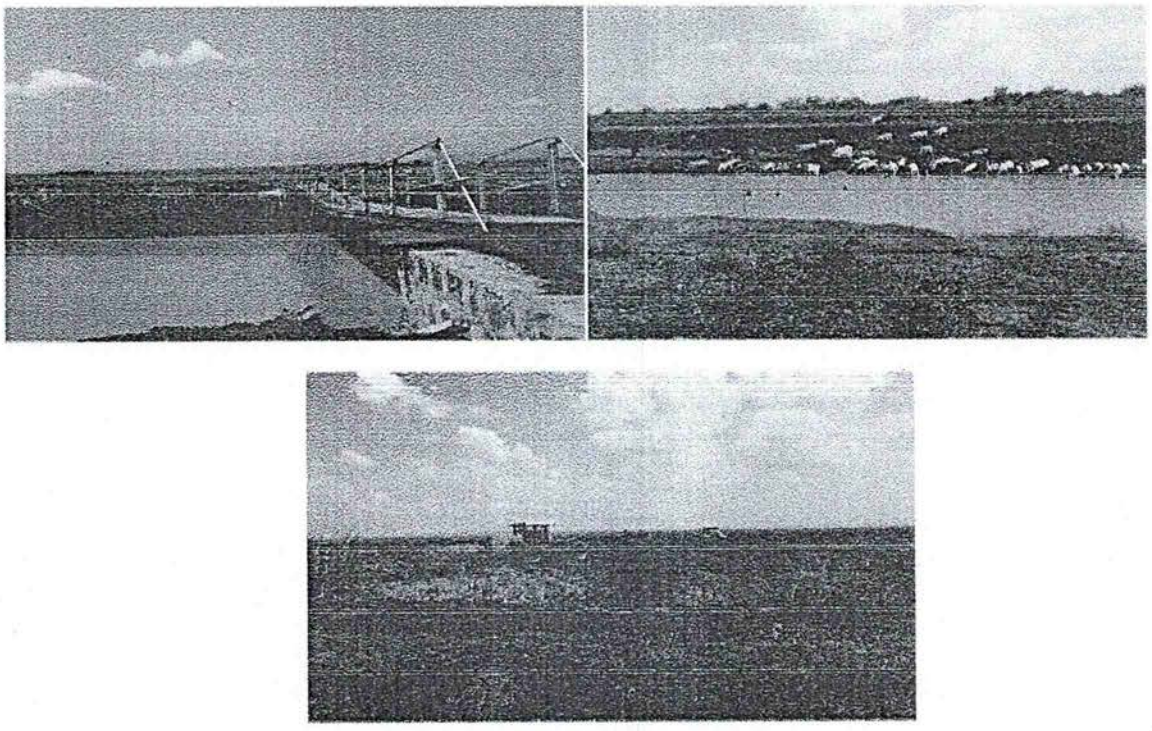
The Kuraz sugar project categorized by two blocks: - (i) Block II and I. Block I consists Block I (left) and Block I (right). Block I (left) consists Omo 1(factory 1) and Omo 2(factory 2). Block I (right) consists Omo 3(factory 3). (ii) Block II consists Omo 5(factory 5)-under construction.

From environmental and social protections' issues aspects, as to our observation, in house experiences including Omo(factory) 1 and Omo(factory) 2, can be considered as a model for some of the following issues:-

- There is an effort in implementing the ESIA study;
- Have a good integration with the communities and administrators such as enhancing civilizations and working culture; developing farming areas(0.75 ha for canes and 0.25 for maize, sorghums ,banana, moringa, papaya ,vegetables and others) ; developing modern beehives; securing markets for their products for factory and domestic residents(transport service for their products to sale at Hanna/Jinka towns) ; providing different services (transport, health, school, farming machineries, labor ,milling, bridge, water, road networks and other infrastructure facilities and water ponds for their live stock);and protecting wild animals and vegetations;
- Had a good practices in managing cannels' constructions; conservation(such as planting elephant grass on secondary cannel) made on them ;
- Planting wind break tree/ such as Neam trees(Zadaction Dice),Diredewa tree(Delonics Redfica), Moringa ,etc/ , chemical bottles' wastes management and employee with safety cloth ; and
- Protecting wildlife and buffering zones of Omo river and drainages



Picture 9: Conservation made on Cannel, Chemical Bottles' Wastes Management, Wind Break Trees, and Employee with Safety Cloths, and Natural Vegetations at Buffering Zone at Omo(factory) 2.



Picture 10: Settlers' Bridge, Farm and Utilizing of Cannel for Livestock Water at Omo(factory) 2 Surrounding Areas

6.1.6.2 Lessons from Similar External Projects

The major lessons to be learnt from similar sugar and related projects:-

- Consider the live changing experiences of the pastoralists' communities, better experiences of the sugar corporation including Omo(factory) 1 and Omo(factory) 2;
- Quota of employees should be given to the project surrounding people, by considering the Sugar Corporation Working Manual ;
- adequate advanced planning and preparatory work should be done before initiating the scheme;
- conduct frequently local community/park/administrations consultations and allocate enough resources for capacity buildings of stakeholders such as park, environmental protection, and pastoralist, water and agriculture offices;
- peer follow ups in proper ESIA execution, community mobilization, and awareness creation;
- strengthen the implementation of environmental monitoring and management;
- assist in training and organization for local level sector offices and project affected communities;
- giving proper attention to social and environmental issues as other works; and
- Implementation of the proper irrigation/factory management, etc.

6.2 Baseline Information- Physical Environment

6.2.1 Descriptions of the Project Area

The revised gross project area(142,713 ha) was delineated to 43.3% in Nyangatom and 25.4% in Selamago Weredas of South Omo Zone, 25.6% in Maji Wereda(Omo National Park) and 4.9% in Menit Shasha Weredas of Bench Maji Zone , and 0.8 % in Decha (now Goba) Wereda of Keffa Zone.

SelamagoWereda found on the left side of Omo River where as the remaining Weredas are on the right side. They are accessible through Jinka, the capital of South Omo Zone; and Jima-Mizan-Jemu-Tum-Kibish and Kangaten. The details of the project site shownin thetopography map, figure 5.

Table 6: Project Areas by Weredas,Zones, Command Area Blocks and Factories

Zone	Wereda	Command Area Blocks	Gross Project Area		Project Av. Net Area (ha) by Factory		Remark (deducted from gross)
			Area(ha)	%	Location of Factories	Net(ha)*	
Keffa	Decha	Block I (Right Side)	1122	0.8	Omo Kuraz 3	30,570	14,088 ha(permanentl y not suitable)
Bench Maji	Maji(Omo National Park /ONP/)		36537	25.6			
	Menit Shasha		6998	4.9			
		Sub total	**44,657.7**	**31.3**			
South Omo	Selamago	Block I (Left Side)	36307	25.4	Omo Kuraz 1 &2	23,430	.8214 ha (corridor) and 4442ha(perma nently not suitable) +221(currently not suitable)= =12877ha
South Omo	Nyangatom	Block II (Right Side)	61,748.4	43.3	Omo Kuraz 5	46,000	6547 ha(permanentl y not suitable)+9,20 1(currently no suitable)=15,7 48ha
Total			**142,713**	100		**100000**	

*Net =deducted the remarked amount from gross

Source: Computed based on Sugar Corporation Data (2018)

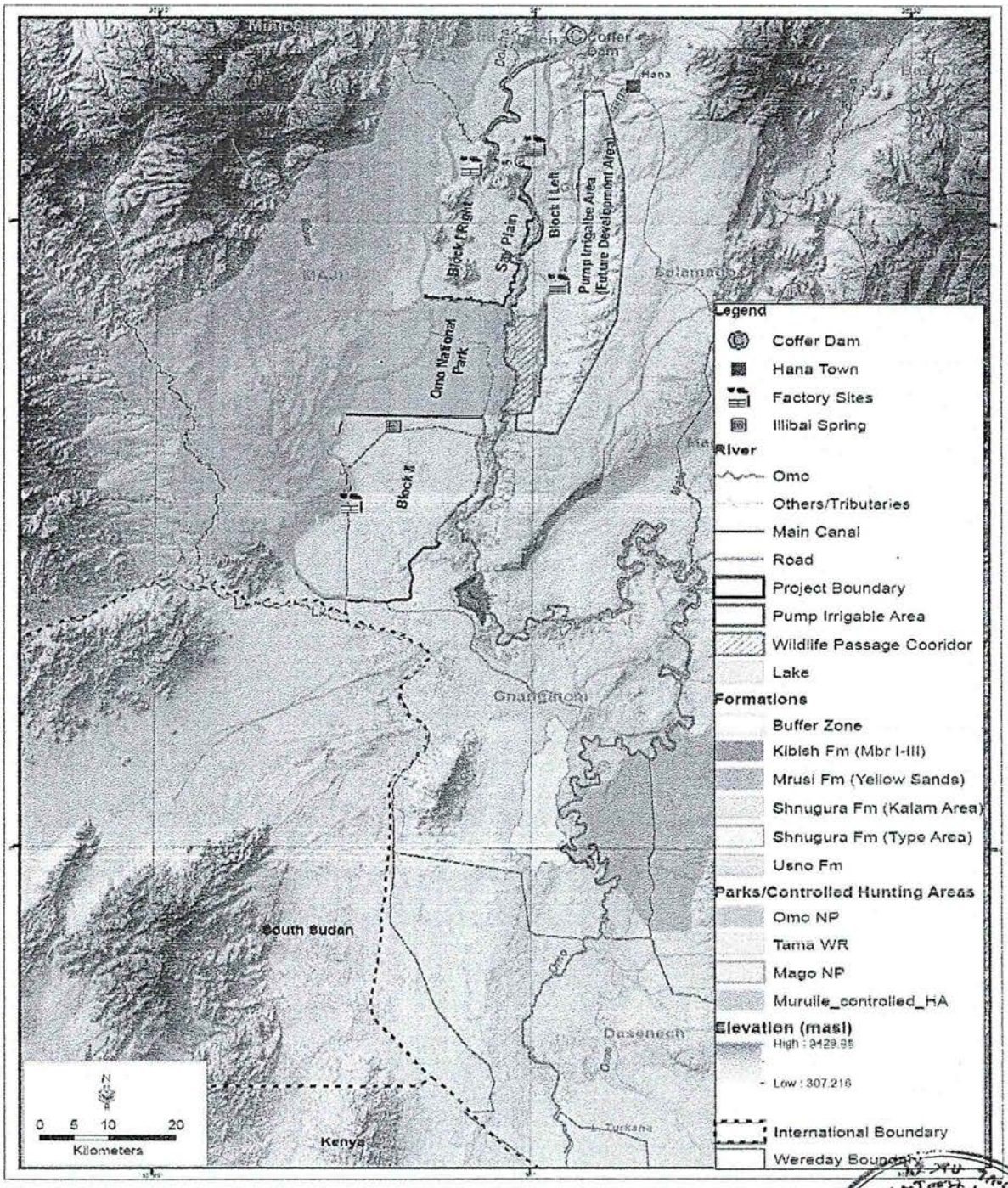
6.2.2Topography

The project found in the Omo Gibe River basin. The dominant project topographic features are flat. The altitudes of the project range from 376 to 477 masl. Figure 5 shows the details of the project topography.

6.2.3 Geology

The project area is a part of south Omo-Gibe Basin. The basin characterized by alluvial plain flanked mainly by Tertiary volcanic in the west and by pre-Cambrian basement rocks in east. The project area is found in the both sides of the Omo River in Selamago,Maji, Menti Shasha, Decha and Nyangatom Weredas. The eastern Omo, the hills south of Jinka, flanking the lower Omo alluvial plain, are composed of Pre-Cambrian age basement of mafic and siliceous gneisses with occasional granite out crops. In most south, Tertiary basalts and Quaternary superficial deposits overlie the basement rocks. The sediments are of lacustrine and alluvial silts and clays. The project area is generally composed of Felsic volcanic, Basalt and Quaternary sediments (Sugar Corporation EIA Study (2013); Sugar Corporation Geo Technical Investigation (2013); EVDSA, 1993, Vol. I).

Figure5: Topography of the Kuraz Sugar Development Project



Source : Own based on Sugar Corporation Data(2018)

6.2.4 Hydrogeology

Two major groups, basaltic rocks (felsic volcanic and Mursi basalt) and Quaternary sediments categorize the hydro geological characteristics of the project area. The sources of ground waters depend on the geological, soil and other formations of the area. There are two kinds of water wells found in the project area, shallow and deep wells.

Of the two Blocks (I &II) of the project site, Block I is dominantly covered by Mursi Basalt formation with plain topography. Its fracture level is significant and can serve as a pipe for groundwater recharging. The depth of the ground water in these areas is greater than 50 m (deep well).

On the other hand, the dominant parts of the Block II of the project area characterized by quaternary sediments, alluvium and fan deposits sourced from Omo River and its seasonal tributaries flow from the high-elevated ridges towards these plains. The groundwater depths found in these areas are shallow, below 30 m.

Ground water sourced from the shallow wells expected at Block II of the project area, may cause to adverse effects like water logging that may result in salinity. Establishing monitoring mechanisms for the rise of shallow wells is necessary, such as subsurface and surface drainage systems, to prevent the negative impacts.

Groundwater recharge conditions in the project area are different from place to place. In the areas, found in volcanic ridges, dominantly covered by the felsic and basaltic rocks, subsurface seepage from the fracture openings of the volcanic rocks are the major groundwater recharge sources. In these areas, the recharge from direct infiltration and seepage from rivers is negligible.

In the lower lying plain areas that are covered by recent sediments, Block II, the major recharge sources of groundwater are subsurface flow through the fracture openings of the volcanic rocks, and direct recharge from precipitation and seepage from Omo River.

The project areas' ground water table is generally deeper than 5 m that means it is not shallow from irrigation point of view. In the future due to the irrigation, the ground water table may raise which requires regular monitoring.

Currently, the project does not use ground water for irrigation due to the availability of Omo River. To evaluate properly the trend of the estimated average rise of water table, collecting and analyzing time series water table record data, using pizeometric wells recommended (Sugar Corporation Geo Technical Investigation (2013)).

6.2.5 Soils and Land Suitability

6.2.5.1 Soils

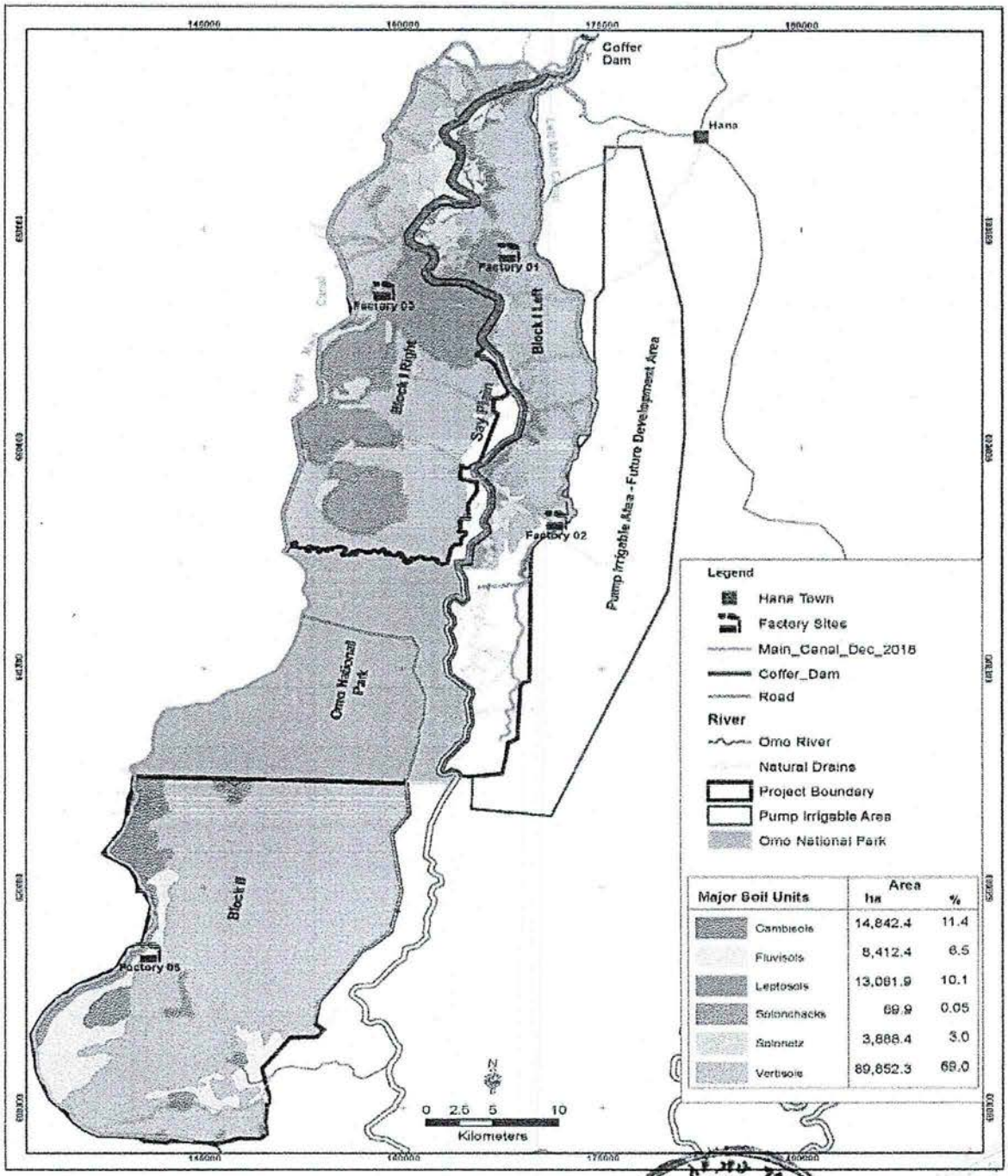
The soil survey was conducted on a gross of 130,147 ha land in Block I, Left Side, Block I, and Block II right side as basis for confirming/rejecting the irrigation potential for surface irrigated sugarcane development. Six soil groups (Vertisols, Cambisols, Fluvisols, Solonetz and Leptosols) are identified, table 7, in the command area, each covering 69.0%, 11.4%, 6.5%, 3.0 and 0.1% of the command area respectively in descending order. The soil survey investigation also enabled the identification of six miscellaneous land types and the Leptosols in the miscellaneous land type's account 10.1%. Figure 6 displays the distribution of major soil groups in the project area. The detailed soil–landscape map with its extended legend annexed.

Table 7: Major Soil Groups of Kuraz Sugar Development Project and their Extent

S.No	Major Soil Group	Area	
		ha	%
1	Vertisols	89,852.3	69.0
2	Cambisols	14,842.4	11.4
3	Fluvisols	8,412.4	6.5
4	Solonaez	3,888.4	3.0
5	Soloncaks	69.9	0.1
	Sub-total	117,065.4	90
Miscellaneous Land Types			
P3hD5	Shallow soils; alluvial plains soils (Lithic /MollicLeptosols).	11.4	0.0
R	Riverbeds and banks (slope 0.5 – 6%) (MollicLeptosols).	1271.0	1.0
H5m	Shallow & very shallow, loamy textured soils with common rock outcrops, and dominant stone cover, developed on dissected side slopes (5 – 8 %) (Lithic and MolicLeptosols).	102.1	0.1
H6	Dissected side slopes and hills, slope 8 – 30 % (Lithic Leptosols)	11129.7	8.6
A4m	Degraded &/or gully complex (slope 2 – 5 %) areas dominantly Leptosols.	371.1	0.3
A5m	Shallow & very shallow, loamy textured soils with common rock outcrops, and dominant stone cover, developed on dissected side slopes (5 – 8 %) (Lithic and MolicLeptosols).	196.7	0.2
	Sub-total	13082	10.2
	Grand total	130,147.3	100

Source: Compiled based on Sugar Corporation Soil Study (2015)

Figure 6: Major Soil Groups Map of the Kuraz Sugar Development Project



Source: Own based on Sugar Corporation Data (2018)

Regarding to the soil physical characteristics, most of the soil surface horizons are dominantly marked by the existence of heavy clays, fine clays, loams, silty clays and clay loams while the sub-surface horizons showed fine clay texture to heavy clays, clay loams, silty clay loams, silt loam, loams and sandy loam textures.

The effective rooting depth in most of the soil-mapping units found to be deep and very deep indicating absence of limitation for irrigated sugar cane development. However, the available rooting depth in some areas (such as in mapping units L1hz and D1hz) could be restricted by the presence of hard clay pans/ structural compaction sodic at some depths in the profiles (between 40 cm and 90 cm depths) presumably inhibiting root penetration.

Soils with ESP values of above 15% are considered as sodic soils and, thus soil mapping units such as A1f/mz, A1f/hz, A2f/mz, L1hz, D1hz, F2f/mz, M1hz &U1f/hz with pH values >8.5 have showed the presence of sodic properties in their sub soils.

Most of the soils are considered as non-saline (VOLUME V: Part A and B: Soil Survey and Land Evaluation (block I and II right bank and block I left bank), PART A: Soil Survey- Main Report (Final), December, 2015).

6.2.5.2Land Suitability

Land suitability was carried out based on soils and site/land characteristics information, which were gathered during field soil survey investigation in Kuraz Sugar Development Project (Block 1 Left Side, Block I right side and Block II right side) covering a total area of some about 130,,147.3ha gross command area.

The land suitability maps (both actual and potential) have been prepared separately for the LUT considered separately. Table8 shows the sharing of current and potential land suitability for furrow irrigation sugar cane cultivation and their extent, while figures 7 and 8 display the current land and potential land suitability of the command area for the LUT under consideration.

Table 8: Current and Potential Land Suitability for Furrow Irrigated Sugar Cane Cultivation

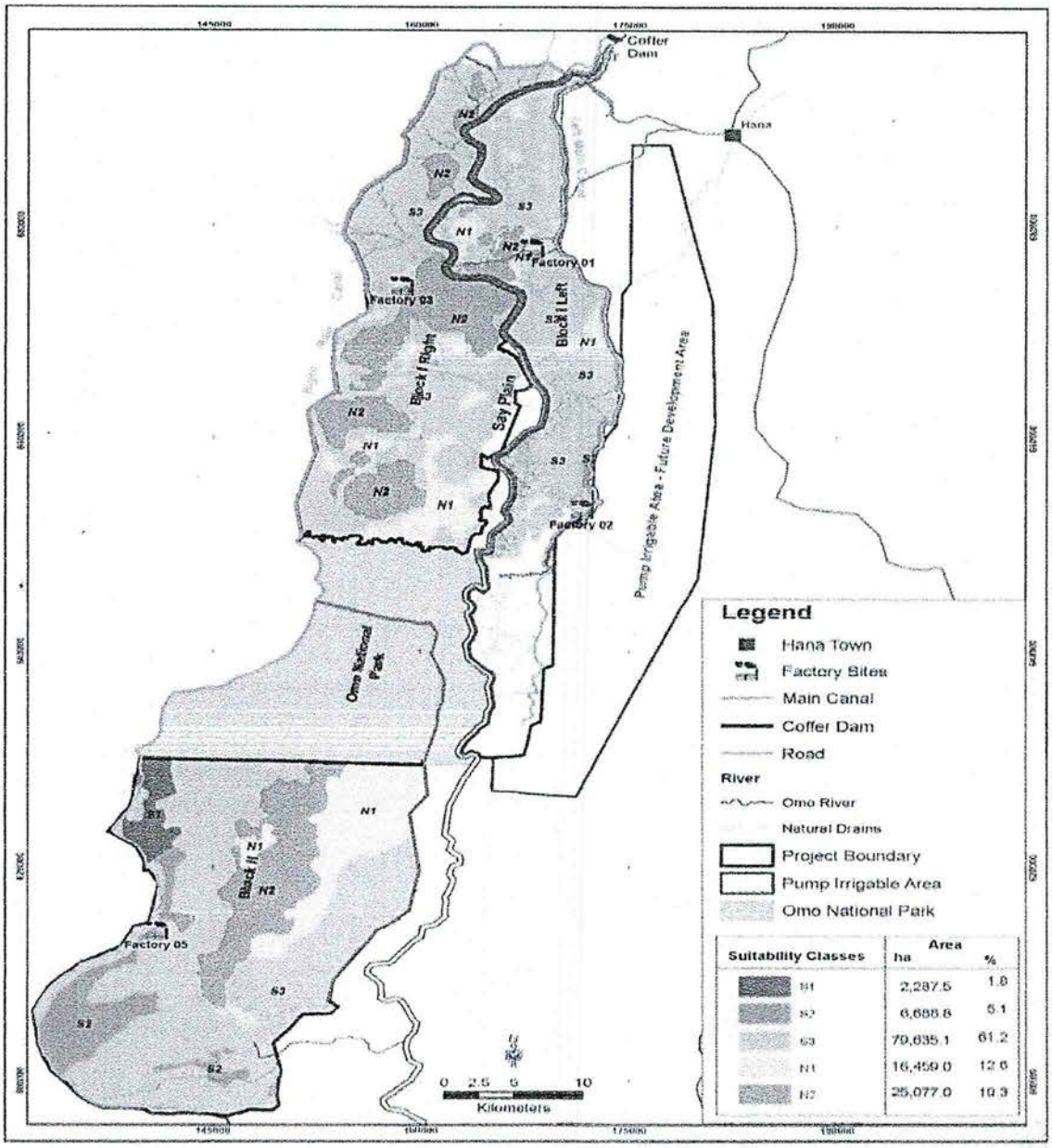
Land Suitability Class/LUT	Current Land Suitability Area		Potential Land Suitability Area	
	ha	%	ha	%
Highly Suitable (S1)	2,287.5	1.8	2,287.5	1.8
Moderately Suitable (S2)	6,688.8	5.1	19,811.4	15.2
Marginally Suitable (S3)	79,635.1	61.2	82029.1	63.0
Subtotal Suitable	88,611.4	68.1	104,128.0	80.0
Currently Unsuitable (N1)	16,459.0	12.6	942.3	0.7
Permanently Unsuitable (N2)	25,077.0	19.3	25,077.0	19.3
Sub-total Unsuitable	41,536.0	31.9	26,019.3	20.0
Total	130,147.3	100	130,147.3	100

Source: Compiled based on Sugar Corporation Soil Study (2015)

The result of current land suitability map of the project area indicates that out of the total area of 130,147.3 ha surveyed, some 88,611.4 ha (68.1%) are classified as currently suitable land for the

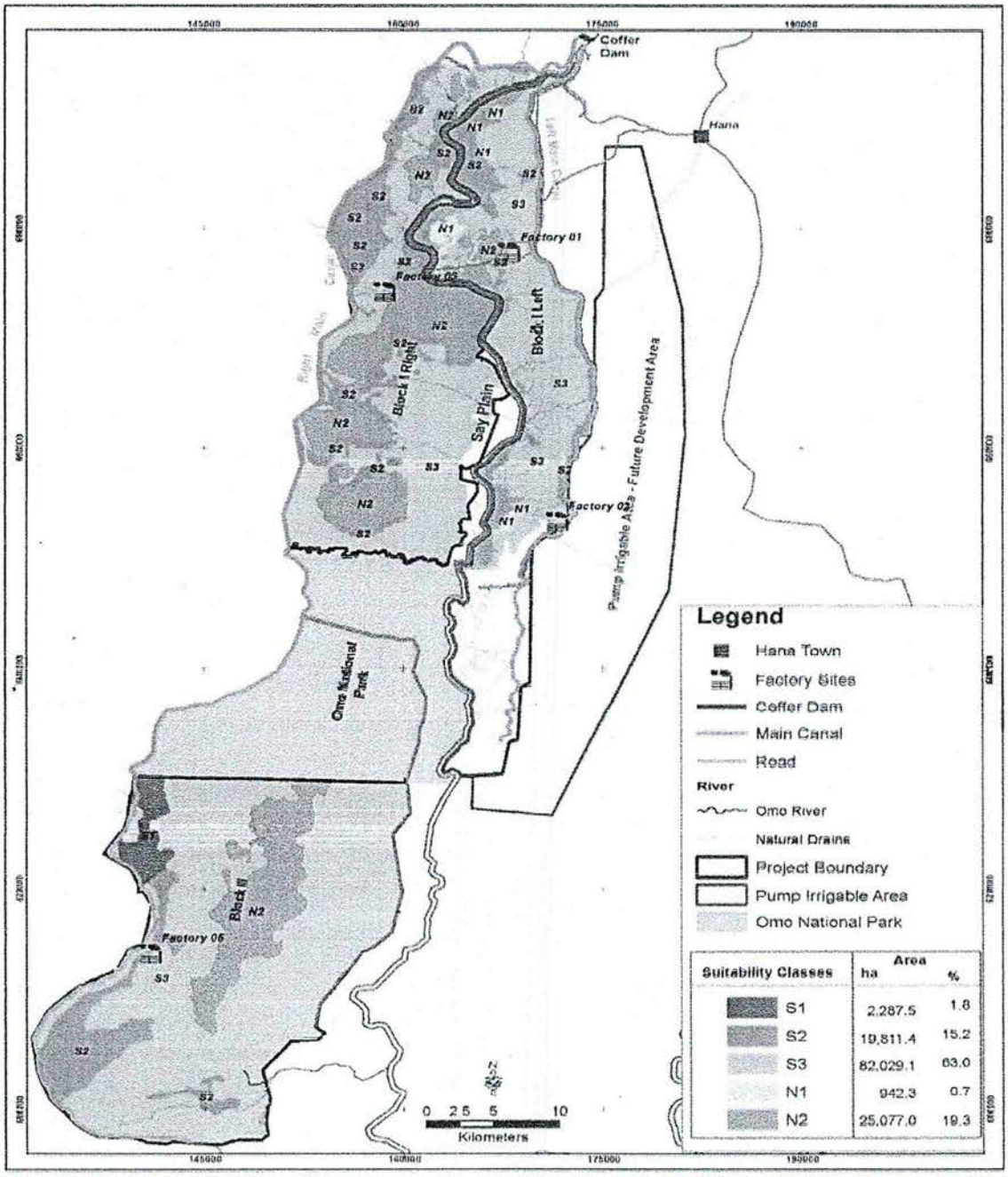
furrow irrigated agricultural development. Figure 7 displays the current land suitability of the project(LUT under consideration).

Figure 7: Current Land Suitability of the Kuraz Sugar Development Project for the Furrow Irrigated Sugar Cane Cultivation



Source: Own based on Sugar Corporation Data (2018)

Figure 8: Potential Land Suitability Map of Kuraz Sugar Development Project



Source: Own based on Sugar Corporation Data (2018)

The major limiting factors for the specified land utilization type are nutrient availability or soil fertility due mainly to high soil pH/alkalinity and low organic carbon content, sodicity, rooting condition specifically effective soil depth of the soils, drainage, workability, potential for mechanization, erosion, land preparation and clearance. The potential land suitability of the project area (LUT under consideration) displayed in the figure8.

After taking appropriate remedial measures,about 104,128.0 ha (80 %) are potentially suitable for furrow irrigated sugarcane cultivation. Out of the total 104,128.0 ha (80 %), of the project area some 2,287.5ha (1.8 %), 19,811.4 (15.2 %) and 82,029.1ha (63 %) of the land are classified as highly suitable (S1), moderately suitable (S2) and marginally suitable (S3) land respectively. If some 8% of the total suitable land (104,128.0 ha) will be used for infrastructure development within the command area, then about 96,000 net irrigable lands could be secured for the envisaged LUT development.

6.2.6 Agro Climatic Zone

The project area situated in hot to warm arid plains of agro climatic zones, lies below 1200 masl. The altitudinal ranges of the project site stretched from 376 to 477 masl. According to the agronomy report (2013), the rainfall ranges from over 1900 mm/year in the northern and western part of the basin to less than 300 mm/year near Lake Turkana. The command area annual rainfall is in the range of 661.4 mm with 75 %, 80 % and 90 % dependability of 256, 214 and 159 mm, respectively.

Temperature over the project area varies from 19^{0}C (July and August) to 33^{0}C (February), Wind speed from 10.4 km/h to 15.5 km/h, humidity from 57 % to 75 %, sunshine hours from 6.9 hrs to 10.2 hrs. The mean monthly evapo-transpiration values ranges from 151mm to 205 mm with annual value of 2 070 mm.

In general, the average project area temperature is 29.8 ^{0}C which coincides with the mean annual temperature of the zone, greater than 27 ^{0}C. As seen in figure 9, the agro-ecological characteristics of the project area are Hot Moist Low Lands (91.6%), Hot Per-Humid Low Land (2.4%), and Warm Moist Low Land (6%).

In general, cereals, legumes, oil seeds, root crops and industrials crops mainly maize, sorghum, haricot beans, cotton, sweet potato, sugarcate, pepper, onion, banana and other fruit crops are growing in the project area.

Table 9: Mean Monthly Climatic Data

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
RH (%)	66.7	58.6	67.8	76	77.2	73.9	76.1	74.4	70.5	77.3	77.6	69.4	72.1
Wind Speed (km/hr)	8	9.2	9.4	7.3	8	8	8.1	8.2	8.8	8.9	8.9	8	8.4
Sunshine Hours (hr)	11.4	11.4	9.1	10.6	10.3	10.2	9.7	9.6	10.9	11.0	10.7	11.4	10.5
Max. Temp. (°c)	37.3	36.7	38	37.1	37	36.6	35.3	35.3	35.2	35.2	35.9	36.5	36.4
Min. Temp. (°c)	22.9	21.9	23.3	23.4	24.9	24.5	23.8	23.7	23	22.9	22.8	22.7	23.3
Mean Temp. (°c)	30.1	29.3	30.7	30.3	31	30.6	29.6	29.5	29.1	29.1	29.4	29.6	29.8
Aver. RF, mm	25.9	21.5	44.2	89.6	53.7	34.0	35.1	40.5	32.6	40.1	40.3	24.6	482.0
Max. RF, mm	108.7	63.2	104.3	214.0	105.3	135.5	133.1	98.3	92.9	105.4	112.5	94.8	677.7
Min. RF, mm	0.0	0.0	1.1	15.1	0.0	1.2	1.2	1.6	0.0	5.4	0.0	0.0	100.2

Source: Sugar Corporation Hydrology Study (2013)

Dependable Rainfall

Dependable rainfall at levels of 75 %, 80 % and 90 % estimated by statistical method considering monthly rainfall over years as normally distributed.

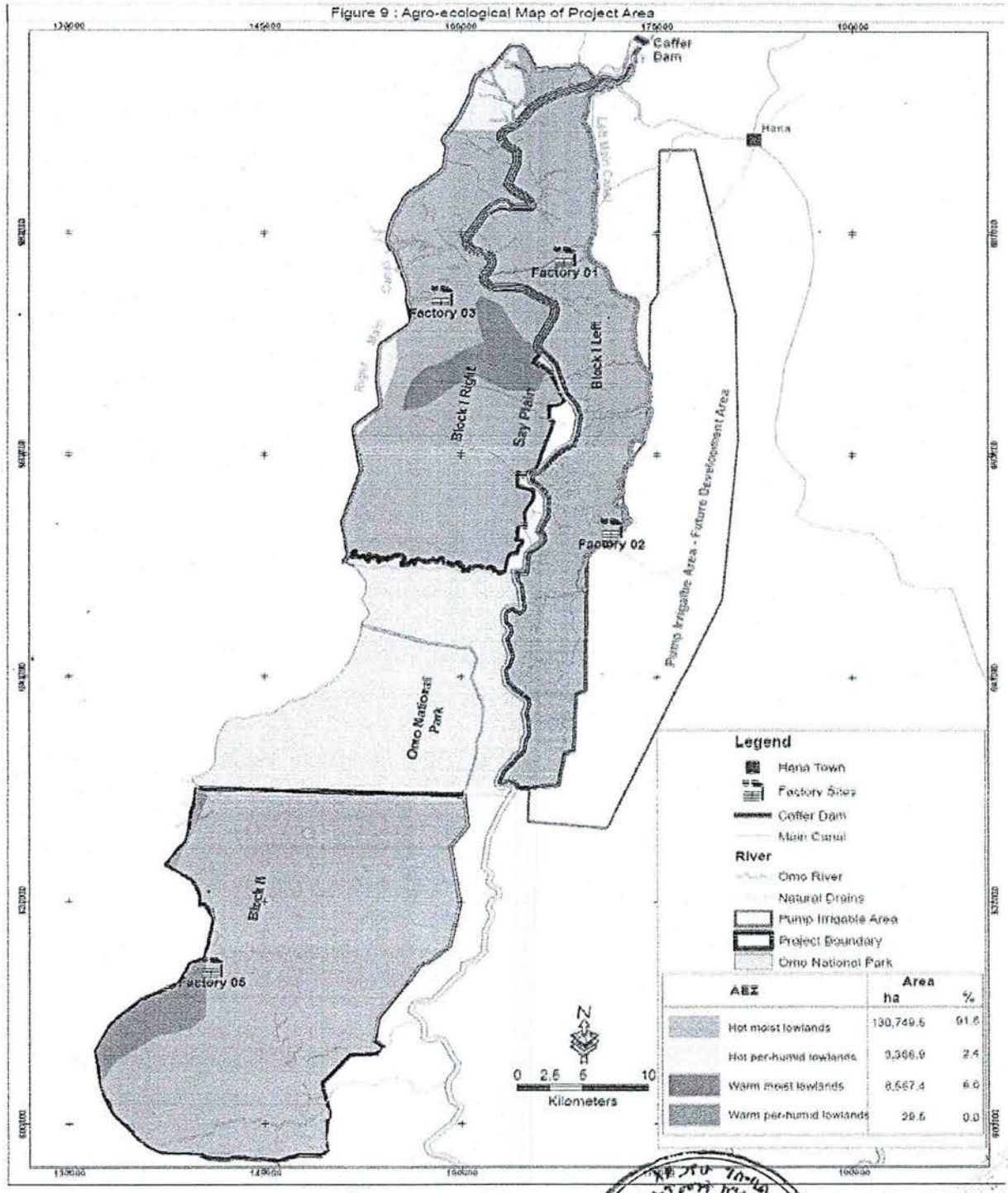
Table 10: Monthly Dependable Rainfall for the Project Area

Description/ Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Mean, mm	35.3	30.9	60.4	122.5	77.3	46.4	47.9	52.5	44.6	54.8	55.0	33.7	**661.4**
75%, mm	0.5	9.9	24.9	65.2	46.6	10.9	13.6	22.3	14.9	23.2	21.4	2.5	**255.9**
80%, mm	0.0	7.7	21.3	59.4	43.4	7.3	10.2	13.6	11.8	19.9	19.3	0.1	**214.3**
90%, mm	0.0	3.9	14.7	48.9	37.8	0.8	3.9	13.1	6.3	14.0	15.6	0.0	**158.7**

Source: Agronomy Study, Sugar Corporation (2013)

The area receives mean monthly rainfall of about 60.4, 122.5, 77.3 mm in months of March, April and May, respectively, enable to grow sorghum and maize . The serious constraints mentioned in the area are erratic, low and bi model rainfalls, high temperature and low infrastructures. Therefore, additional water supply for vegetation growth including irrigation farm is essential. Livestock rearing irrigated agriculture, wildlife, tourism, and related activities also commonly practiced in the area (MoA, 2000). However, currently, the infrastructures' facilities improved due to the existence of the project.

Figure 9: Agro-ecological Map of Project Area



Source: Computed based on GIS layer from MoA with 32 zoning for Ethiopia in International Classification Approach (2018)

6.2.7 Surface Water/Hydrology/

The Omo Gibe Basin extends approximately 525 km north to south and 150 km west to east. The overall drainage area of the basin situated in an area is 78,200 sq. km (EVDSA, 1993, Vol. I).The basin master plan study indicated that lower Omo sedimentary flood plain mostly characterized by poor drainage (MoWR, 1995, Vol. III).

The dominant surface water found in the project area is Omo River. The river arises in the northern of Omo-Gibe River Basin, in west Shewa Zone of the Oromia National Regional State. It arises at an elevation of approximately 2,400masl and finally ends into Lake Turkana, at approximately 376 masl, travelling about 1000 km and descending about 2000m from its origin to its ends - Lake Turkana or Rudolf.

Omo River constitutes 54% of the SNNP region river drainages. The river and the lakes have great potential for hydropower (Gilgil Gibe 1, 2 and 3), irrigation, and fishery (Omo River, Abaya, Chamo and Awassa Lakes). The lakes area and lower courses of the rivers are habitats for variety of fish, crocodiles and birds (RSA, 2007). Lakes and rivers of the project area, South Omo Zone, described in Tables 12.

Table 11: Major Lakes of South Omo Zone

No	Lake	Area (m^2)	Location	Maximum depth (m)	Altitude
1.	Chew Bahir	250 - 2000	South Omo Zone	Now almost dry	500 masl
2.	Rudolf /Turkana/	6400	South Omo Zone	20	376 masl

Source: Sugar Corporation EIA (2013)

Currently, a small portion of the total surface area of Lake Turkana left in Ethiopia most probably due to continuous sedimentation problem entering the lake through Omo River. Chew Bahir almost dried up and turned to arid land even though swampy during wet seasons.

Omo River picks much of silt content from Wabe, Gorombo and neighboring sub-catchments. Gojeb River is a major tributary of Omo River. Both rivers join here in the middle course. The tributary is much clearer than the heavily laden Omo River. Thus, the silt content and environmental aspect of Omo River is at a middle course that may have serious impact on downstream and the project area (Sugar Corporation Hydrology Study (2013).

There are four rivers in lower Omo, Mago, Segen and Weito. The destinations of these rivers are Lake Turkana, Omo River, Weito and Chew Bahir as shown in Table 11.

Table 12:Major River Basins with their Drainage in South Omo Zone

Scr. No	River	Major tributaries	Areas of drainage	Destination of the river
1	Omo	Gojeb, Sharma, Dalacha, Denchi, Saka, Guma, Eigna, Mansa, Muie, Mago, Ginyo	Oromia, Gurage, Hadiya, Kembata-tembaro, Kaffa, Walayita, Gamogofa, Dawro, Bench Maji, Southern Omo, Konta, Yem	**Rudolf (Turkana Lake)**
2	Mago	Neri, Sara, Berso, Maki	South Omo	**Omo River**
3	Segen	Weito, Haro, Gayo, Turkut	South Omo, Konso,	**Weito**
4	**Weito**	**Afa, Lemeto, Merka**	**South Omo, Konso, Gamogofa**	**Chew Bahir**

Source: South Omo and SNNPRS BOFED Socio-economic Profiles (2015).

6.2.7.1 Lake Turkana

The Lake Turkana Basin consists of three main drainage systems /sub-basins (Omo-Gibe, Kerio and Turkwell) that are forming the total catchment area of 130,860 km2. Predominantly, the Lake sustained by the inflows from the Omo River. The Omo-Gibe Basin represents about 60% of the total catchment area but contributes for more than 90% of total inflows to the Lake. The Lake receives more than 68% of its annual water supply (from the Omo flood Peak) between July and April. The Omo River discharges about 20 BCM of water into Lake Turkana each year.

Lake Turkana extends from coordinates 2o23' to 4o35' North and 35o50' to 36o44' East having a length of 240 km and a max width of about 40 km. Lake Turkana has a mean depth of 30 m and a maximum depth of 110 m.

Lake Turkana is known for it's inter and intra-annual fluctuation. Seasonal variations in rainfall over the Omo River catchment cause a high influx of water during July–December. Thus, the Lake shows minimum water levels during June–July and maximum water levels during April–November.

The limnological study (1985-1988) (NIVA/KMFRI, 1988)], undertaken on Lake Turkana reveals that, the lowest water level recorded on 22nd July 1988 is equals to 360.4 masl. The Lake surface area and volume at an elevation of 360.4 masl are respectively 6750 km2 and 203.6 BCM. Bathymetric survey of the Lake undertaken during the 1972-75 Lake Turkana project (Hopson et al, Ferguson & Harbott, 1982) . The datum was taken to be the lake level in April 1972 (Zero=365.4 masl). Accordingly, the surface area and volume of water stored at this level are 7,560 km2 and 237 BCM respectively. In 1988, another bathymetric survey made by NIVA and KMFRI and the survey result amended to the Hopson bathymetric map. As per the NIVA and KMFRI the Lake, level had dropped by 5 meters since Hopson study. Accordingly they adjusted the contours relative to their datum (Zero=360.4 masl).

The reference datum of the Lake given on the above studies seems to be conflicting and non-representative of the recent morphologic evolution of the Omo river delta. The morphometry of the lake surface deeply affected by the sediment balance of the river and it has been continuously changing over the years (see more the water balance/hydrology study).

6.2.8 Sediment

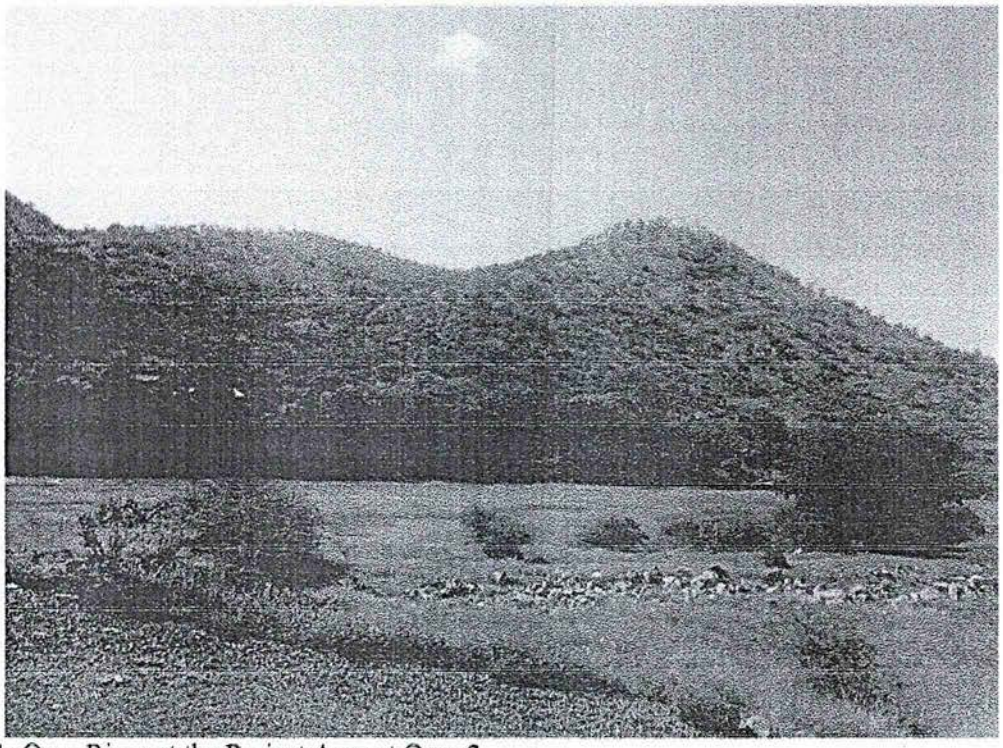
Sediment mean monthly and annual load of the project at diversion weir site was estimated based on two sites (WWDSE, 2011); Gibe III dam catchment and Omo River at Karadus Catchment with sediment load concentrations as shown in the table below(see more the hydrology study).

Table 13: Sediment Concentration of Lower Omo Basin with Catchment Coefficients.

	Mean Annual Rainfall (mm)	Soil (index)	Land Use (index)	Slope (fraction)	Catchment Area (km^2)	Suspended sediment transport rate (tonnes/km^2/year)
Gibe III dam catchment	1 388	1	1	0.18	34 100	700
Residual area (catchment between Gibe III dam and Kuraz Head work)	1 000	1	0.9	0.17	14 420	
	0.72	**1.00**	**0.90**	**0.94**	**0.42**	**624**

6.2.9 Omo River Water Quality

The Omo River water analysis was conducted based on water samples collected from Omo River at the weir site, in Omo National Park at the point where the seasonal road crosses Omo River on the way to Jinka, at Kangaten Town of Nyangatom district and at Omo Ratte Town site (downstream) during the detail feasibility study of the sugar development project.



Picture 11: Omo River at the Project Area at Omo 3

FAO's guideline is more appropriate for this water quality analysis and interpretations. The guideline focuses on EC and TDS in relation to salinity, SAR with regard to infiltration, sodium percent, chloride and boron for specific iron toxicity identification and nitrogen as nitrate, bicarbonate and PH for other effects. The results of these parameters presented in the table below.

Total dissolved solids (TDS) consist mainly of calcium, magnesium, sodium, bicarbonates, chlorides and sulfates. TDS affects adoptions of individual aquatic species, community structure, microbial and ecological processes such as rates of metabolism and nutrient cycling.

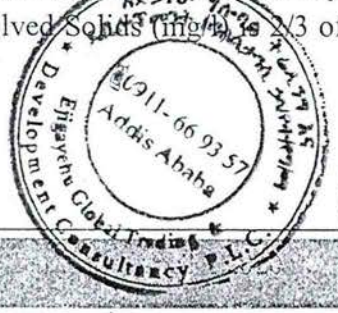
The TDS results of down streams from the weir site are 136 mg/l, 79 mg/l, 80 mg/l and 108 mg/l indicating that there would not be no restrictions on using the river as all TDS fall below the minimum recommended permissible concentration of 450 mg/l.

Table 14: Water Samples Analysis Results for Omo River

Description	Limit*	Sampling Site Locations and Analytical Results		
Source, Sampling site		Omo River at Proposed Weir Site	Omo River in Omo National Park	Omo River at Kangaten Town Site(Downstream)
Location	FAO ,Maximum allowable concentration in (mg/l) for irrigation	N – 171519 E – 693942	N – 648565 E – 829137	N – 177403 E – 572958
Altitude, masl		465	405	385
Total Dissolved Solids 105 ^{0}C (mg/l)	450 - 2 000	136	79	80
Electrical Conductivity (µS/cm)	700 - 3 000	186	108	110
P^H	6.5 – 8.4	6.64	6.36	6.12
Ammonia (mg/l NH_3)	-	1.99	2.95	1
Sodium (mg/l Na)	230	9.6	6.4	6.8
Potassium (mg/l K)	-	12.5	6.8	7
Calcium (mg/l Ca)	200	22.4	12.8	14.4
Magnesium (mg/l Mg)	150	6.24	4.32	5.28
Chloride (mg/l CI)	350	5.68	4.73	0.95
Nitrite (mg/l NO_2)	-	Trace	Trace	0.29
Nitrate (mg/l NO_3)	50	2.56	13.13	11.28
Bicarbonate (mg/l HCO_3)	520	109.8	62.59	69.54
SAR (calculated)	9-Mar	2.54	2.18	2.17
% Na (calculated)		43.56	43.54	41.22

Source: Kuraz Sugar Development Project (2018) and * FAO Irrigation and Drainage Paper, Rome, 1985.

EC also considered in the river water samples. Conductivity is a function of dissolved (ionic sable) solids concentration. It indicates the range into which hardness and alkalinity values likely fall. In most cases for many surface waters, Total Dissolved Solids (mg/l) is 2/3 of conductivity (µs/cm).



The ECs of the samples are 186 µs/cm, 108 µs/cm, 110 µs/cm and 152 µs/cm where as the limit rangesare 700 to 3 000 µs/cm or 0.7 to 3.0 ds/m. All values found below the minimum limit indicating that the river water does not have serious salinity.
Higher concentration of sodium brings soil hardening by reducing soil permeability. Therefore, identification of Sodium Adsorption Ratio (SAR) is an important factor in determining water utilization for irrigation.

By considering SAR values, sodium hazards can be classified as follows:- < 2 no hazard, 2 to 10 as little hazards, 7 to 18 medium hazard, 11 to 26 high hazard and > 26 very high hazard (Fetter, 1994). The SAR values of the results found to be 2.54, 2.18, 2.17 and 2.8 downstream. It is identified that sodium hazard is little so that the water can be used for irrigation.

The corrosion problems expected due to chloride (Cl). The permissible limit for chloride (Cl) is 250 mg/l in ambient environment and 350 mg/l for irrigation water. The results showed 5.68 mg/l, 4.73 mg/l, 0.95 mg/l and 0.95 mg/l indicating very low chloride concentration when compared to the permissible limit.

Analysis results of ammonia (NH_3) and its derivatives, nitrate (NO_3) and nitrite (NO_2), were also done. Ammonia affects respiratory system of animals either by inhibiting cellular metabolism or by decreasing oxygen permeability of cell membranes. It is extremely toxic to fish and breaks down into nitrite and nitrate. Permissible concentration limit for NH_3 is 0.2 mg/l in ambient environment. The analytical results for ammonia indicated 1.99 mg/l, 2.95 mg/l, 1.0 mg/l and 3.34 mg/l, beyond the permissible limit of 0.2 mg/l for ambient water quality.

Nitrite (NO_2) concentration in the river water also identified. Ammonia and nitrate break down into nitrite. Presence of nitrite even at low levels in surface water indicates mainly possible organic pollution. It has greater affinity for hemoglobin in blood stream than oxygen thus; it is extremely toxic to babies. The results for nitrite also indicated trace in both upstream sampling sites and showed 0.29 mg/l and 0.19 mg/l above permissible limit of 0.1 mg/l for the 2 downstream sampling sites indicating probability of nitrite hazards.

The nitrate (NO_3) analysis results for the samples also indicate 2.56 mg/l, 13.13 mg/l, 11.28 mg/l and 6.11 mg/l downstream. Comparing these results with the permissible limit range of 5-30 mg/l all show below the permissible limit. In addition, nitrite rather than nitrate is a direct toxicant of expected organic pollutants.

The major effects of calcium carbonate and its derivative bicarbonate in water sources are changes in taste and effects on domestic water uses. The recommended permissible use limit for Ca $(HCO_3)_{\text{twa in}}$ water is 520 mg/l. The analysis results indicated 109.8 mg/l, 62.59 mg/l, 69.54 mg/l and 83.45 mg/l. All the results are below the limit and thus no significant bicarbonate related problem expected during water use for the irrigation activities.

PH is a measure of hydrogen ion activity in water. PH levels less than 7 may cause severe corrosion of metals and at PH levels above 8, there is a progressive decrease in disinfection efficiency. The normal range for PH water quality based on FAO guideline is 6.5 to 8.4 for irrigation water. The laboratory findings indicated 6.64, 6.36, 6.12 and 6.71 showing almost in acidic range near neutral. With regard to the normal range, the most downstream below the command area sampling site result shows 6.71 within the recommended normal PH range.

To sum up, till now, it can be concluded that the status of the water has no significant water quality problem for the irrigation uses but when the increments of the anthropogenic activities in the project area may affect both the terrestrial and aquatic ecosystems of the river and create water quality deteriorations so that it needs monitoring tests.

6.2.10 Flooding

As to the baseline assessment, there has not seen any flooding since the construction of Gibe III dam.

There had been significant downstream flooding before Gibe III was operational, the occurrences of floodinghad been large and sudden during the wet years (up to 5200 m3/sec at Gibe III with a return period of 30 years). Floods had occurred in 2006 (with return period of less than 10 years) caused destructive effects on human and animal life, private assets and public infrastructure in the river delta (Gibe III EIA Downstream, 2009 GC).

The project command area is not significantly exposed/safe from flooding. In case flooding occurs in the project site due to heavy raining, the designed drainage systems such as dyke will control it (see hydrology study).

6.2.11 Land Use/Cover

According to the Bench Maji, South Omo, Keffa Zones' Finance and Economy Development Offices(2017/18) , the main land uses/covers of the weredas include cultivated , cultivable , not cultivable , grazing, natural forest(forest , wood, and bush) , state/private priority forest ,wet lands and others.

The cultivable /cultivated lands distribution consists of 21.8 % for Selamago, 18.3 % for Nyangatom, 37.7 % for Maji, 37.9 % for Menit Shasha and 57.5 % for Decha of their respective total lands. The shares of grazing lands of Selamago and Nyangatom weredas are high because of their live hoods are mainly dependent on their livestock. The grazing and natural forestlands are 42.2 % and 15% for Selamago, 63.9 %and 1% for Nyangatom, 14.4 %and 12.2% for Maji, 14.6 %and 28.9% for Menit Shasha and 0.8 %and 15.3% for Decha of the total area of the project wereda, respectively. The wetland is about 1.3 % of the total areas of the project weredas. The land uses/covers of the weredas that consist of the project area seen in the table below.

As seen in figure 10, the land use/land cover pattern of the project area (142,713ha) found at most a combination of open shrub land (43.85%), cultivated land including irrigation

Infrastructure (19.14%); open grassland (25%); open forest Land (6.6 %), closed shrub land (3.6 %) and sparse forest land (1.6%) that totals to 11.4% of the project area. A minor area of some 0.21 % of the project area covered by bare soils (0.1%), closed grassland (0.1 %), rocky outcrop (0.01%) and wetland (0.01 %).

The natural vegetation pattern in the current study area classified as dense bush shrub land dominantly covered with more herbaceous plants and open scrublands such as Acacia species, riparian wood/bush lands, woodlands and other non-woody herbs. In addition, open grasslands and bushed grass lands dominantly occurred on clay plains. The dominant natural vegetation species identified during the field survey include Acacia mellifera, Acacia tortillis, Acacia sisal, Acacia bussie, Euphorbia tirucalli, Grawavillosa, Dicrostachyuscenera, Acacia Senegal, Acaciabrevispica, Acaciapolicanta, Acaciabrebspica, Combretumadinogamum, Zizipusspinachrist and others.

Table 15: Land Use/ Cover of the Weredas of the Project Area

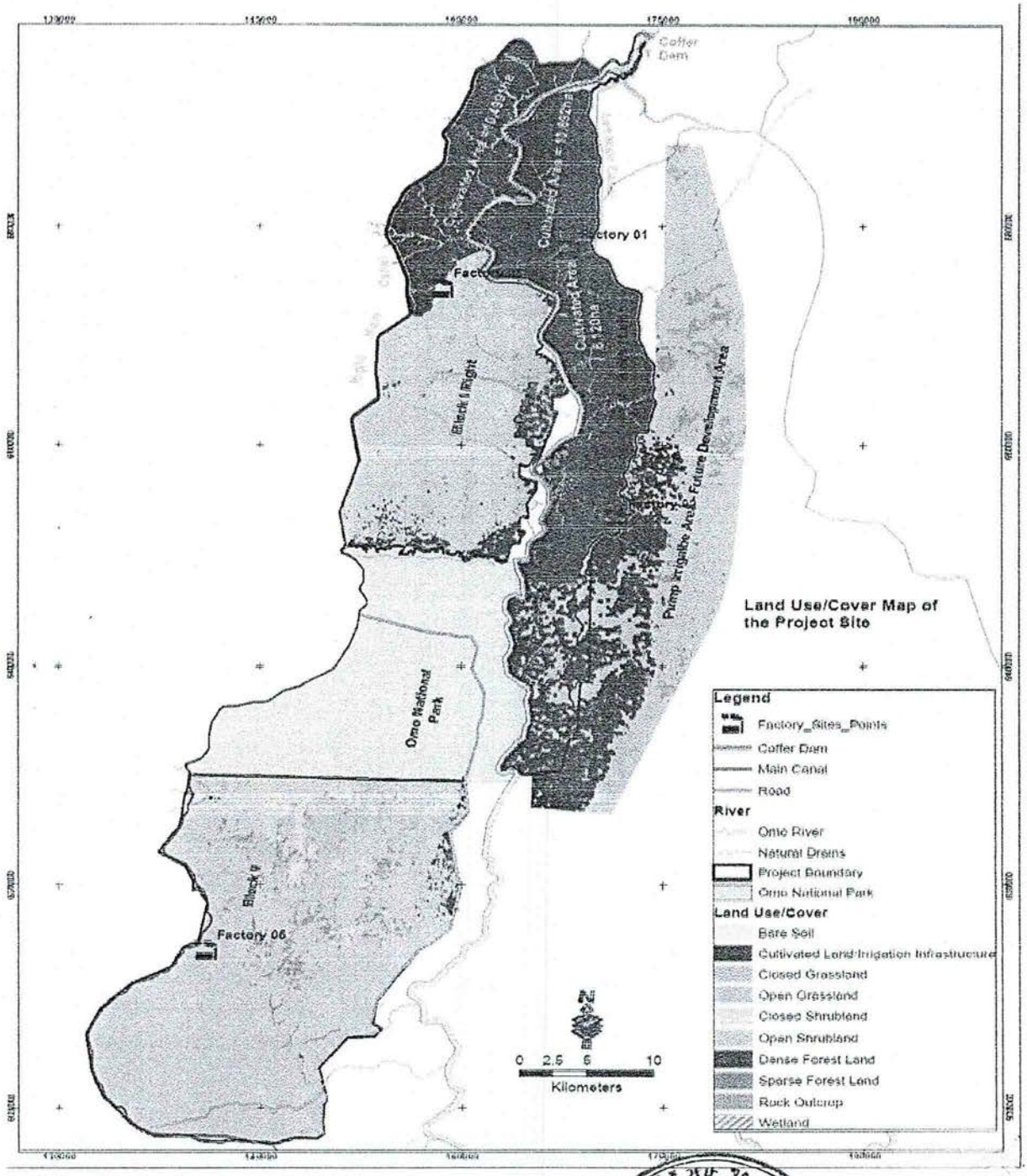
Land Use Type	Selamago		Nyangatom		Maji		Menit Shasha		Decha		Total	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area	%	Area	%
Cultivable land	59505	13.2	20000	14.7	76032	19.4	73834	26.6	110957	37.3	340328	21.9
Cultivated	38892.68	8.6	4895	3.6	71617.88	18.3	31259.51	11.3	60193	20.2	206858	13.3
Not Cultivable	6767	1.5	11000	8.1		0.0		0.0	62765	21.1	80532	5.2
Grazing land	190196	42.2	86982	63.9	56368.12	14.4	40550	14.6	2400	0.8	376496	24.2
Natural Forest	67668	15.0	1400	1.0	47690	12.2	80120	28.9	45602	15.3	242480	15.6
State / Private Forest	2376	0.5		0.0	3527	0.9	3	0.0		0.0	5906	0.4
Wetlands		0.0	1.5	0.0	800	0.2	19946	7.2		0.0	20748	1.3
Others	85715	19.0	11905	8.7	135125	34.5	31383.49	11.3	15626	5.3	279754	18.0
Total	451120	100	136184	100	391160	100	277096	100	297543	100	1553102	100

Source: Computed based on Bench Maji, South Omo, Keffa Zones' Finance and Economy Development Offices'Data (2017/18)

6.2.12 Slope Ranges of the Project Area

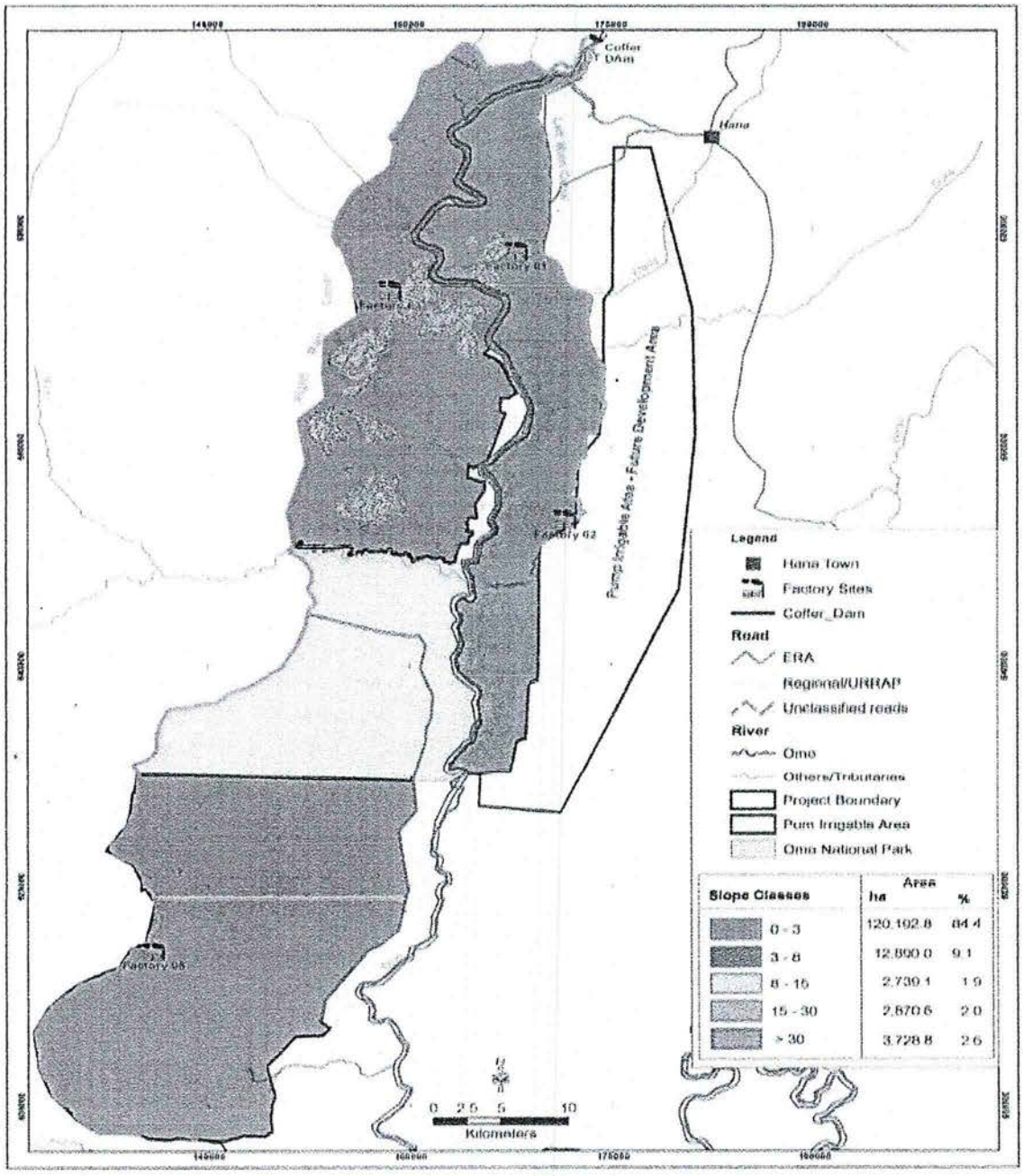
As seen in figure 11, the topography of the area dominated by flat to very gently sloping alluvial plains with slopes 0-3% in most cases and gently sloping to undulating alluvial plains with slopes 2-3% in some cases covering about 84.4% and 9.1% of the gross command area respectively. There are also minor occurrences of moderate to high relief hills, dissected stream channels, riverbeds and banks constituting about 6.5%.

Figure 10: Project Area Land Use /Cover Map



Source: Observation, Project site and Updated Google Map (2018)

Figure 11: Slope Ranges of the Project Area



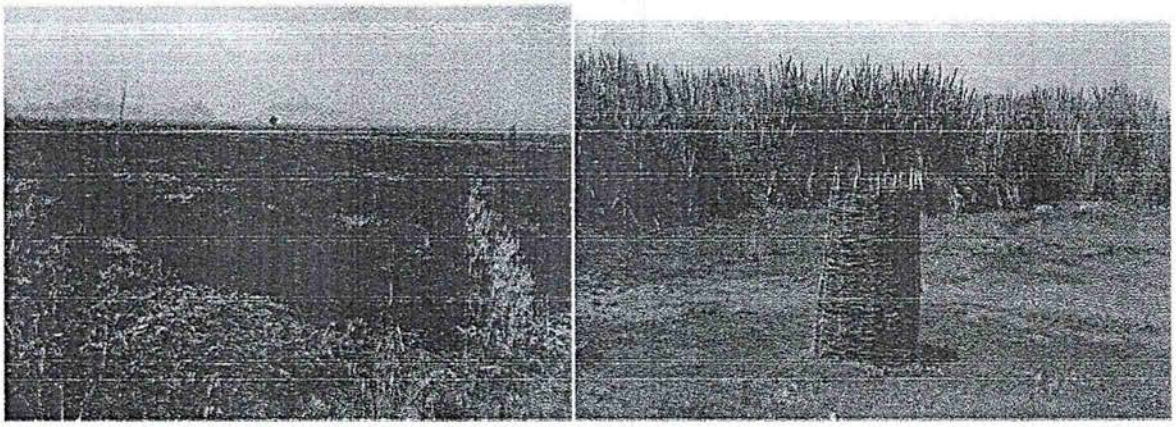
Source: Own based on Sugar Corporation Data (2018)

6.3 Baseline Information- Biological Environment

6.3.1 Flora

As seen in the picture 13, currently, the project involves in cultivating sugar canes and in the process of land preparation. The original natural vegetation types of the project areas comprise of open grass, bush, acacia bush and shrubs land with a little dense euphorbia thickets along Omo River Bank. The original dominant small trees and bushes are *Acacia senegal*, *Acacia mellifera*, *Acacia seyal*, *Acacia tortilis*, *Commiphora africana* , *Commiphora* spp, *Salvadora persica* ,Balanitus *aegyptica* ,*Doebra glabra* and others. The shrubs include Boswellia neglecta, Boscia coriacea, Combretum aculeatum, Grewia bicolor, Balanites spp, Adenium obesum, and others(Gibe III EIA,2009 ; Kuraz EIA, 2013,Zonal Report(2018)).

The very hazardous plant species, "prosopise Julifera species", was found in the project and surrounding areas.



Picture 12: Parts of Prepared Land and Sugarcane Plantations at Factory 2

Table 16: Major Vegetation/Crops Types and their Distributions in the Project Area

S/N	Vegetation Type	Distribution (√)		
		Good/ Common	Fair/ Rare	Poor/ Endangered
1	Accacia Spp	✓		
2	Equaliputus spps	✓		
3	Grewia Bicolar	✓		
4	Cordia Africana		✓	
5	Croton macro stachyus		✓	
6	Butigi		✓	
7	Albizia spp		✓	
8	Gravitia robusta		✓	
9	Prunos Africanes		✓	

10	Heby and Braziliness	✓	
11	Podocarpus		✓
12	Vicus Vasta		✓
13	Tikur enchet		✓
14	Kerero		✓

Source: Field Observations (2018), ZoneReport (2018) and EIA (2013).

Table 17: Major tree types in the project area and their uses

Ser. No	Types of trees /shrubs of the project area with local/ scientific names	Wood uses				Food and Medicine			Fodder	Environmental					Other uses							
		Fire wood	Charcoal	Housing	Construction	Fruits/Food	Edible oil/Gum	Medicine	Fodder/Forage	Bee forage	Shade	Ornamental	Mulch	Nitrogen fixation	Soil conservation	Wind break	Gum/resin/latex	Tanning/ Dye	Toxins for insects	Cosmetics/ Soap	Live fence/ Dry	Traditional uses	Tooth brushes
1.	*Accacia Spp*	√	√	√	√	√					√												
2.	*Acacia seyal*	√	√	√	√																		
3.	*Acacia tortilis*	√	√																				
4.	*Commiphora spp*	√	√																				
5.	*Combretum aculeatum*	√																					
6.	*Balanites spp*	√			√																		
7.	*Balanitus aegyptica*	√																					
8.	*Grewia bicolor*	√													√								

Source: Field Observations(2018) and Wereda Agricalture Office(2018)

6.3.2 Faunaand Parks/Reserved Areas

Parks and the wildlife resources have ecological, environmental services such as ecological, tourism and recreations, scientific research, education, social, economic, aesthetic, cultural and spiritual values. The major parks and other fauna or wildlife resources found in the lower Omo valley are Omo National Park, Mago National Park, Tama Wildlife Reserve and Murulle controlled hunting area. The buffer zones of the parks, reserves and hunting areas vary from area to area ,the minimum is 1Km radius from residents or development areas.The study could not get ecotourism incomes of each park or reserved areas but the South Omo Zone's tourism income in 2018 was 39 million birr. The Omo park established in 1968 covering a total area of 4 068 km^2. The boundaries of Omo and Mago National Parks updated in 2010 GC by SNNPRS. The revision considered recent local settlements, natural resources, sugar project, and wild animals' distributions, movements and habitats.

As a result, the area of the Omo National Park reduced to 3,438 km^2, and 630 km^2, south west of the park, went to the Kuraz Sugar Development Project.

The project, therefore, directly influences the Omo National Park and indirectly the others. The right main cannel of the project is the border and at the same time crosses the park, 34km. The locations of the major fauna resources in the reference to the project are presented in the topography map,figure 5.

The stated fauna resources are mutually dependent and interlinked wildlife protected areas. These biodiversities' centers have significant roles in ensuring or protecting the impacts of the climate changes in the nation.

6.3.3 Omo National Park

Omo is one of biologically riches national parks found in Lower Omo, SNNPRS, and Ethiopia. It is located at about 870 km southwest of the Capital, Addis Ababa.

The compositions of vegetations found in the park are savanna, riparian formation and deciduous woodland. As the park did not have legal status, the regional government re-demarcated the park boundary by considering core wildlife habitats, corridors and land needed for the planned sugarcane plantations and industrial development project. Based on this, both Omo and Mago National Parks secured legal demarcated boundary by the end of 2010 by the South Nations, Nationalities and Peoples Regional State.

The main water sources for the wildlife in the park are Omo River and its tributaries such as Mui , Shorum and Kibish Rivers. Omo River is the only dry season water source for most of the game animals.

The main game animals' breeding and feeding (grazers) areas of the park wildlife are reverine vegetations of the Omo River and its tributaries, and Sai, Illilbai and Tinign Plains. The bush and the woodlands of the Omo and Mui Rivers are also good feeding grounds for bush animals.

The Omo park,as seen in location and topography maps, found from North West, West , South West and between Block I Right and Block II(Kuraz 3 and Kuraz 5) of the project area. The right main canal served as a boundary demarcation between Omo Park and the Kuraz Sugar Project. The promising buffer zones between the park and the project area stated expected to be minimum 1 km radius (wildanimals' traffic areas).

6.3.3.1 Existing Conditions of Wildlife (including Corridors)

The Ethiopian Wildlife Conservation Report (2018) indicated that the project area is the major habitats, breeding and feeding areas, and migration routes for wild animals including elephants and others. Their numbers decreased compared from 2007GC due to hunting (commercialized), accidents of vehicles and getting in to dry and wet cannels and others. The project management bodies and other stakeholders (administrators, community, etc) confirmed the same. The animals' movements frequently observed among Tama Wildlife Reserve, Mago and Omo National Park. As to the Omo park officer, the wildlife movement particularly elephants used to cross Omo River via Gimwuha, Illilbie spring and others (mainly during dry season) in the

southern part of the park. Elephants move to and from South Sudan, North Kenya and Omo National Park.

Mammals

There are 75 species of mammals have been registered in the park with no endemic species. The major mammals species are:-Common Eland, Cheetah, Wild Dog ,Elephant, Black Rhinoceros, Giraffe, Buffalo, Brazza's monkey, Aubis Baboon, Guereza, Lion, Leopard, Burch ell's Zebra, Lesser Kudu, Lelwel Hartebeest, Topi, , Oryx and others.

The rare species are Cheetah and Wild Dog. The endangered species are Oryx, Hartebeest, Beisa Orgx, Black Rhino and Bush Pig. However, the remaining pockets on the eastern side of Omo River give the hartebeest potential if specific conservation actions implemented. The aerial survey did not locate the Oryx (Graham et al., 1996:Omo National Park office, 2011, 2018: South Omo Socio Economy Profile ,2018).

Birds, Reptiles and Amphibians

Of 325 species of the birds so far recorded in the park, the Black-winged lovebird or Agapornis caranta is the only endemic to Ethiopia (EWCO, 1974). The species are Common Ostrich, Secretary bird, Helmented guineafowl, Francolins, Honey Guide, Crreat Egret, Cattle Egret, Owls, Night Jars, Bastard ,Egyptian Vulture ,Black Wiaped love Bird, Atrisan Fish Eaple, Hammer Kop, Jakobson Harnbills ,Pied Ring fisher, Abssynian Ground Hornbills, Starling, Black billed Hornbills, Mourning Dove, Black Collard Dove , Red billed Hornbills and Abysynian Roller. Considerable reptiles and amphibians also found in the park. The dominants are:- Snakes, Lizards, Fish, Crocodiles and Tortoise (OMO Park Office,2018: South Omo Socio Economy Profile ,2018).

6.3.4 Mago National Park

Mago National Park does not contact the project directly, it may affect indirectly. It consists of a typical bush savanna fauna with 81 larger mammals and 237 species of bird.

The major wildlife species conserved in Mago National Park are Cheetah, Elephant, Black Rhinoceros, Giraffe, Lelwel Hartebeest, Topi , Buffalo, Guera, da Brazza's Monkey, Lion, Leopard, Burchell's zebra, Hippopotamus, Gerenuk, Grater Kudu, Lesser Kudu, and Oryx.

The large sizes of herbivorous species in the area are elephant, bush pig, warthog, baboons, monkeys, and some antelopes. The carnivores are lion, leopard, hyena, mongooses, etc all together 56 mammal species were identified in the park (EWCS, 1993,South Omo 2018).

There are 237 bird species in the park, three of them are endemic to Ethiopia. The endemics are Thick-billed Raven (*Corvus crassirostris Ruppell*), Black-healed Forest oriole (*Oriolus Monacha*) and the White-winged cliff–chat (*Hyrmecocichla semirufa*). Speckled pigeon *(Columba guinea) and* Green pigeon *(Treron australis)* are the endangered species (EWCS, 1993,2018: South Omo Socio Economy Profile ,2018).

6.3.5 Tama Wildlife Reserve

Tama established together with Mago National Park in 1970 GC. The site found between Omo and Mago National Parks, Selamago Wereda.

The total area of the reserve is 1472 km^2. It is rich in wildlife resources being one of the dry season's refugees for wildlife of the nearby Wildlife Protected Areas (EWCA, 2011).

Dominant mammals' species of the reserve are : *Cheetah, elephant, giraffe, buffalo, lion, leopard, lelwel hartebeest, tiang, oryx, buchell's zebra, lesser kudu, de brazzas monkey, common baboon and gureza, and ostrich* on the plains; and endemic *black-winged love bird* are among others typical features of the reserve.

There is wildlife corridor ,in the revised plan of the project territory, from Tama Wildlife Reserve to Omo River and Omo National Park , key animals' movements especially elephant movement during seasonal migrations(EWCA, 2011:South Omo Socio Economy Profile ,2018)

6.3.6 Murulle Controlled Hunting Area

Large mammals such as Lesser Kudu (*Tragelaphus imberbis*), Grant's gazzelle (*Gazella granti*), Gerenuk (*Litocranius walleri*) Gunther's dik dik (*Madaqua guntheri*), Warthog *(Phacochorus aethiopicus*) Bat-eared fox *(Otocyon megalotis),* Common Jackal *(Canis aurius*), Abyssinian Hare (*Lepus abyssinicus), Topi* (*Damaliscus korigum tiang*) and Guereza (*Colobus guereza*) are found in the Controlled Hunting Area. The area consists of bird species like Kori bustard (*Ardeotis kori*), Secretary bird (*Sagittarius serpentarius*), Tawny eagle (*Aquila rapax*), Drongo (*Dicrurus adsimilis*), Helmeted Guineafowl (*Numida meleagris*), Vulturine Guineafowl (*Acryllium vulturinum*), Black-headed Gonolek (Laniarius erythogaster), Green Pigeon (*Treron waalia*), Long-tailed starling *(Lamprotornis purpuropterus*), Double-toothed barbet (*Lybius bidentatus*), Red and yellow barbet (*Trachyphonus erythrocephalus*), White-headed buffalo weaver (*Dinemellia dinemelli),* Caramine bee-eater (*Merops nubicus*), White throated bee-eater (*Merops albicollis*) and Yellow-necked spurfowl (*Francolinus leucoscepus*) (Kahsay G.et.al, 2008 : South Omo Socio Economy Profile ,2018).

Of all animals, 16 identified to have scientific and conservational values, allowed for controlled hunting. The animals are Grant's gazelle (*Gazella grant*), Gerenuk (*Litocranius walleri*), Guenther's dik dik (*Madaqua guntheri*), Warthog (*Phpkcochorus aethiopicus*), Bat-eared fox (*Otocyon megalotis*), Common Jackal (*Canis aurius*), Topi (*Damaliscus korigum tiang*), Cheetah (*Acinonyx jubatus*), Lion (*Panthera leo*), Lesser Kudu (*Tragelaphus imberbis*), Grater Kudu (*Tragelaphus strepsiceros*), Beisa Oryx (*Oryx gazelle Beisa*), wild Dog (*Iycaon pictus*), Leopard (*Panthera pardus*), Caracal (*Felis caracal*) and Genet rusty-spotted (*genetta rubiginosa*) (Kahsay G.et.al, 2008 : South Omo Socio Economy Profile ,2018).

6.3.7 Aquatic Ecology

Fishes and Related

There are fish and related populations in the Omo River and Lake Turkana such as commercial fishes including:- *Nile perch*, *Barbus* and *Tilapia*,Crocodiles, Hippopotamus and other aquatic animals exist in these water bodies. The mentioned sources of the fishes are not well exploited yet.

Phytoplankton and Zooplankton

Phytoplankton and Zooplankton, algae, seen in the water bodies found in the project area so that it is an indication of the existing of favorable condition for the production of fishes.

6.4 Baseline Information- Socioeconomic Environment

6.4.1 Demographic Feature

6.4.1.1 Population Size

As to the CSA's Statistical Population Projection (2013), the total population (2017GC) of the Nation ,SNNPRS , Bench Maji Zone(Maji and Menit Shasha Weredas) ,South Omo Zone(Nyangatom and Selemago Weredas) , Keffa Zone(Decha Wereda) were 94.4 ,19.2, 0.85, 1.1 and 0.72 million ,respectively .Of these populations , urban population accounts ranging from 24.8%(Maji Wereda) to nil(Nyangatom Wereda). The urbanization rate on average as the whole in the region(16.6%) is lower than that of the country(20.2%).

Table 18: Population Size of Ethiopia, SNNPRS , Bench Maji Zone(Maji and Menit Shasha Weredas) ,South Omo Zone(Nyangatom and Selemago Weredas) , and Keffa Zone(Decha Wereda) ,000

Population '000	Urban + Rural			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Ethiopia	94400	47400	47000	19100	9500	9600	75300	37900	37400
SNNPRS	19170	9500	9670	3178	1575	1603	15992	7925	8067
Bench Maji Zone	847.1	417.7	429.4	159.9	78.4	81.5	687.2	339.3	347.9
Maji Wereda	41.6	20	21.6	10.3	4.9	5.4	31.3	15.1	16.2
Menit Shasha Wereda	54.2	27.1	27.1	5.9	2.8	3.1	48.3	24.3	24
Keffa Zone	1102.2	541.6	560.6	138.4	65.8	72.6	963.8	475.8	488
Decha Wereda	158.5	79	79.5	11.6	5.4	6.2	146.9	73.6	73.3
South Omo Zone	722.9	360.5	362.4	91.7	46	45.7	631.2	314.5	316.7
Nyangatom Wereda	21.01	10.6	10.41	0			21.01	10.6	10.41
Selemago Wereda	34.29	17.32	16.97	2.62	1.32	1.3	31.67	16	15.67

Source: CSA Statistical Population Projection (2013)

As to the project office, the residents of the project area estimated to be 3000 HHS including tradesmen, pastoralists and employees. Based on the household survey, the average family size of the area is 4.4 so that the total residents expected to be 13,200.The HH survey indicates that of the total population of the project area 50.5% are female.

Table 19: The Project Area Population Distribution (%)

Project Area Population Distribution by Age Groups *(%)*					
Sex/Age Interval	<=7	8_13	14_64	>=65	Total
Male	13.4	4.0	32.2	0.0	49.5
Female	15.8	8.9	25.7	0.0	50.5
Total	29.2	12.9	57.9	0.0	100.0

Source: Estimated based on Household Survey (2017/18 GC)

6.4.1.2 Settlement Pattern and Population Density

The settlement patterns of the residents , population density , within or surrounding the project area are very crucial for planning and implementation of any project. As to the Sugar Corporation, Zone, Wereda administration and the Community discussions, currently no pastoralist found in the project area.

The settlement patterns of the people at the project area are sedentary. Majority of the pastoralists found the project surrounding areas are moving here and there for searching of cattle feeds or other things.

The population density of the project area, table 20, is low , 8.1 persons /km2. It indicates that most of the project and surrounding areas are covered by sugar plantations or virgin lands.

Table 20: Population Density of Nation, SNNPRS , Bench Maji Zone(Maji and Menit Shasha Weredas) ,South Omo Zone(Nyangatom and Selemago Weredas) , Keffa Zone(Decha Wereda) and Project Area

Description	Crude population density (Person /km^2)
Ethiopia	127.3
SNNPRS	181.0
Bench Maji Zone	44.0
Maji Wereda	8.9
Menit Shasha Wereda	18.5
Keffa Zone	103.6
Decha Wereda	53.6
South Omo Zone	34.3
Nyangatom Wereda	7.9
Selemago Wereda	7.7
Project Area	8.1

Source: CSA Statistical Abstract (July, 2013) and Study Survey

6.4.1.3 Age Structure

Age structure of any community is essential to identify the potentials of school age, working age, dependent, etc. The age structures of the Nation, SNNPRS , Bench Maji Zone(Maji and Menit Shasha Weredas) ,South Omo Zone(Nyangatom and Selemago Weredas) , Keffa Zone(Decha Wereda) and Project Area are explained in the table below. The shares of child below 15 and productive labors (15-64) of the project area are 42.1% & 57.9%, respectively.

Table 21: Population Size by Broad Age Category in Percent

Age Category	Percent (%)										
	Nation*	SNNPRS*	Bench Maji Zone*	Maji Wereda*	Menit Shasha Wereda*	Keffa Zone*	Decha Wereda*	South Omo Zone*	Nyangatom Wereda*	Selemago Wereda*	**Project Area****
<15 Years	45	48.3	48.7	46.8	44.2	48.6	48.8	49.6	45.5	47.7	**42.1**
15-64 Years	52	49.2	49.8	47.7	54.0	48.6	48.1	48.4	53.6	50.9	**57.9**
>=65 years	3	2.5	1.5	5.5	1.9	2.9	3.1	2.0	0.9	1.4	**0.0**

Source: Computed based on Data Obtained from CSA Reports* and Field Survey**

The general broad age categories' percentages, table 21, of the average productive and non-productive age structures of the project areas are 57.9% and 42.1%, respectively. In the project area, productive forces dominated.

6.4.1. 4 Dependency Ratio

The definitions of dependencies varies from nations to nations depending on the age ranges, for instance some nations have considered productive labours from 18 to 55 years or the others start from 14 up to 64 years. This study follows the country labour law which says a person less than 14 years old are considered as children; and the law allows from 14 up to 17 years old to work light works. Here, the age structures have been classified by two major groups: age between 14-64 years old are productive ones and those less than 14 and above 64 years old are dependent or non productive. As increase dependency ratio, the burden of working age population also increases in a given area.

Table 22: Dependency Ratio

Age Category	Dependency Ratio										
	Nation*	SNNPRS*	Bench Maji Zone*	Maji Wereda*	Menit Shasha Wereda*	Keffa Zone*	Decha Wereda*	South Omo Zone*	Nyangatom Wereda*	Selemago Wereda*	**Project Area****
Youth dependency ratio	0.87	0.98	0.98	0.98	0.82	1.00	1.02	1.02	0.85	0.94	0.73
Old age Dependency Ratio	0.06	0.05	0.03	0.11	0.03	0.06	0.06	0.04	0.02	0.03	0.00
Total Dependency Ratio	**0.92**	**1.03**	**1.01**	**1.09**	**0.85**	**1.06**	**1.08**	**1.06**	**0.86**	**0.96**	**0.73**

Source: Computed based on CSA *Data & Field Survey **

The total dependency ratio of the project area is 0.73, means on average every 100 productive persons are responsible for assisting 73 unproductive persons (old and youth). Compared to others, the project area is relatively less suffered with unproductive labours duet to mainly a significant number of productive workers.

6.4.1.5 School Age Population

The school age populations of the project area estimated based on the surveyed and weredas' data. The total school ages (7-18) including primary school age (7-14) and secondary school age (15-18) in the project area presented in table23.

The table below shows that the total primary and secondary school age populations in the project area are 1672 and 197 , which account 17% and 2 % of the total project area's population,. respectively.

Table 23: School Age Populations of the Maji ,Menit Shasha, Nyangatom and Selemago and Decha Weredas and Project Area

Descriptions	Primary School (7-14 Age)			Secondary School (15-18Age)			Total school age (7-18)		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**
Maji Wereda	9757	4870	4887	105040	52910	52130	114797	57780	57017
Menit Shasha Wereda	12504	6574	5930	37844	18675	19169	50348	25249	25099
Decha Wereda	37615	20770	16845	3582	2011	1571	41197	22781	18416
Nyangatom Wereda	5325	2795	2530	2387	1255	1132	7712	4050	3662
Selemago Wereda	8504	4284	4220	3399	1693	1706	11903	5977	5926
Project Area*	1672	590	1082	197	148	49	1869	738	1131

Source: Bench Maji, South Omo, Keffa Zones' Finance and Economy Offices(2018) and Computed based on Household Survey* (2018)

6.4.1.6 Population Dynamics

The population dynamics, generally, consider three major demographic variables: Fertility, Mortality and Migration. The Ethiopian Demography and Healthy Survey(2011) Report showed that the Total Fertility Rate per women of the Nation was 2.6, urban and 5.5 , rural . As to the household survey, 5% and 95% of the residents in the project area are in their respective manner of born there and living less than ten years. This confirmed that most of the project area's residents are migrants.

6.4.1.7 Population Projection

The future size of the population can be computed through population projection[3] . It is a fundamental for the developments of plans ,budget preparations ,etc.

[3] $Pl=Po* e^{rt}$ Pl=Population at later date ,Po=Population at initial date, r=growth rate(2.9 % for the Region(Weredas and Project area) and t=the time elapsed between initial date and later date and e=constant(2.718)

The 20 years projected populations of the Maji ,Menit Shasha, Nyangatom and Selemago and Decha Weredas and Project Area are presented as follows:-

Table 24: Population Projections of Maji ,Menit Shasha, Nyangatom and Selemago and Decha Weredas and Project Area'000

Period in GC	Maji Wereda	Menit Shasha Wereda	Decha Wereda	Nyangatom Wereda	Selemago Wereda	Project Area
2017	41.6	54.2	158.5	21.01	34.29	12.3
2018	42.8	55.8	163.2	21.6	35.3	12.7
2020	44.1	57.4	168.0	22.3	36.3	13.0
2020	45.4	59.1	172.9	22.9	37.4	13.4
2021	46.7	60.9	178.0	23.6	38.5	13.8
2022	48.1	62.7	183.2	24.3	39.6	14.2
2023	49.5	64.5	188.6	25.0	40.8	14.6
2024	51.0	66.4	194.2	25.7	42.0	15.1
2025	52.5	68.4	199.9	26.5	43.2	15.5
2026	54.0	70.4	205.8	27.3	44.5	16.0
2027	55.6	72.4	211.8	28.1	45.8	16.4
2028	57.2	74.6	218.0	28.9	47.2	16.9
2029	58.9	76.8	224.5	29.8	48.6	17.4
2030	60.6	79.0	231.1	30.6	50.0	17.9
2031	62.4	81.3	237.9	31.5	51.5	18.5
2032	64.3	83.7	244.9	32.5	53.0	19.0
2033	66.2	86.2	252.1	33.4	54.5	19.6
2034	68.1	88.7	259.5	34.4	56.1	20.1
2035	70.1	91.3	267.1	35.4	57.8	20.7
2036	72.2	94.0	275.0	36.4	59.5	21.3
2037	74.3	96.8	283.1	37.5	61.2	22.0

6.4.2 Socioeconomic Features of the Project Area

6.4.2.1 Administration Structures

The project site is located in the South Nations, Nationalities and Peoples Regional State of three zones; South Omo, Bench Maji and Keffa Zones. The capitals are Jinka for South Omo, Mizan Aman for Bench Maji and Bonga for Keffa Zone. The project touched the werdas are Selamago and Nyangatom of South Omo, Maji and Menit Shasha of Bench Maji and Becha Woreda of Keffa zones.

Each Zone and Wereda has councils. The councils structured with executive, judiciary organs and the police. The environmental activitiesleaded by Forest, Environment and Climate Change Office. The natural resources such as wildlife administered under Woreda Agriculture or Pastoralist Development Offices.

6.4.2.3 Major Indigenous People, Culture, and Ethnic Groups

The tribe to be "indigenous" or not is decided by the National or Regional concerned bodies. In SNNPRS, there are about 56 different ethnic groups. The major nine indigenous ethnic groups found in the project and surrounding areas presented in the table below: These ethnic groups have their own cultures, their hair styles, body's decorations, dressing styles, jewelry, cultural ceremonies, etc (see as an example of the Nyngatom tribe , picture 14).

Table 25: Project Area and its Surrounding Major Indigenous Population Distribution by Major Ethnic Groups(2017 GC)

S/N	Zone	Wereda	Ethnic Group	Population	Ethnic Distribution, %
1	South Omo	Selamago	Mursi	3753	9.1
			Bodi	3945	9.5
			Bacha	2897	7.0
			Dime	1101	2.7
		Total		**11696**	**28.3**
		Nyangatom	Nyangatom	10145	24.5
			Muguji	2173	5.3
			Murle	1617	3.9
		Total		**13935**	**33.7**
2	Bench Maji	Maji	Dizi	3703	9.0
		Menit Shasha	Menit	10909	26.4
		Total		**14612**	**35.3**
3	Keffa	Decha	Chara	1101	2.7
Total				**41344**	**100**

Source: Computed based on Former EIA(2013) and CSA Statistical Population Projection (2013)



Picture 13: Nyangatom People Singing and Jump-Dancing



Picture 14: Nyangatom Woman with its Beautification Style

Souce: WWW.Regardes-Passion.Com

6.4.2.4 Ethnic Groups and Conflicts

The major conflict groups in the Maji, Menit Shasha, Nyangatom and Selemago and Decha Weredas of the project areas are Inter –Indigenous Ethnics, Indigenous with Migrants and Cross-Border Conflicts.

Inter-Indigenous Ethnic Conflicts: The common conflicts among tribes such as between Bodi with Konso and Dime with Mursy ethnic groups, Nyangatom with Dasenech, Nyangatom with Karo, Nyangatom with Hammer and Nyangatom with Mursi ethnic groups and others. The causes of these conflicts are mainly on livestock raiding, water points and accessing over the grazing lands.

Conflicts frequently observed in the project and surrounding areas. During our field works, the same conflicts occurred such as

- Maji Woreda: Conflicts reported by the zone administrators/community members/tour operators;
- Menit Shasha Woreda: Conflicts reported by the zone administrators/community members/tour operators; and
- Decha Woreda of Keffa Zone: Conflicts reported by the zone administrators/community members/tour operators;

Sometimes conflicts within indigenous and migrants could be occurred in such case of vehicles' accidents and others. The cross-border conflicts, Nyangatom with the Turkana-to the south (in Kenya) and the Toposa-to the west (in Sudan), rarely occurs; however, the occurrences have been far away from the project site.

In whatever conflicts, it is expected a continuous discussions with them by the administrations and concerned stakeholders to minimize or mitigate the conflicts in sustainable manure.

6.4.2.5 Religion and Marriage System

The survey report indicates that the respondents are 52.5% Orthodox, 23% Protestant, 18% traditional and 6% Muslim. All religions have their own worship places in the project area. Majority of the surveyed respondents, 60.7%, are married.

A man of indigenous people can marry more than one wife (polygamy) depending on the size of his wealth; it could be in kinds (cattle, etc) or in cash.

Polygamy, early, and forced marriages have been frequently observed in marriage and related problems of the indigenous people.

6.4.2.6 Social Administration Institutions

The governmental and traditional social administration institutions have a significant role in managing community issues (such as developmental, judiciary and communal scarce resources). As to the HH survey. to manage the above issues in the project area, the residents usually use

informal institutions (Iddir, etc) , governmental bodies ,and esteemed elders. Almost all respondents have involved in the community development programs through mainly labor and material contributions.

6.4.2.7Tourism, Cultural, and Heritage Sites

Tourist, cultural and heritage sites found in the zonal and project and its surrounding areas.Mago and Omo national parks, Murle and Wollishet – Sala Controlled hunting areas, Buska natural forest, Decha(Origin of Coffee) ,Lower Omo valley, Fejej , Kibish and Weyto Bola Archeological & Anthropology Sites, Jinka Museum,Lakulan, Maki & Tuket, Dolom and other hot springs ,Gicha & Bombi, Diadin Codona and other caves, Murile Ostrich breading ,Chelbi and Tama wildlife reserves ,and Cultural attractions /Pastoralist Markets. The Omo national park is adjacent to the project command area.

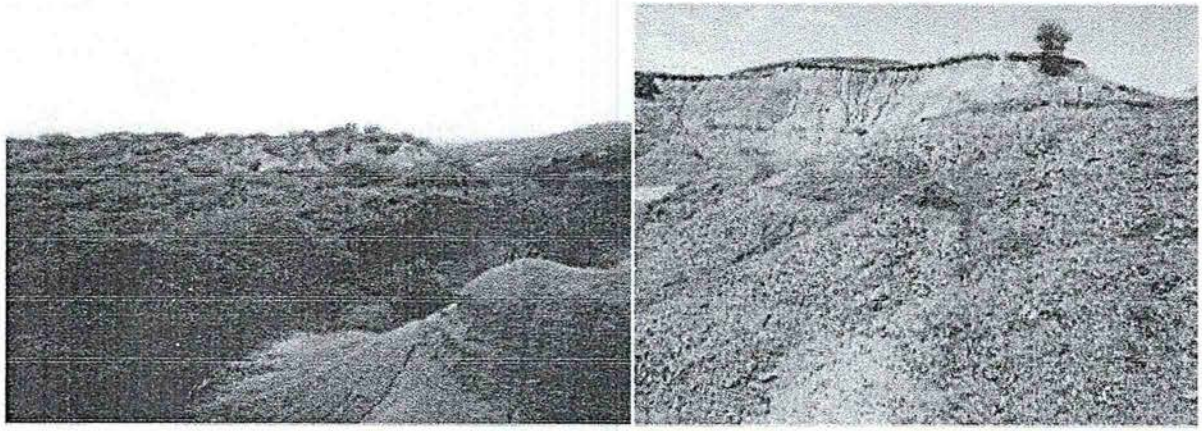
The residents of the project surrounding areas have their own culture. Dressing, way of living, dancing,and lips decoration of Mursi peoples and hair decorations are few of them. They are attracting tourists due to natural beauties that can contribute to the development of the area.

6.4.2.8 World Heritages, Pale ontological and Archaeological Sites

EFDR constitution, Art(41(9)), and EPA Guide line have clearly stated about cares of or protections of ,in cooperation with the local people, historical relics, burial sites, scenic values from being damaged. As to our observations, discussions with key informants including cultural, heritages' experts, and community members, until now there is no identified or well-known historical or protected cultural heritage sites in the project territory.

In the context of world heritages of pale ontological and archaeological sites, by many scholars, Ethiopia considered as a source of human origin due to the existences of different evidences such as Luci and Ardi in Afar, and four geological formation areas (Kibish, Mursi, Usno and Shungura) in Lower Omo Vally in South Regions, Nyangatom and Dasenech Weredas. The lower Omo Valley can be a model in providing comprehensive information on Plio-Pleistocene faunas for all projects studying compared to other sites in Africa and others. The findings of the study conducted in 1960-70s on the lower Omo Valley sites have brought a paradigm shift in methodological and conceptual frame works human evolutions sciences (Boisserie et al., 2011).

The formation areas of Kibish, Mursi, Usno and Shungura registered by UNESCO World Heritage lists in 1980 on the basis of its paleontological and archaeological resources due to mainly the works of the International Omo Research Expedition (IORE, 1967-1976: Heinzelin, 1983). In the Lower Omo Paleontological project area, there are 1 600 localities, 53 000 fossil vertebrates of 210 taxa, 250 hominid fossils (5 - 6 taxa) and 2-3 Million years old stone tools. It serves still in providing very crucial information on hominid, fauna and flora fossils associated with stone arte facts (Boisserie et al 2011).



Picture 15: Examples of Formation Areas, Usno and Kibish Sites from Left to Right

As to the study team observation, the aforementioned paleontological and archaeological sites are far away, physical distances, from the nearest project boundary ranged from 35 km(Kibish) to around 50 km(Usno).

Significance of the Paleo-anthropological and Archaeological Site

The Lower Omo Valley formations are over 1000 meters thick well exposed fossilforous and well dated by standard scale. It is also interesting to investigate how the environment changed during the period when the hominids were evolving (As Stated in ESIA of Sugar Corporation, 2013).

The formations are good scientific indicators to put Ethiopian as a leading place in human evolution discoveries. Besides, the existences of such formations have showed the country commitment to protect its heritages, which in turn creates positive images in foreign countries for Omo, Lucy, Ardi, and others. In general, the sites help in:

- encouraging further researches on the deep histories of African biodiversities including Ethiopian ancestors;
- evaluating the long period of environmental changes in the nation and at large in the Africa and World;
- calibrating climate evolution models aiming at reconstructing past climate changes and forecasting future ones;
- training future generations of geologists, paleontologists and archeologists and
- developing tourism industry that contributes to the economic growth of the country.

6.4.2.9 Housing

Communities of the project surrounding areas have at least one main thatched (grass) roofed main house with wood and mud wall, no toilet .



Picture 16: Residence House at Factory One Surrounding Village

6.4.2.10 Crop Production and Consumption

Little crop production taken place in the project areas. The area is known with food shortage and erratic rainfall. The main food sources for the households arepurchased crops, livestock products such as milk, meat and blood and also small amount of crops grown using Omo River flood retreat farming.

The farming practice of the communities is very backward, using sharp sticks for holing , cropping mostly sorghum, maize and pea as major crops; and cabbage, tomato, mango, banana and moringa as minor crops.

There are some practices of modern farming with the help of the project at nearby the project site. Sugar canes produced by the project and out growers. Currently, fertilizers not used by the producers.

The average productivities of maize and sorghum of the project areas are less than that of the nation, 20.9 q/ha. The crop production or productivity of the project area is very low though significant opportunities exist such as virgin lands, and sustainable rivers. The main reasons for this low productivity are very backward agricultural tools (hoe) or farms (tillage), poor extension services, low community awareness or knowledge towards crop production, lack of farmers' organization, professionals' limited capacity, etc.

6.4.2.11 Livestock

The project weredas' live stock per capita in 2010 EC ranged from12.8 (Decha) to 54.1(Nyangatom) ,on average 19.3. The sources of main fodders are grazing on natural pasture. Practicing of improved breeds and fodders are little or none.

The common animal diseases are Trypanosomiasis, CCPP, PPR (Pestides Petitis Ruminant), CBPP, Anthrax, Lumpy Skin Diseases (LSD), sheep and goat-pox, blackleg and men-gmite gastro-intestinal parasites (GIP).

Shortage of feeds, especially during dry season, animal diseases, animal health workers shortage, drought and low yields of animal products stated as major constraints to livestock development in the area.

The solutions forwarded are improved livestock extension services, creating a continuous livestock development awareness for the community, establish livestock development association at Kebele level , provide veterinary service with enough medicines and growing improved forages or grasses.

Indigenous people living at Omo River bank, especially, the Kwegu of Nyangatom and the Bacha of Selamago lead most of their livelihood on fishing. Catch rates in lower Omo is almost the highest. Besides, the traditional fisheries involved in commercial fishing on Lake Turkana. The marketing area reaches at Arba-Minch. Remoteness of the area from major urban market centers and reducing the water levels identified as major constraints in the development of the sector.

Table 26: Livestock Population of the Project Area in 217/18

Livestock	Selamago	Nyangatom	Maji	Menit Shasha	Decha	Total
Cattle	308355	685506	279284	915116	795234	**2983495**
Sheep	16821	186627	92391	181102	240609	**717550**
Goat	56286	233571	62170	337691	141154	**830872**
Camel	0	2	0	0	0	**2**
Horse	0	0	159	47	153577	**153783**
Mule	0	0	67	17	100210	**100294**
Donkey	600	16664	69	182	12722	**30237**
Poultry	113396	13807	198515	262175	582267	**1170160**
Total	**495458**	**1136177**	**632655**	**1696330**	**2025773**	**5986393**
live stock per capita	**14.4**	**54.1**	**15.2**	**31.3**	**12.8**	**19.3**

Source: Bench Maji, South Omo, Keffa Zones' Finance and Economy Offices(2017/18)

6.4.2.12 LandPossession

Article 40.3 of the Constitution of the Federal Democratic Republic of Ethiopia (1995) states public ownership of both rural and urban lands of the country. It also states that the natural resources are under the public ownership. Land is "common property of the Ethiopian people and cannot be subjected to sale or to other means of exchange. Moreover, ownership of land is vested on the public and the people while rural and urban dwellers have only use rights over land". A use right gives the user of the land the right to use and benefited from the fruits of her/his labour which may be crops, trees, etc. found on the land or any permanent works such as buildings etc.

Similar to other pastoralist communities of the country, the project areas' lands are under communal ownership and do not have even the feeling that land belongs to the state. Generally,

the pastoralists seem to maintain right over wide areas, live with less demarcations within the territory of each group. Therefore, there was no standard land tenure and land certification.

6.4.2.13 Wealth and Income (expenditure)

As to the HHS survey, an average of a HH income (expenditure) of the project area is 4467 birr per month per HH or 12,183 birr or 435 USD per capita per year (1USD ≈ 28 birr). According to the Ethiopian NBE Report (2017/18 GC), the real per capita income of the country in 2016/17 was 18,256 birr or 815 USD. World Bank and other international organizations have recognized the poverty line of $1.25 per capita per day or $ 456 per capita per year. As to the ESIA (Sisay Tesfaye Farm in Nyngatom) in 2013/14, generally, an average per capita income (living standard) of the residents in the project area is around one fifth of a country's average per capita income where as in 2017/18 the existing per capita per year of the project area income is almost half of the country. It indicates there is an improvement due to mainly the existence of the sugar development project.

Wealth indicators can also serve as a poverty proxy. As to the household survey, all the respondents have at least one modern house furniture and equipments (telephone, radio, tv, etc).

6.4.2.14 Agricultural Cooperatives and Extension Services

As to the Wereda Agriculture Offices and the sampled pastoralists' responses , the available extension service packages in the project area consist of better farming system, improved cattle and sheep , , improved seeds and tools ,inputs such as herbicides ,etc ,technical advices and trainings , credit facility, etc. The surveyed pastoralists received in one way or other most of the above extension service packages though these services' outputs are very poor. The total numbers of cooperatives found in Selemago, Nyngatom, Maji and Miniti Shasha weredas(2017/18 GC) were 30,38,51, and 47 ,respectively.

6.4.2.15 Food Security

As to the agriculture experts and the residents' of the kebeles (sample surveyed), shortage of food is usually observed in the project area. Majority of the interviewed household heads have used purchased/aid crops when getting food shortage.

6.4.2.16 Agriculture Investment in the Down Stream of the Project Area

As to the South Omo Investment Report (2017/18), there are 9 investors (cotton farms) with around 30,000ha found in the Desanech , Nyangatom and Hamer Weredas. The estimated the pick water requirement of cotton, on average, is 800mm /annum over 5 months: equivalent to about 8000 m3/ha/seasons so that the total estimated downstream water consumption is 0.24BM3.

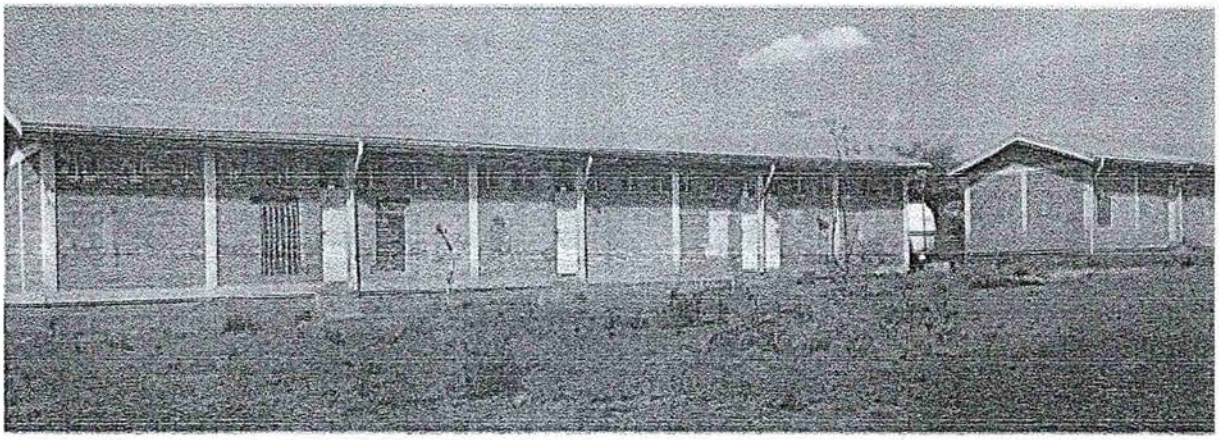
6.4.2.17 Social and Other Services

Ethiopian Government has paid attention for the development or improvement of these services, education, health, water supply, etc., since they are very crucial to enhance the development other economic sectors.The infrastructure developments(schools, health posts, animal health

clinics, police stations, irrigation canals, milling houses, roads and water points constructed in the Omo(factory) 1and 2 settlement villages.The settlements' conditions at Omo(factory) 3 and 5are under process.

a) Education

It is an engine for achieving the growth strategies of the country. A number of education strategies, in Education Sector Development program II , are marked out towards improving the admission, commission and transition rates of students. The total the Weredas' gross enrollment (GE) by school levels and sex presented in the table 27.In the project area, in settlement place of Selemago Wereda, there are primary schools constructed by the project.



Picture 17: Primary School built at Selemago Pastoralists' Settlement by the Project(factory 1)

According to the Selemago wereda education office (2011), students attending at elementary school in all four villages (Omo (factory)1) are 436. The total numbers of students at primary school at settlement place of Omo(factory) 2 surrounding areas are 104.

Table 27: Project Area Weredas' Gross Enrollment (GE) by School Levels and Sex (2017/18)

Wereda /		GE-1-8			GE-9-12	
Level	Male	Female	Total	Male	Female	Total
Nyangatom	1753	1247	3000	87	29	116
Selamago	5524	5038	10562	401	236	637
Maji	6339	5528	11867	541	468	1009
Menti Shasha	11313	3890	15203	304	92	396
Decha	22543	17685	40228	2434	1766	4200
Wereda /		GE-1-8			GE-9-12	
Level	Male	Female	Total	Male	Female	Total
Nyangatom	1753	1247	3000	87	29	116
Selamago	5524	5038	10562	401	236	637
Maji	6339	5528	11867	541	468	1009
Menti Shasha	11313	3890	15203	304	92	396
Decha	22543	17685	40228	2434	1766	4200

Source: Bench Maji, South Omo, Kefa Zones' Finance and Economy Offices(2017/18)

Table 28:Weredas' Education Quality Development Indicators (2017/18)

School Levels	(1-8)		(9-12)	
Weredas	Class to student ratio	Teacher to student ratio	Class to student ratio	Teacher to student ratio
Nyangatom	1:143	1:26	1:116	1:11
Selamago	1:364	1:42	1:319	1:27
Maji	1:24	1:36	1:30	1:21
Menti Shasha	1:32	1:41	1:25	1:28
Decha	NA	1:48	NA	1:29

Source: Computed based on Zones' Finance and Economy Offices Data (2017/18) ,NA-Not Available

The standards of the country for class to student ratio, teacher to student ratio and book to pupil ratio are 1:40, 1:40and 1:1, respectively. Based on the country standards, the education quality indicators of the weredas like student to class ratio are below the country standards of primary (1-8) and secondary (9-12) school levels. Student -teacher ratios of secondary school levels are above of the given standard. Both education office and residents state that shortages of food , quality teachers, water supply, lights ,text books ,very high school dropping outs(especially girls due to early marriage), less participation of the community, reference books, teaching aids, libraries, toilets and other educational materials are the major problems associated with education.

(b) Health, Sanitation, Family Planning and HIV

Health is crucial for high productivities. The average top ten diseases in the project area are as follows:-

Table 29: Top Ten Diseases in Project Area (2017/18 GC)

Types of diseases	%
Malaria	19.8
Acute Febrile Illness(AFI)	13
Infections of the skin and subcutaneous tissue	11.5
All respiratory diseases	8.1
Diarrhea	6.1
Other or unspecified infections and parasitic diseases	6
Diseases of muscular skeletal system and connective tissues	5.5
Trauma(injury, fracture, etc)	4.1
Urinary tract infections	3.3
Dyspepsia	3.1
Total top ten diseases	80.5
Others	19.5
Total	100

Source: Project Area Health Office (2017/18 GC)

On the average, 2800 patients per month treated in the health center of the project area. In the project area, 1 medical doctor, 4 health officers, and10 nurses have been found as to the country standard. The National Health Policy standards of major indicators are 1 health centre for 25,000 people, 1 health post for 5,000, 1 doctor for 25,000, health officer for 12,500 and 1 nurse for 5,000.

Table 30:Numbers of Health Institutions and Major Professionals in the Project Area's Weredas (2017/18)

Weredas	Health Center	Health Post	Major Health Professionals			
			Health Officers	Nurses	Druggists	Lab.Tec
Maji	2	20	0	6	NA	NA
Menit Shasha	3	17	0	15	NA	NA
Selamago	5	27(of them14 private clinics)	6	24(of them 3 degree)	3	3
Nyangatom	1	21(of them 1 private clinic)	1	7(of them 3 degree)	NA	NA
Decha	6	51	11	60(of them 16 degree)	NA	NA

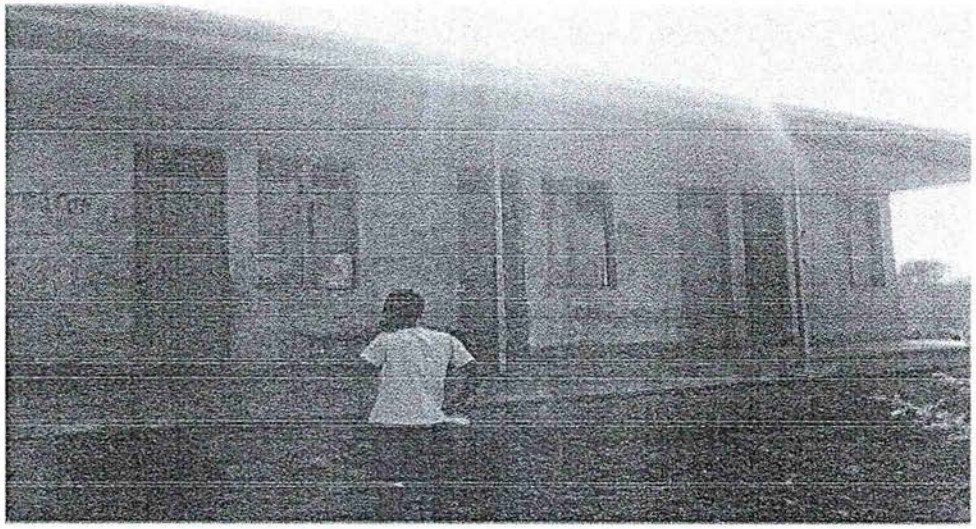
Source: Computed based on Zones' Finance and Economy Offices Data (2017/18) ,NA-Not Available

The average major health indicators of the project weredas are 1 1health officer for 13,711 and 1 nurse for 3524. In general, the health services in the weredas are poor.

Both the survey outputs and health office data indicate that communicable diseases (malaria and others) are common diseases in the project area. The malaria disease managed by environmental management, efficient net distribution, and indoor residual spray and in awareness creation on the environment management and utilization of the net. The top five diseases stated in the above mitigated by primary health cares, incorporated in the National Health Policies.

All respondents have received health extension services how to control and prevent basic diseases. The average (mean) distance of to reach the nearest health institution when they get sickness is around 0.5-1km. The major problems in relation to health in the weredas/project area are shortage of medicines, equipments, health professionals and others.

Majority of the surveyed HHS disposes their domestic dray wastes nearby their homes. It needs further works on dray waste disposal management. In general, living in poor health situations may cause to low productivities.



Picture 18: Health Post built at Selemago Pastoralists' Settlement by the Project (factory one)

Table 31: Reproductive Health Services

Weredas	Birth control service users	Mothers provided Delivery service s	Mothers provided Ant-natal care services	Mothers provided Post-natal care service s	Voluntary HIV/AIDS tested persons	HIV/AIDS positives from the tested persons	HIV/AIDS positives who use anti-HIV/AIDS tablets
Nyangatom	766	845	865	875	25	5	5
Selamago	4012	1958	2554	2354	49	29	28
Decha	16211	2669	3208	2090	8334	8	8

Source: South Omo and Keffa Zones' Finance and Economy Offices(2017/18)

The key informant and the data indicates that majority of the people living in the weredas have a strong desire to have children due to a need of helping persons in their working activities, to get wealth if the child is daughter.

Family planning interventions may have a significant impact in mitigating high proportion of economically dependent people through giving a space between childbirths and other means, and thus in turn reduce the number of children a family ultimately has. As to the survey, all the respondents have an awareness of the transmission /protection of HIV/AIDS.

(c) Water Supply

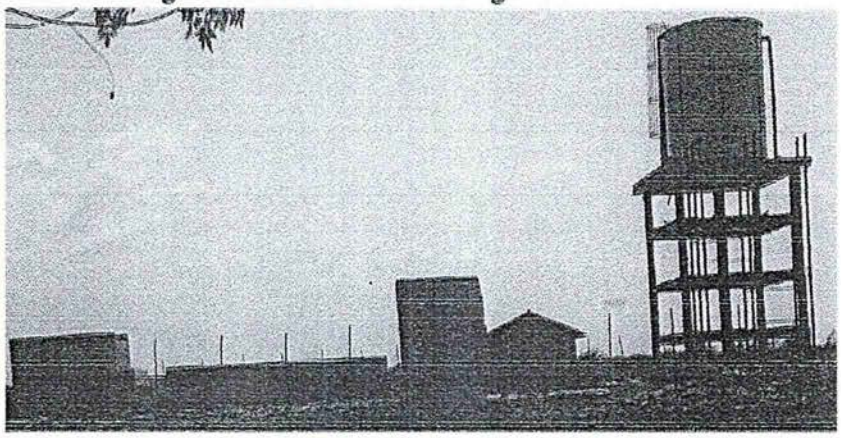
There is a problem of potable water in terms of quality, quantity and its sustainability in the project areaweredas.

Table 32: Weredas' Water Coverage (%) in 2017/18

Weredas	Weredas' Water Coverage(%) - 2017/18
Nyangatom	80.1
Selamago	79.2
Decha	92.7

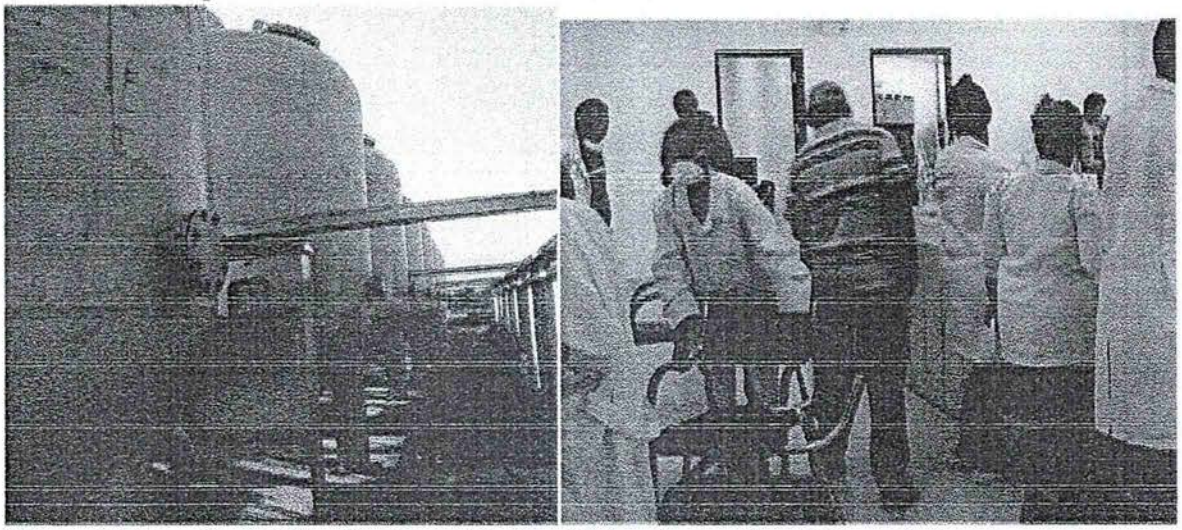
Source: South Omo and Keffa Zones' Finance and Economy Offices(2017/18)

As to the survey and key informants, the main potable water supply sources in the project area are ground water and Omo River. Currently the water supply in the settlement area interrupted. In the project compound, as to health expert and employees, the water (ground water) quality is poor so that most of the employees use packed water. The project provides the potable water by treating the Omo River using chemicals like "Water Agar".



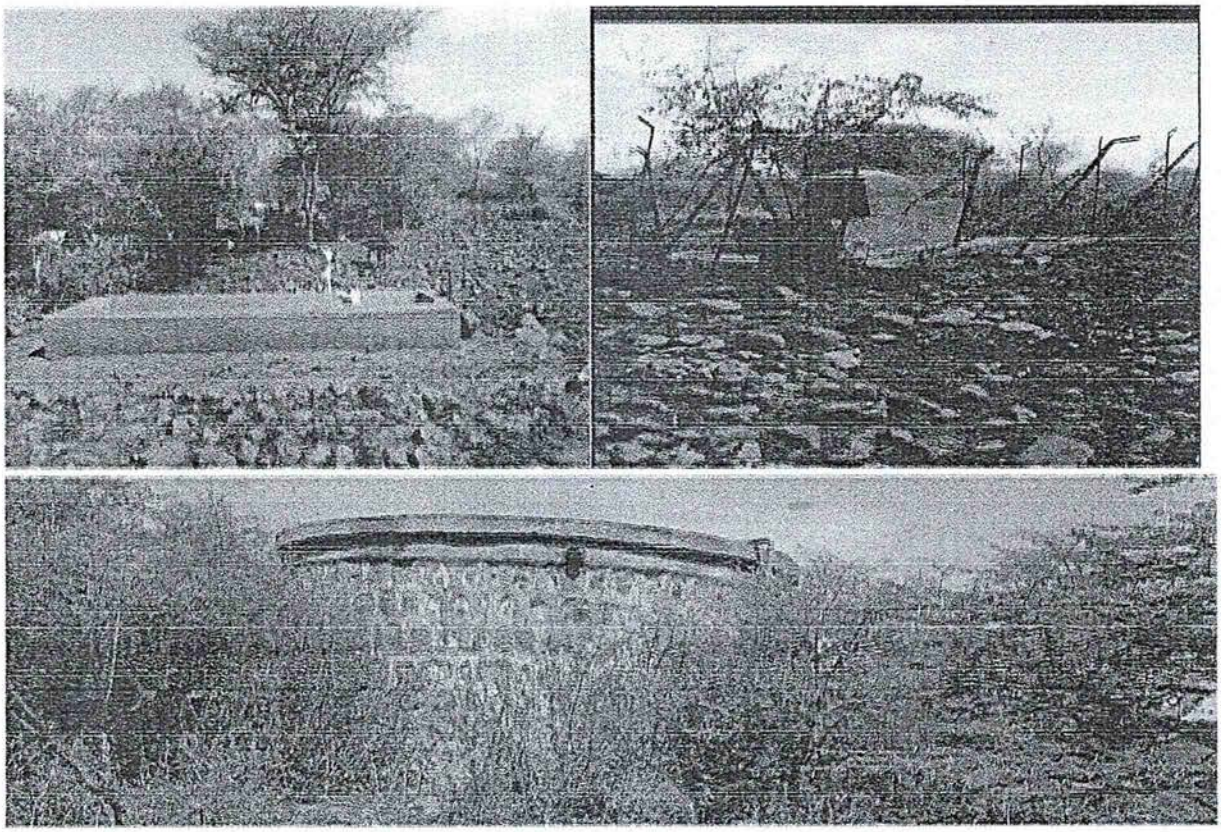
Picture 19: Sample of the Water Tanker with Potable Water by Treating the Omo River Using Chemicals(factory 2, village 8).

The water treatment plants found/expected at each of the factories for two purposes:- (i) To produce potable water sourced from Omo River for employees and (ii) To produce de-ionized water for steam production.



Picture 20: Sample of Water Treatment Plant and Laboratory at Omo 3 Sugar factory

Poor water quality and shortage/non-sustainability of waters for the people and livestock are the major problems mentioned by the settlement areas. As a result people have been suffering from water born diseases caused by polluted water.



Picture 21: Potable and Livestock Water Points built at Selemago Pastoralists' Settlement by the Project(factory one)

6.4.2.18 Road and Other Infrastructure Developments

(a) Road Development and Transport

Road is very critical for socioeconomic development of any area. In the project and surrounding areas, there is an improvement of road access. Before starting this project, the road networks are limited, not more than 500kms.Currently, the road networks in the area is expanded to above 2000 kms, almost four times of earlier. The asphalt road constructed from Kangate to Kuraz Omo 5(around 75km). On the other hand, there are poor/none accessible roads on the right bank of the project such as the road from Coffar Dam to Decha/Neda Kebele. This road is at poor condition, the residents and administrators complain on this issue. The administrations said that even for them getting difficulty to control the frequently occurred security problems in the area due to poor road conditions. The construction of this road is advantageous for the sugar corporation and the people living in both Bench Maji and Keffa Zones. The Corporation can access easily sufficient skilled, semi skilled and unskilled labours for its works. It becomes a short way to get Bonga, Mizan Aman and other towns to get the universities for research and other things. The administrators can control easily the conflicts arise in the area. The interactions

of market, social and others among the people and the corporation increased are among major ones.

(b) Communication , Electricity and Energy

There are electric power, telecommunication and postal services in the project compound.The project has currently partially gotten electricity from the factories' sources.

Majority of the respondents have one of the communications' instruments (radio, telephone ,etc). The sources of energy mainly in the surveyed in the compound are electricity, and fuel wood in the settlement villages. Its sources are bush/natural woods. The use of natural resources for household energy contributes greatly to the devastating effects on the forest resources. Alternative energy sources such as "Laqech", " Midja" should get a priority attention by concerned body such interventions would have also a potential contribution in reducing the burden of women in collecting fire woods and mitigates the health effects of smoking caused by fire woods.

6.4.2.19 Financial Service

The rural households in the project area suffered due to limited access to credit and saving services. The survey indicates that few residents do have an access for credit.

6.4.2.20 Urbanization

The urban population of Ethiopia estimated to be almost double, from 16% in 2007 to 27 % by 2035GC (World Bank, 2010).

There are significant migrants in the project area. The project found near to the capitals of the weredas, Kaganten and Hana. The project itself has a significant role in changing the life style of people living surrounding the project area. Hiring the pastoralists, migrants may transfer their positive lifestyles and related aspects to the local ones.Many hotels, trades, and others developed in the area. The road and infrastructures services increased.

6.4.2.21 Non -Governmental Organizations (NGOs)

The NGOs found in the project area like AFP, AMREF, World Vision, IDE and others have played an indispensable role in mitigating the socioeconomic and other problems of the society such as sectoral development, capacity building, environment protection, emergency helps, health, school rehabilitation and related services.

6.4.2.22 Views about the Project

All of what the study team contacted stackholders accepted the project development but they are expecting job opportunities, better infrastructure and services and knowledge transfers. Besides, the stackholders are willing to work together with the project to bring sustainable solutions for the raised problems in relation to communities , parks and adminsterations during constructions' and operations' phases.

6.4.2.23 Gender Issues

The current Ethiopian Government has shown its comitement on gender equity by such as 50% of the cabinits of the Prime Miniter Office are women, woman presendant of the country and

others. The women policy and programs developed and incorporated in every sectotial offices' policies, program documents and legislations [4].

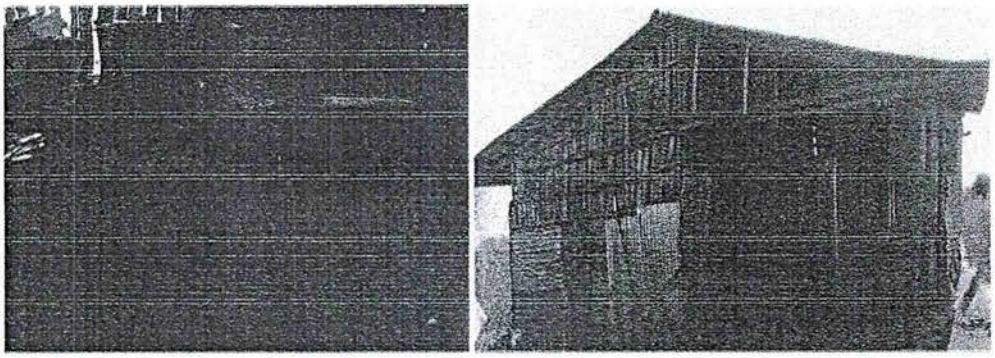
The economy empowerments of women limited in the project area/wereda. They are significantly suffered, as to the survey, with poverty ,heavy tasks as well as economy discrimination such as in the settelement village, females dominantly collect water , the average total working hours(both in and out of home) for women and men are with their respective order of 15 and 8 hours. Beides, the women suffered with unavailability or not working of grain mills and safewater supply. However, the project has given equal chances for both sexes in employeeing process and others.The existing share of permannt women empoyees in the sugar project is 16% of total.

Polygamy, enormous gifts for marriage , marriage age differences and early marriage are among others harmful culture and social practices widespread in the project area weredas.

The women school drop outs in the project wereda is mainly due to early marriage and other social and economic problems.

The respondents of the surveyed indignous people reavel that the husband is the only decision making in their common proporties, but women are participating in community affairs.

The overall socio-economy situations of women in the project area are at low level and needs the attentions of government, all stakeholders and development actors including the project to avert the situation.



Picture 22: Grain Mill built at Selemago Pastoralists' Settlement by the Project(factory one)

6.5 Public and Stakeholders' Consultations

6.5.1 Objectives of the Consultations

The FDRE Constitution contains a number of articles in the issues of environment in the public development projects and others. The principal objective of public consultation, as stated in the national policy, under article 92 of Chapter 10, described as follows:

4 Ethiopian constitution (Ar. 35),Women Policy(1993GC),UN Convention on Women and Sectorial Office Policy/Programs

"People have the right to full consultation and to the expression of their views in the planning and implementation of environmental policies and projects that affect them directly".
The stakeholders and public consultations process designed in order to identifying the potential impacts of the project, either negative or positive or both, and prioritize the remedial measures for the identified impacts.

6.5.2 Major Findings/ Issues Raised by Stakeholders

6.5.2.1 New Findings in the Project Development

- The net irrigation lands were condensed from 175,000 ha to 100,000 ha;
- The factories reduced from 5 to 4.
- Two of the factories are at the status of production (factory 3&2) ,one at correction/adjustment (factory 1) and another one(factory 5) will be completed its first phase and start commissioning by the next year.
- No body settled in the project area.
- The project involves in the settlements' plans of the government/SPNNRS (GTP plane of community settlements) by providing health centers, grain millings, schools, roads, both potable and farming waters, train modern farming practices, and others. Each settler is expected to have one ha , 0.75 ha for sugar canes(as out growers) and 0.25 ha for maize/sorghum cultivations.
- The earlier proposed the irrigation water intakes exaggerated; it did not consider the planning phases of the project developments/implementations, actual weather conditions and others.
- The installed factories equipped with ISO standards modern environmental control mechanisms such as electro precipitation of flaying ashes/particulate matters, liquid wastes management, water treatment plant and others.
- Surprisingly all stakeholders are ready to work together with the Corporation in order to mitigate or to reduce the environmental problems.
- It is a good news for stakeholders hearing heritage sites are far away from the project boundary; however, there are still expected some basic works such as creation of awareness to the project area's residents , far away camp establishment ,carefully designed and implemented drainage systems, avoid heavy machinery movements and cultivating plantation at buffer zone.
- The constructions of cannels have being done based on the design of the cannel which considered the environmental protected areas such as wild animals' corridors, heritages and others;
- The sugar plantation farm uses surface water irrigation with the support of flex tube technique. It improves the efficiency/ effective water utilization of the farm, and reduces water evaporations, labour and other operational costs.

- The irrigation drainage system of the farm mainly considers two issues: (1) The irrigation water come through the channel should be fully consumed in the plantation field, avoiding any water log(salinity) ; and (2) The final destiny of the water caused by the raining is going to the Omo River.

6.5.2.2 Major Project Benefits

- Creates job opportunities (contract and permanent workers) for about 5000 citizens,16% local people. The project permanent workers in 2014 were 136 and increased to 1140(16% female) in 2018, and expected to absorb more than 10,000 employees at full capacity working.
- Urbanization (creates thousands jobs in trade, hotel and other activities, in the created more than 5 towns and 27 villages).
- The infrastructure developments(packages) such as schools, health posts, animal health clinics, police stations, irrigation canals, milling houses, roads and water points being developed for the surrounding settlement villages and even for the people far away from the project. The works completed in 7 settlement areas and under process in the remaining 5 settlement villages. They are a significant role in the developments of their products and labour markets with community, wereda , zone and at large regional areas.
- Out growers of sugar canes developed by providing 0.75 ha for each settler and 0.25 ha for maize/sorghum cultivating, using water from the irrigation canal, farm machinery and sometimes labors from the project. There are significant efforts/works of the project observed to change the lives of settlers. There is a sign of transformation from pastoralists to semi farmers. The out growers are 2205 HHS (factory one and surroundings) , 2122 HHS (factory two and surroundings) and to embraced more than 3000 HHs in factory 3 and 5 surrounding settlement villages. Students attending at elementary school in the settlement villages of Omo (factory) 1 and Omo (factory) 2 are 436 and 104 respectively.
- Improve the working cultures of the local people, some of the local people hired in the project.
- More than four times of the earlier, above 2000 kms (including the asphalt road from Kangate to Kuraz Omo 5, 75km), expanded the road networks in the area. These road net works enhance the tourism and researches on World Heritage formations.
- The sugarcane plantations are excellent reclamation crop being resistant to water logging and salinity/alkalinity and creating green areas throughout the year

- Increases /improves their food security levels/basic needs by increasing their incomes through salary/wage or by selling their products to factories/ towns(Hana /Jinka);
- 250 ha irrigation farming lands and social institution setups (packages) developed in Maki area for Mursi indigenous people, which used for around 250 HHs of pastoralists. These and even faraway areas have a promising advantages to get electricity sourced from the project. The promising ethanol factories will have also significant contribution in providing ethanol for the HHs energy purpose, which inurn reduce deforestation caused by the residents. These factories will create jobs for surrounding communities and others.
- Create opportunities in developing positive socio-cultural integrations among different ethnic groups ie local with migrant people, mitigating conflicts among different ethnic groups of the project areas and their surroundings.
- Transfer knowledges to the local/wereda people such as working culture and disciplines, health protection, livelihoods' transformation from pastoralists' to semi settled residents such as by teaching them semi modern farming practices and others.
- The starting of the sugar productions by the project minimize the demand supply gap of sugar needs in the nation , save foreign currencies that used to be for importing sugar and related ones.
- Increase sugar bi-products that support animal fattening and power generation.
- Creates opportunity in export of sugar products.
- New development plan has benefited the bio physical and down streams of the project areas including increased the water balance of the down streamssuch as Turkana Lake. The harmonized international environmental conflicts, decrease the number of the affected people, protect heritages and archaeological sites such as Mursi ,Kibish,Usno and other Formations , reduce biological and ecological impacts of the areas, and decrease project costs are among others.
- Cannel water provides water for the residances' livestock/wild animals ie reduces travel time and energy to search water.
- The water cannels, trees'afforestions, sugar plantation and coffer dam /reservoir cool down the weather conditions.
- The in house experiences including factory 1& 2can be a good model for others in such as community handling, conservations, in implementing Environmental Management Plan (EMP), wildlife protection, protecting buffer zones of the Omo and tributaries rivers and others.

6.5.2.3 Major Concerns

Major stakeholders' and publics' concerns are:

- Wildlife, reptiles, birds and others disturbed, injured and suffered by vehicles' accidents, factories and farming operations and cannels' constructions. They are also hunted for bush or marketing meats in the project and surrounding areas by local tribes, and local and international migrants.
- Permanent job opportunity for local people is 30% of total employees(most of them are low class workers such as jobs like guards, assistants, waste canes' collecting, and others).
- The settlers' life styles still tilted to pastoralist nature: (i) For instance, the plan of the wereda to resettle the indigenous community as out growers in the in four villages of the project surrounding areas (factory1) is 2205 HHs(some of the HHs not there) .(ii) They have considered it as temporary places. When the water services for the livestock interrupted immediately, they left the area for searching grazing and water as they had done before. (iii) As pastoralists , the men works just protecting the family from their enemies and searching water and grazing areas for their livestock so that almost all the remain works are the responsibilities of women as a result men are not committed to work other activities for instance lack of full engagement in outgrowing activities. (iv)Majority of the settlers are not living there together with their family by fearing their enemies. (v) Their capacities are limited to manage themselves as permanent residents. (vi) Their feelings/understandings towards modern education, health and related facilities are poor. (vii) High ambitions of the wereda to settle the pastoralists within short period. (viii) The capacity of the wereda /settlers in engaging on their live hoodsare weak and others.
- Canal constructions may block the movements of livestock/wild animals to Omo River/ pasture lands, tourists ,operators and park employees in the park.
- Soils removed from main right canals' construction dumped in the park territory, formed hills. It is a cause to buried seed banks and humus , and loss wildlife security from hunters.
- Lost of traditional common grazing lands, woodland/forests, shortages of livestock feeds and effect on traditional livestock husbandry.
- There are few or none infrastructure developments seen in the settlements of Maji, Menti Shaha, Decha and Nyngatom weredas. There are infrastructure constraints in the above weredas such as constructions of roads of Coffar Dam to Fide Kebele (42km) ; developing potable and livestock waters and others in the settlements' areas.

- Due to the unbalanced development of roads ,difficult to control the security of the areas so that travel long distances are common , through Arba Minch , to go to Mizan,Bonga and other related areas.
- Vehicles' accidents seen on asphalt road of Kangateen Town, Nyngatom wereda.
- The ESIA document is not given to the Zone Environmental Office which in turn causes to poor or none monitoring done.
- Community ecotourism, downstreamareas, is taking tourists from Lake Turkana upstream on the Omo River by small hand operated as well as motorized boats. By this way a tourist will visit the National Parks as well as the indigenous people of the area. Therefore, excessively fluctuating water levels (as at present) would be a hindrance to the aforementioned operations. Besides, the decreasing of Omo River water level has a negative impact on farms found downstream areas ie less access to take water from the river, high operating cost to pump the water.
- As pastoralists /agro pastoralists , the decreasing of the river water levels create challenging for their livestock's waters and cultivating crops.
- Lack of providing water for livestock and residents.
- The park affected by the project activities.
- Women are significantly suffered with poverty ,heavy tasks as well as economy discrimination such as in the settelement village, females are dominantly collect water , the average total working hours(both in and out of home) for women and men are with their respective order of 15 and 8 hours. Women suffered due to unavailability or not working of grain mills and safewater supply.
- Malaria and other water related diseases incidences increases due to favourable conditions to be created for disease causing vectors;
- Increases communicable diseases such as HIV/AIDS prevalence as more labour forces migrate to the area.
- Grazing land based conflicts with neighboring ethnic groups expected to be increased.
- Burning the matured sugar canes for harvesting in all directions in a time destroy the wild animals found in the plantation.
- Raises environmental degradations, pollution problems, etc.

6.5.2.4 Proposed Major Solutionsfor the Concerns

- The ESIA document should be given to the Zone Environmental Office for monitoring the implementations of ESIA.

- The project should be engaged to work with the stakeholders to bring more sustainable developments and solutions in the project areas.
- Frequently discussions with the stakeholders should be mandatory so as to minimize the information gap and to entertain their views for instance Ethiopian Wildlife Conservation Authority (EWCA) experts do not have information whether the design of the cannel include the environmental protected areas such as wild animals' corridors.
- Encourages the local people to be employed in the project by upgrading their working culture and disciplines, and skills.
- The assistances of the project in capacity buildings shall be continue till getting true changes seen in the settlers.
- Consider the live changing experiences of the pastoralists' communities, better experiences of the sugar corporation including Omo 2 project.
- Quota of employees should be given to the project surrounding people by considering the Sugar Corporation Working Manual.
- When burning the matured sugar canes for harvesting ,the burning process shall start from one side to save wild animals found in the plantation.
- Utilizations of chemicals(after doing further research, in long run), the experiences of Latin American Countries, rather than burning to harvest the sugar canes so as to protect wild animals from migration.
- Construct fences/soil hills in the critical/risk areas of the canal found ,together with Ethiopian Construction Works Corporation(ECWC) , Omo Park and Sugar Corporation , near by the left and right sides of the cannel, to detour the residents or wildlife from entering.
- Balanced infrastructures and economic developments shall be done for all settlements found nearby the project areas.
- Create continuously awareness for local, immigrants(employees) and international residents about illegal hunting activities.
- Provide basic awareness for local, immigrants(employees) and international residents about accidents, heritage and archaeological areas.
- Protect the proposed wildlife breading and corridors areas by discussing with the Park and Sugar Corporation. In case of Sai Plain, found in the project territory and make ready for farm, the wild animals are already disappeared due to the project disturbances and other non-stoppable activities. It needs alternative measures by discussing with the Omo park and Sugar Corporation.
- The in house experiences including factory 1 & 2 can be taken as a model for others in such as community handling, conservations, in implementing

Environmental Management Plan (EMP), wildlife protection, protecting buffer zones of the Omo and tributaries' rivers and others.

- Natural bridgesshould be constructed by discussing with Ethiopian Construction Works Corporation(ECWC), Omo park and Sugar Corporationon canal constructions found in the territory of Omo Park (35 km) for the movements of wild animals , tourists ,operators and park employees in the park.
- The soil hills found in the park territory shall be removed by discussion with Ethiopian Construction Works Corporation(ECWC), Sugar Corporation and Omo park , either it could be used for land fill in the project compound or other areas.
- Afforest tree plantations (water and chemical absorbers due to fertilizers and pesticides) at the border of sugarcane farm, buffer zone, nearby the UNESCO acknowledged archaeological sites such as Mursi ,Kibish,Usno and other formations. Avoid construction of camps/villages and frequently machinery and people movements in the areas of the formations. Currently, due to Gibe III dam, the Omo River flooding is controlled, the final destiny of the drainage systems of the sugar farm is the Omo River, and the irrigated water fully consumed in the plantation field, avoiding any water log, are also the mechanisms to protect the heritages.
- The project should more involve in the protections of wildlife, parks, heritages and archaeological sites by assisting materials, providing training/awareness and others.
- Encourage the residents of the project to use energy saving electrical stoves and related items.

6.5.2.5Conclusions of the Consultations

In general, the public/stakeholders' consultations have confirmed that the positive impacts of the project are outweighs compared to the negative impacts and the project has gotten full consent of the people living/stakeholders' in the project area and at large to the nation.

One of the pastoralists lived in the project area explained the advantages of the project in the following ways: "Once upon of the time, the plantation of sugarcane burnt by unknown causes and the pastoralist said that who burnt my Mother".

Minutes of the consultative meetings (the date, place and list of participants) are in annexeddocument in Amharic version.

7 SYNTHESIS AND ANALYSIS OF THEPROJECT IMPACTS

7.1 Major Positive Impacts

7.1.1 Creation of Job Opportunities

Skilled, semi skilled and unskilled citizens have gained employment opportunities during constructions, implementations and operation phases of the project. Creates job opportunity for more than 3000 citizens during construction (factory 5) and operation phases (for other factories), around 30% to the local people. The project permanent workers in 2014 were 136 and increased to 1,235(16% female) in 2018. Creates jobs for more than 7000 as out growers.

Besides, Chinese Compliant Company (installing factories), Ethiopian Design and Supervision of Construction Works Corporation and Ethiopian Construction Works Corporation (including sub contract enterprises) employ more than 2000 individuals. The ethanol factories also create jobs for surrounding communities and others.

7.1.2 Contribution to Economy Growth

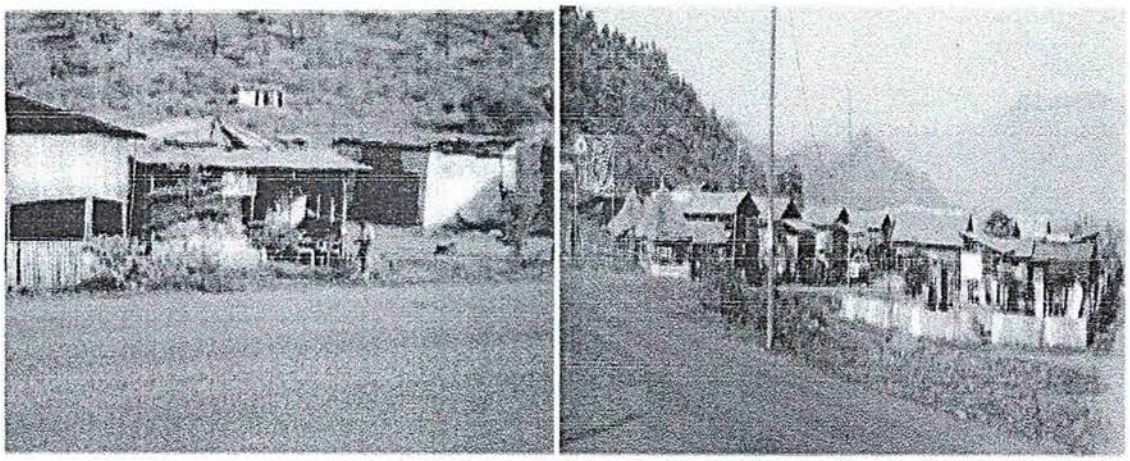
The project has its own roles in boosting the economy of the country through saving /gaining foreign currency i.e. import substitution/export rising ;narrowing the local demand and supply gap of the products; generating steams and electricity (baggasse) ; productions of ethanoll(uses for industrial, medicine, fuel (by mixing with petrol) and drinking purposes) ; livestock feed ; and others.

7.1.3 Changing the Live Hood of the People

As to the household survey, there have been seen live hood changes in the project area due to main contribution of the project compared to earlier time. Increased /improved the indigenous people food security levels/basic needs by increasing their incomes through salary/wage or by selling their products to factories/ towns (Hanna and others). According to the Ethiopian NBE Report (2017/18 GC), the real per capita income of the country in 2016/17 was 18,256 birr or 815 USD. World Bank and other international organizations have recognized the poverty line of $1.25 per capita per day or $ 456 per capita per year. As to the ESIA (Sisay Tesfaye Farm in Nyngatom) in 2013/14, generally, an average per capita income of the residents is around one fifth of a country's average where as in 2017/18 the existing per capita per year of the project area income (435 USD) is almost half of the country (815 USD). It indicates there is an improvement due to mainly the existence of the sugar development project.

7.1.4 Urbanization

Due to the existence of the project, several businesses centers and related things created such as shops, hotels and entertainment spots and others. As seen in the location map, there are four main towns (one for each factory) and other sub towns established.Thousands jobs are created in the trade, hotel and other activities, in the created more than 5 towns and 5 villages.



Picture 23: Business Centers at the Project Compound, Main Town , at Factory One

7.1.5 Improved the Infrastructure Facilities

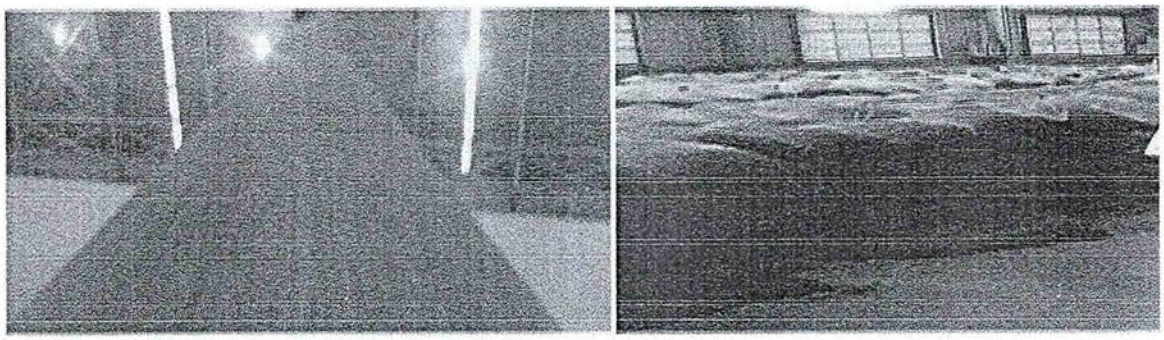
The implementations and operations of the project improve the infrastructures' facilities including developing health facilities, drinking water supply and access roads. This in turn improves accessibility and access to markets.

Currently, there are main roads, bridges and road networks built which are not found earlier for instance the Asphalt road from Factory 5 up to Kangaten, the capital of Nyngatom . They are a significant role in the developments of tourism, products and labor markets with community, wereda, zone and at large regional areas.

The infrastructure developments(packages) such as schools, health posts, animal health clinics, police stations, irrigation canals, milling houses, roads and water points being developed for the surrounding settlement villages and even for the people far away from the project. The works completed in 7 settlement areas and under process in the remaining 5 settlement villages. Besides, 250 ha irrigation farming lands and social institution setups (packages) developed in Maki area for Mursi indigenous people, which used for around 250 HHs of pastoralists. These and even faraway areas have a promising advantages to get electricity sourced from the project.

7.1.6 Increased Sugar and Sugar Related Products

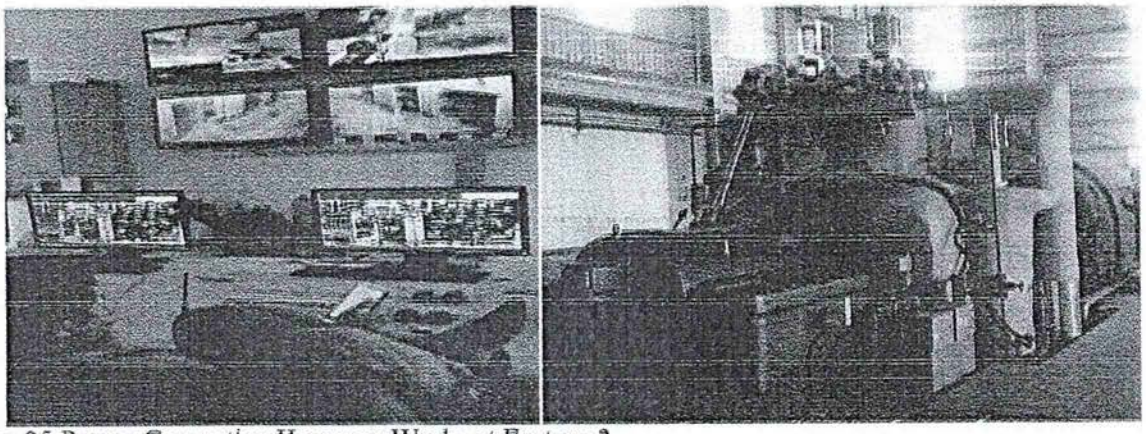
Sugar is a raw material for the manufactures of pharmaceuticals, alcohol and other beverages. It is also a major food item in providing significant calories. Refined sugar is an essential raw material in food processing, beverage manufacture and soft drinks. The byproducts such as molasses are used for ethanol production, a blending of it with benzene (5 % ethanol and 95 % benzene) used for fuel; dietary supplement for livestock; and others. The project, therefore, plays its own roles in increasing sugar and related products in the nation. The promising ethanol factories will have also significant contribution in providing ethanol for the HHs energy purpose in the surrounding areas, which inurn reduce deforestation caused by the residents.



Picture 24: Raw sugars at Omo 3 Sugar Factory's store

7.1.7 Electricity and Fertilizers Generation

Bagasse (by products) is combusted to produce electricity thus providing an alternative energy source from sugarcane milling plant. The project will generate 300megawatts (MWs) electric power, 100 MWs will be used in the project areas and the remaining 200MWs will go to the national power grid. Currently, factory 2 and 3 generate for their own consumption estimated to be 40 MW. Besides, the filtered cake is also rich in organic and inorganic ingredients and is able to be used as fertilizer for sugarcane plantation, the volume of the mud is expected to be 9850 tons per year for each factory. According to the Corporation Agronomy Study (2013), the total estimated fertilizer consumption is 3.5 quintals per ha/year (around current price of birr 2000 per quintal). The total commercial fertilizers for 100,000 ha estimated to be 35,000 tons per year. Therefore, it has its own contribution in the reduction of fertilizer costs.



Picture 25:Power-Generating House on Works at Factory 3

7.1.8 Moderated the Downstream Flooding

Currently, due to Gibe III dam, the Omro River flooding controlled. The project has also its own roles in managing the flow of the Omo River, which, in turns reducing the flooding impacts upon

the downstream areas , Dasenech and Nyangatom Woredas; and it may as well serve as a protect mechanism to the heritages found there such as Kbish and related formations.

In general, by controlling and releasing it at a moderate rate, the incidences due to flooding at downstream areas significantly reduced.

7.1.9 Improved Socio-cultural Relations and Integrations

The project areas consist of both indigenous and migrant people. It is an opportunity in developing cultural relations and strong socio-cultural integrations. This integration may reduce the conflicts arise among indigenous tribes and between migrants visa vis indigenous people. Improved the working cultures of the local people, some of them hired in the project in such jobs like guards, assistants, waste canes' collecting, operators and others.

7.1.10 Increased Settled Lives

The project helps in promoting settlement development of the indigenous community who had been leading pastoral mode of life for years. Out growers of sugarcanes are developed by providing 0.75 ha for each settlers and 0.25 ha for maize/sorghum cultivating, using water from the irrigation canal. There is a little sign of transformation from pastoralists to semi farmers. However, the existing settlements have so many limitations stated in the consultations part.

7.1.11 Encouraged Agricultural Sector Development

The project helps in developing agricultural sector because of the induced development activities. Currently, the project supports the out growers in the cultivations of sugar canes, maize, sorghums, and local community practices perennial crops (mango, papaya, etc) .Besides, the developments of dairy farm, milk and milk product markets, and forage development have being practiced.

7.1.12 Skills and Technologies Transformation

The project enables the community to adopt new technology, irrigation farming practices, and related issues to improve their livelihoods.

The project has been using tractors and other modern farming machineries in which the local people are engaged in labor force and/or permanent workers. Therefore, that it is a good opportunity to transfer farming, operators and factory operating skills and technologies to the local workers and the weredas.

7.1.13Reduces Women Burdens

Women living in the project area significantly suffered with a poverty, heavy tasks as well as economy discrimination. The project has given equal chances for job opportunities. However, cultureinfluences, low education level and others make the women not to use the opportunities. The involvement of the project in the water, education, farming and other activities directly minimize the burden of local women.

7.1.14Industrialization

The project does not aim only at sugar productions but also has a plan in establishing ethanol factory which in turn bring industrialization in the project area, wereda and region.

7.1.15 Cooled Local Climatic Conditions

Sugarcane has double benefits. Expansion of sugarcane plantations in the areas previously occupied by vegetations cools the local climate; by lowering the temperature of the surrounding air as the plants "exhale" cooler water (Nature Climate Change as stated in EIA(2013), 2011). Sugarcane gives off more water much like natural vegetation than crops, pasture, and thus lowers local air temperature. Scientists currently proved that converting from natural vegetation to crops or pasture on average warmed the climate by 1.55 °C but conversion from crops or pastures to sugarcane, on average, cooled the surrounding air by 0.93 °C, decreasing the surrounding temperature by 40 %. In general, other crops and pasture land not recommended to move to natural vegetation areas, which would contribute to deforestation.

7.5 Potential Adverse Impacts

7.2.1 Impacts of Integrated Sugar Manufacturing Process

7.2.1.1 Effluents or Wastewaters

The major possible wastewater sources of the sugar factory manufacturing processes are as follows:

Raw and Concentrated Water: The source of raw water is Omo River. The characteristics of the raw water explained in 6.2.9 Omo River Water Quality, Table 12 and Table 33.

Cane Unloading: There is significant amount water, estimated to be 200 m^3/hr, used for cleaning of the burned blankets of the sugar canes (cane crushing process) and other related purposes for a factory a capacity of 12,000 TCD.The water what the factory use here is recycling. Thewastewater effluents expected to be 200 m^3/hr.

Milling House: Consists of effluents caused by washing of the floor of the mill house including oils, grease, ruminant sugars and others. It increasesthe microbial activities of the wastewater since the sugar and moisture levels are quite high, which may a cause to high BOD. The PH,solid particles and high temperature expected to be challenges. The cane preparation needs a lot of water for washing the blankets of the canes that in turn increase the wastewater.

Boiler and Steam Production: The major effluents released from this process are high dissolved solids and phosphates, flue gas, boiler ash water and others.

Processing House: It consists of the effluents from major sugar processing units such as Juice extraction, raw sugar process, sugar refinery process, purification and others.

Rotary Filter: Filter cloth periodic washings expected to contain high-suspended solids and BOD due to retaining sugar juice.

Condensates: The vapors from the last effect evaporator and pan boiling separately cooled in barometric condensers and the condensate goes to pond. A part of the cooled water from the pond is recycled into sugar mill, but a large portion discharged as wastewater.

Condensate Washings: Caustic soda washings used for cleaning operations of evaporators, juice heaters, pans, etc. The wastewater due to washings discharged into the drains. The holding tank and mix this wastewater gradually to the final effluent to avoid shock loading on the treatment plant.

Spills and Leaks: The sources of wastewaters, occasionally occurred, from the leaks and spills of pumps and pipes in the evaporators and centrifuge centers.

Sulphur and Lime Houses: It consists of washings of Sulphur (sulphates) and lime house (carbonates) with a considerable amount of inorganic solids. The combination of the two effluents would give neutral pH value.

Other Wastes:-

- molasses mixed water contains significant concentration of un-crystallized sugar and other organic compounds increase pollution load considerably due to its high BOD;
- hazardous materials to be used in the factory manufacturing processes are process chemicals; Sulphur (Lime), Caustic Soda and washing soda, Talocide (antibacterial spray applied in vicinity of milling equipment), Phosphoric acid, Sodium Hydrosulphite and fuels - petroleum storage tanks;
- pollution of water bodies by factory effluents;
- sanitary wastewater from industrial facilities which may include effluents from domestic sewage, food service, and facilities serving site employees;
- Sludges from wastewater treatment and others.

Factories' sources of wastewater, volumes, components and characteristics

The total raw effluent (wastewater) volumes of each of three factories (Omo 1,2 and 3) is 576.91 m3/hr as seen in the table 33 where as Omo 5 will be double of it since its capacity is 2x 12 000 TCD.

Table 33: Factories' sources of wastewater, volumes, components and characteristics (for factory -12 000 TCD each)

Wastewater sources	Quantity (m^3/hr)	Expected Raw Effluent Quality Level
Juice extraction process(wastewater from circulating cooling water)	17	CODcr =1000mg/l,BOD5=500mg/l and SS=100mg/l
Sugar refinery process	131.46	CODcr =2989mg/l,BOD5=1565mg/l and SS=527mg/l
Sugar refinery process (wastewater from circulating cooling water)	246.85	CODcr =600mg/l,BOD5=300mg/l and SS=100mg/l
Sugar refinery process (wastewater from circulating cooling water for pumps)	0.95	CODcr =1000mg/l,BOD5=500mg/l and SS=10mg/l
Concentrated water for water treatment station	23	CODcr =1000mg/l,BOD5=50mg/l and SS=10mg/l
Acid and alkali wastewater	4.17	CODcr =1500mg/l,BOD5=800mg/l and SS=10mg/l
Boiler wastewater	51.90	CODcr =200mg/l,BOD5=100mg/l and SS=50mg/l
Boiler ash flush wastewater	25.52	CODcr =500mg/l,BOD5=250mg/l and SS=2000mg/l
Circulating cooling water system of combined power plant	9.00	CODcr =150 mg/l,BOD5=60mg/l and SS=60mg/l
Purification station	52.45	CODcr =600mg/l,BOD5=300mg/l and SS=300mg/l
Total	576.91	CODcr =1265.72mg/l,BOD5=653.51mg/l and SS=234.9mg/l

Source: FDRE Sugar Corporation (2018)

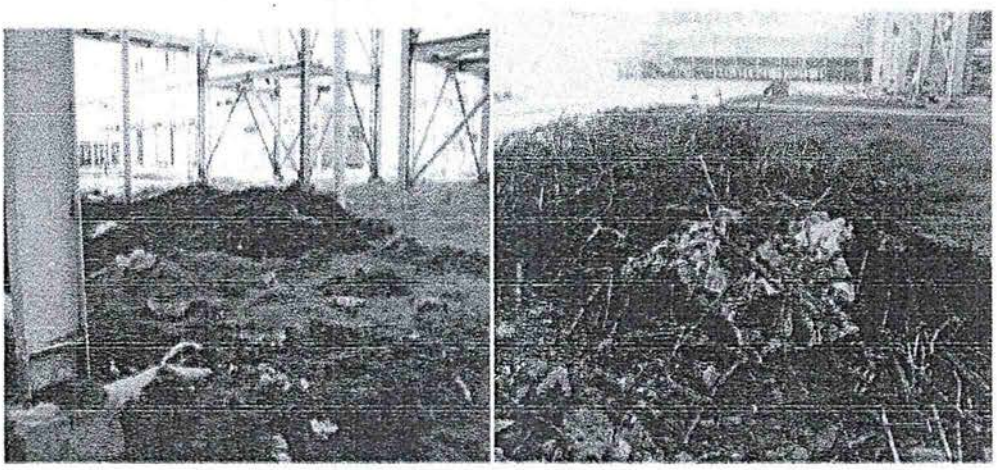
7.2.1.2 Construction Wastes

Improper disposal of excavated soils from the factory construction activities can result in drainage and unproductive land problems. The environmental problems become serious when erosive agents, rainfall and flooding, become active which may interfere with water quality directly through increasing turbidity levels, siltation and indirectly from contaminants carried with or attached to eroded soil particles. Eroded soil particles can create sedimentation problems in different structures unless properly managed during project construction.

7.2.1.3 Solid Waste Generation

Large amounts of solid waste generated during construction and operation of the factory. These include cuttings, rejected and surplus materials such as metal, paper bags, empty cartons and others. There are also fecal wastes during their day-to-day operations. The factory operations are sources of solid wastes such as scrap metal, pieces of packaging bags, press mud and bagasse are the major ones.

These wastes can be injurious to the environment and negative impacts on human health. Environmental damage from poor solid waste disposal typically can include contamination of soil, groundwater, surface water and air quality. The factory project generates some quantities of solid wastes from the factories, office premises and residential areas.



Picture 26: Solid Wastes at Omo 3 Sugar Factory

7.2.1.4 Air Emissions

Air emissions in sugar manufacturing primarily related to particulate matter generated from bagasse-fired steam boilers, dust from unpaved access roads and areas, and sugar drying or packing activities.

Emissions from bagasse burning produces particulates, viz un burnt fibbers, carbon particles and gaseous pollutants like oxides of nitrogen, water vapor and other organic compounds. Of the particulate waste, the heavier particles slowly settle down in the surrounding area. Such dust fall leads to the problems of cleaning, reduction in property value, effect on vegetation, etc. The

main gaseous pollutants are CO not measured by any unit, and CO2 reported to be in the range of 12 – 14 % of crashed canes.

Suspended particles are generally a known to cause asthma to humans. It also increases cough and chest discomfort, irritation to cardio-respiratory system and others. The finer the particle matters, more serious are their damaging effects. Particulate matters (dust) are also harmful to plants since they clog stomata and hence reduce photosynthesis and the subsequent growth.

7.2.1.5 Land, Soils

The burning of matured sugar canes, to make ready to harvest, may be a cause to about 30% of the annual nitrogen removal in a cane crop, by declining soil microbial activity.

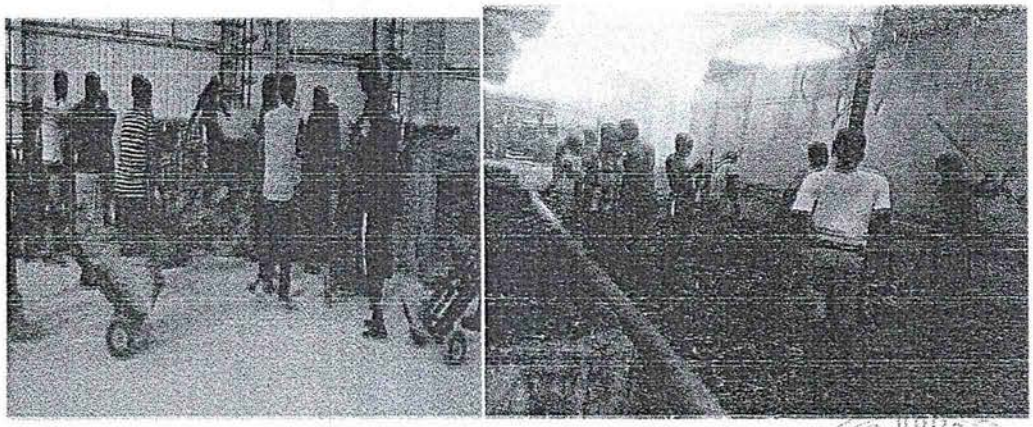
The sugarcane development project affects the environment through loss of natural habitats, intensive use of water, heavy use of agro-chemicals (fertilizers, insecticides and herbicides), discharged and run-off of polluted effluents and air pollution. This may a ground to soil, air and water pollutions in the area and at large may also affect the downstream ecosystems such as aquatic life-forms and humans uses for potable and livestock waters. Currently, the project does not use fertilizers due to the virginity of the lands.

7.2.1.6 Sanitary Wastes

Access to the safe water supply, sanitation and hygiene for the factory employees is mandatory; otherwise, it leads to low productivities. The improper toilet, unsafe drinking water supply, poor housing conditions and poor working environments can be a cause to the poorhealth conditions of the employees or the communities.

7.2.1.7 Environmental Health and Safety

There probability of health hazards during constructions, implementations and production activities of the factories expected. During the factory manufacturing processes, workers can likely to encounter occupational health hazards because of materials handling, noise, fire hazard or other production processes.



Picture 27: Employees Working at Sugar Factory 3

7.2.1.8 Poor Warehouse Keeping

Good ware housekeeping is an important factor in preventing injuries, illnesses, and property damage. It could have positive environmental impacts on the factory resources and employees. Accidents can be caused by poor housekeeping include being hit by falling objects, slipping on greasy, wet or dirty surfaces; striking against poorly stacked items or misplaced material projecting into aisles, cutting, puncturing, or tearing of skin of hands or other parts of the body, wire or steel strapping, chemical hazards, etc.

7.2.1.9 Fire Hazards

Fire hazards may result at potential danger for sugar mill and its amenities. The principal potential hazard is bagasse and fires from boiler. It produces tremendous quantities of heat, smoke and polluting and even toxic gases. The energy generated further favors spreading of the fire. Heat and flames in sugar mills reach temperatures of 600^0C to 1200^0C and burns immediately. It can result in hazard on human eye. The possible impacts can be destruction of buildings and their contents, financial losses associated with the damages and destruction of the entire sugar mill.Besides, there are possibility fire occurs, at farm site, during the burningprocess of the matured canes for harvesting purpose and others.

7.2.1.10Hazardous Materials

Hazardous materials are substances, if released that may pose risks to the environment or to the health and safety of people or wildlife. Hazardous materials used in the factory manufacturing or on farms include process chemicals and other hazardous materials include various types of lubricating oils, empty waste oil drums etc. The hazardous materials pollute surface water, groundwater, and/or soil depending on the location of the spills.

7.2.1.11 Sound/Noise Pollution

Sound pollutions expected in both construction and operation phases of the project such as in construction machinery movements and operations, factory operations, etc.

7.2.2 Impacts on the Physical Environment

7.2.2.1 Soil Erosion and Sedimentation

The current project areas covered with vegetation, sugar plantation, and others. The dominant topography of the area is flat, 84.4% of the project falls below 3% slope. As seen from the data, the wind erosion expected to be high in the low Omo. Currently, the project is partially under constrictions so that dusts/soil erosions expected which in turn increase the river turbidity levels, siltation and indirectly from contaminants carried with or attached to eroded soil particles. The excavated soils can also sterilize the productivity of the land unless dumped in appropriate place

7.2.2.2 Soil Salinity/ sodicity

Soil salinity and sodicity cases affect the crop growth in varying degree by depriving oxygen, interference with absorption of water and nutrients and creating toxic substances. The more commonly expected potential effects are lack of oxygen and impair ability to absorb nutrients and water by plants, sugarcane plantations.

Alkalinity is eminently more serious than salinity. Regarding the intended sugarcane plantation development activity, sugarcane plantations are excellent reclamation crop being healthy, having a vigorous root system being resistant to water logging and salinity/alkalinity and above all being perennial crop, heavily irrigated throughout the year.

In general the major limitations given due emphasis includes nutrient availability (nutrient deficiency), sodicity, soil alkalinity, drainage deficiency, flood risks and erosion hazard etc.

7.2.2.3 Water Balance and Downstream Release including Lake Turkana

The major impacts (see for detail the Hydrology(water balance)study)are:

- The mean annual flow at the diversion site is 18.28 BCM and the total annual Kuraz Sugar Development irrigation water demand (at full capacity) is 2.159 BCM or 21,590 Cubic Meter (CM) per ha. The total demand (irrigation, factories, domestic and social) constitutes 11.8% of the total flow. The Balance flow into Turkana from Omo River is 16.12 BCM per year.
- The mean monthly flow below the diversion weir, after the total demand withdrawal, is a minimum of 253m^3/s in Feb and 1191 m^3/s in Jul. This flow is much more above than the minimum ecological release of 25 m^3/s (i.e. minimum natural flows of Omo River) and proposed ecological flood release of 1,000m^3/sec sustained for 10 days proposed by Gibe III Project.
- The Inflow to Turkana Without Irrigation is 20.44 BCM and with Irrigation total demand abstraction the inflow reduced to 18.23 BCM. The Mean annual reduction is 10.8 % of the mean annual flow. The maximum and minmum monthy reducton is 27.8% in the month of February and the minimum is 4.3% in the month of August.
- The mean monthly change / impact on the level of Turkana(average depth is 30m), due to Irrigation abstraction, is -0.01 m (1 cm) with a maximum and minimum of -0.02m (2 cm) in the month of March and no change in August respectively. So the average impact (reduction) of the project up on the level of Turkana Lake is insignificant, 0.03%. The change in level fluctuation is more pronounced in the dry periods of 1980s. In the years of relatively high flows, 1990-2011, the change/ impact on the lake level are insignificant as the monthly levels, in the natural condition, are fluctuating much due to high inflow and evaporation. On the other hand, the limnological study (1985-1988) indicated that the Turkana lake surface area and volume at an elevation of 360.4 masl are respectively 6750 km^2 and 203.6 BCM. So the impact (water reduction) of Kuraz Sugar Development project up on the lake of Turkana is maximum

- The amount of evaporation from Lake Turkana under Sc-1 (Without Kuraz Irrigation) is lower as compared to Sc-2 (With Kuraz irrigation). This due to the slight reduction in the lake level and hence a reduction in the lake surface area. The mean annual decrease in evaporation is 761 MCM per year.

However, this reduction may have an adverse impact on the downstream water requirements that comprise human, domestic animals, wildlife and environmental flow requirements. During the consultations time, complains observed on the reduction of water level at downstream areas that increase their operation costs and others.

7.2.2.4 Water Quality

Irrigation projects usually bring significant changes on water quality during construction of conveyance canal, irrigation infrastructures and access roads. They likely produce sediment loads.

Changes in surface hydrology and water quality can have adverse impacts on aquatic lives such as fish, plants, and microbes. Increased turbidity, temperature, velocity of flow, and pollutant loads can have direct impacts on species and their habitat. Sediment load generated during construction phase may shield light penetration into water bodies and thus disturb the prevailing aquatic ecosystem. This in turn affects temperature regime, the scale and rate of reproduction, dissolved oxygen and carbon dioxide equilibrium, etc. They all may have significant implication to water quality of the water body in question.

Water quality also affected by agro-chemicals residuals used in the irrigation activities. Sugarcane needs large quantity of N, P, K, Ca and Mg added in the form of manure and fertilizer. Depending on soil type and yield, sugarcane needs about 78 to 80 kg N/hectare, after 2 months of sowing, 130 kg N/ha during second ratoons, 169 kg N/ha during the third ratoons in most cases. Fertilizers used to promote high growth rate and compensate loss of nutrients through leaching. Therefore, fertilizer application is one environmental issue of sugarcane plantations.

Pesticides used to control greater number of crop pests and diseases in irrigation schemes. Persistent chemicals are threats to aquatic systems even when not soluble, as they bond chemically to soil particles and transported by erosion. Persistent organochlorine insecticides (e.g. dieldrin and endosulfan) are particularly hazardous to aquatic systems and become rapidly concentrated in food chain. Pesticide risks are likely to increase if a monoculture practiced, so that weeds and pests not controlled by rotation, or if the method of agricultural management requires high applications, such as low tillage methods.

Contamination of surface water by pesticides will have direct negative effects on variety of aquatic organisms such as fish, amphibians and birds depending on product in use, related factors, and indirect effects if the material enters the food chain and bio-magnifies. Some

herbicides, such as atrazine, have a very high potential for contaminating groundwater and are highly persistent.

The other environmental aspect of sugarcane plantation is weed cases. Weeding can be carried out by manually and herbicides. Depending on weed intensity, pre-emergence or post-emergence weed control practiced by using chemicals like 4-D and Atrazine. The chemical, atrazine, registered for use in Ethiopia in combination with other herbicides for weeds control in sugarcane and maize. Insect pests and disease management are another aspect of sugarcane. The most common pests are borers and sugarcane black beetles that controlled by using BHC and Heptachlor at rate of 2 kg/ha.

Chemical fertilizers, herbicides and pesticides used in sugar plantations expected to increase the pollutions of surface and ground water thus leading to deterioration of downstream water quality. Currently, the project does not use artificial fertilizers due to virgin lands.

7.2.2.5 Water Logging

Waterlogging is among the most adverse impacts associated with irrigation schemes. It is a condition in the soil where free drainage is restricted so that excess water in the root zone exists. Low irrigation efficiencies in some areas are one of the main causes of rise of water table. Poor water distribution system, poor main management and archaic in-field irrigation practices are the main reasons. Drainage is critical element of irrigation projects that if poorly planned and managed can have serious consequences. Water logging results mainly from inadequate drainage systems and over-irrigation, improper land development and to a lesser extent from seepage from canals and ditches.

It exacerbates salinization by concentrating salts, drawn up from lower in the soil profile, in plants rooting zone because of irrigation. Experiences from other irrigation schemes indicate that water-logging increases soil electrical conductivity, pH value and exchangeable Sodium percentage that indicate that the soils are predominantly saline. The soil textures of the project command area is clay, clay loam, loam, sandy clay loam, sandy clay and silt loam for the soil profiles in the command area.

7.2.2.6 Aquatic Weeds and Others

Increased nutrient levels in irrigation and drainage water due to the increased use of chemical fertilizers rich in nitrogen and phosphorous may result in flourishing of algal bloom, proliferation of aquatic weeds and eutrophication.

The main problems of aquatic weeds are that they reduce the storage and conveyance capacity of canals and drains and increase water loss through evapo-transpiration. Other problems of aquatic weeds are that they can provide a favorable conditions and protected habitat for disease vectors such as snails and mosquitoes. The other impact that can arise due to proliferation of aquatic weeds will be blocking of drainage paths and consequently slows down surface drainage and accelerate sub-surface drainage that enhances waterlogging. This condition continues in chocking of primary, secondary and other canal structures if monitoring and follow up activities fail to be practiced strictly.

7.2.2.7 Natural Resource

The development of irrigation schemes often associated with an increase in intensity of human activity in areas surrounding the scheme. The additional pressure on the land would certainly increase the rate of pressure on existing natural resources. Hence, environmental degradation from increased pressure on land might be a potential problem at the end.

7.2.2.7 Construction Materials

The project construction will require bulk construction materials, specifically earth for embankments, stone for stone pitching, stonework and riprap (channel bed and bank protection) and others. As a result, the availability and sustainability of such resources at the extraction sites negatively affected.

7.2.2.8 Air Pollution

Local air pollution may occur during construction phase arising from construction dusts. The potential sources of air pollution will be suspended particles (dust) generated from earth moving and blasting activities, vehicular movements, fuel combustion in various construction equipment, fugitive emissions from crushing plant and others.

Suspended particles are generally a known cause of asthma to humans. It also increases cough and chest discomfort, irritation to cardio-respiratory system and others. The finer the particle matters, more serious are their damaging effects. Particulate matters (dust) are also harmful to plants since they clog stomata and hence reduce photosynthesis and subsequent growth.

There is possibility of particulate matter suspended and settle-able particles affecting the site workers and settlements.

7.2.3 Impacts on Biological Environment/Parks

7.2.3.1 Vegetations Loss

There are significant impacts on vegetation and biodiversities loss due to the constructions' and operations' phases of the project. According to the existing conditions of the project, based on total the revised gross land (142.7 thousands ha), the share of the cultivated land/irrigation infrastructure is 27.8%. The project affects the vegetations found in the Omo National Park due to the construction of the right main channel, by damping soils/ materials in the compound of the park, creating soil hills, conveyance and irrigation canals, drains, access and service roads, quarrying for construction materials, and establishment of construction camps and other facilities.

On the other hand, some studies confirm that planting sugar canes in the place of vegetations (forest and shrubs in the context of the project area) do not lead to hazardous climate conditions rather it has two major advantages. The first one is, from economic aspect, developing the sugar project; and the second one, is cooling the surrounding air, on average, by 0.93 °C decreasing of the surrounding temperature by 40 %.

Different Woody Biomass studies commonly defined the woodlands as "a continuous stand of trees with a crown density of between 20 - 80%. Mature trees are usually single storied, although there may be layered under-stories of immature trees, and of bushes, shrubs and

grasses/forbs. Maximum height of the canopy is generally not more than 20 meters, although emergent may exceed this. Scarce wood land has below 150 stems per hectare, open woodland has between 150 and 400 stems per hectare, whilst dense woodland has more than 400 stems per hectare."

Shrubs are a multi-stemmed woody plant in which most of the stems appear at or very close to the ground (i.e. less than 30 cms), generally less than 5 meters high. Trees by definition have branches that extend from a main stem more than 30 cms from the ground.

The land use and land cover (observation and satellite map) data of the project area shows that the area covered by cultivated/irrigation structures, forestland, shrub-land and others. There exist also significant parts of the riverine forest along Omo River having multitude environmental functions. Clearing of the vegetations, land has an adverse environmental impact to the project area in particular and the nation at large if a compensation reforestation program has not done.

The impacts on vegetations by the project do not only the direct ones; but also the indirect impacts related to increased human population attracted by the project. However, most of residents in the project compound have used electricity for their energy consumptions and living in the houses built by the project (made in cheep woods and hallow blocks).

7.2.3.2 Wildlife Resources/Parks

The Ethiopian Wildlife Conservation Report (2018) indicated that the project surrounding areas are the habitat, breeding and feeding areas, and migration routes for wild animals including elephants and others.

The Kuraz Sugar Development Project affects the wildlife resources directly and indirectly. The direct effects revealed through changing, fragmentations of wildlife habitats, direct loss or displacement of species. The indirect ones consist of the ecosystem in providing biological resources such as the project communities hunting or purchasing the wild animals. Rare or endangered animal species may also extinct due to the impacts.

Wildlife, reptiles, birds and others disturbed, disappeared, injured and suffered by vehicles' accidents, factories and farming operations and cannels' constructions. They also hunted for bush or marketing meats in the project and surrounding areas by local tribes, and migrants.

7.2.3.3 Impacts on Aquatic Ecology

Omo River consists of various aquatic fauna and flora including amphibians, reptiles, fishes and other larger aquatic animals. The river can play essential roles in functioning of the aquatic ecosystem, the existences of varieties of invertebrates, so that the reduction of the water levels to down streams may reduce habitat and induce stress on aquatic command fauna.

The final water flows from the project command area/factories can bring high pollutions, sediment loads and residual agricultural chemicals to the river system that can adversely affect the aquatic ecology.

Inappropriate utilization of fertilizers and pesticide can expose for the growth of algal blooms and aquatic weeds, which in turn have adverse impacts on the livelihood of human beings, and

other aquatic life through high biological concentrations along the food chains. In general, these impacts have direct influence on the fish quality, quantity and the community who use them.
Currently the project uses natural virgin lands without artificial fertilizers and continues at least for the next seven years.

7.2.4 Impacts on the Socio-economic, and Heritages Environment

7.2.4.1 Displacement/Settlements

The existing socio-economic assessment showed that nobody affected by the project or displaced. The settlers' or the communities' of surrounding the project area livelihoods depend on mainly livestock husbandry, apiculture and rarely on crop production. There are infrastructure developments, increasing community awareness about the project, employed in the project, involved in the project as out growers and others . On the other hand, the right bank sides settlers complain on the unbalanced changes compared to the left sides settlers.

7.2.4.2 Human Health

The project may create favorable habitats for disease causing vectors. It creates more access to disease causing vectors breading sites. The climate of the area, sanitation and status of water supply, vector species, population mobility, social norms, values, customs and status of awareness all expected to aggravate the health problem of the project area communities. Waterborne and/or water related diseases such as Malaria and Schistosomiasis (Bilharzias) and also HIV/AIDS can likely aggravated due to the introduction of the sugar development project.

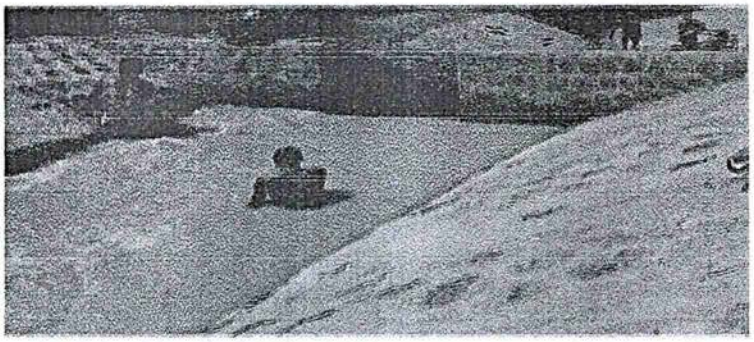
Malaria

Malaria is one of vector-borne diseases. The socio economy base line assessment indicates that it is at first position from all diseases found in the project area. Unless remedial actions taken, the project conditions (using water bodies and others) byitself can be a good favorablevector-breeding site for mosquitoes.

Schistosomiasis

Migrants of people to sustain endemic areas to the project area in search of job opportunities may promote introduction of the disease.

Increase in contact between humans and stagnant water will probably lead to a more intense transmission of S. mansoni. These contacts will be most frequent at the level of during distribution of water onto plots and washing their body and cloths. The new and permanent water bodies (canals and drains) may be favorable snail habitat and create a snail outbreak if snails infected with Schistosoma, transmission could increase significantly.



Picture 28: Residents at the Cannel, Washing their Body and Clothes at Factory 2

Communicable diseases

There are significant opportunities of a new influx of population out of the project area for searching of jobs. As a result, in increase the risks of sexually transmitted diseases (STD) including HIV/AIDS, due to the interaction of local women with migrant workforces. Thewomen ,due to the intensity of the poverty, expose themselves for improper sex in searching money.

Infections, Respiratory and Parasitic Diseases

According to the socioeconomic base line analysis, infections, respiratory and parasitic diseases are the common diseases found in the project area, next to malaria. It is mainly caused by poor sanitation, pollutions and unsafe potable water supply.

The housing conditions with its facilities expected to be at good status to prevent such diseases.

Traffic Hazards

Accidents can occur due to vehicle speeds, unsafe loading, poor road surfaces, poor vehicle maintenance, livestock and unwary pedestrians, especially children not used to vehicles, wildlife and others.

7.2.4.3 Pesticide Poisoning

The project will intensify in using pesticides (insecticides, herbicides and fungicides). Many of these chemicals are toxic to humans as well as to the target and non-target species. Exposure can be through a number of different routes, especially: occupational (during handling, mixing and application) and accidental (from contaminated clothes, re-use of containers etc.).

7.2.4.4 Water Supply, Sanitation and Hygiene

Poor water quality and shortage/non-sustainability of waters for the settlers and their livestock. In the project compound, the piped water qualityneeds improvement so that most of the employees use packed water. The health and sanitation conditions of the project area in general expected to satisfy the minimum requirements. The living conditions of the employees may expose to communicable diseases. The solid wastes found here and there so that the residents easily exposed to health problems. In general, living in such situations may cause to low productivities.

7.2.4.5 Labor and Working Conditions

The project and its construction partners have employed more than 5000 workers as permanent, contract and daily laborers. As to our observations and discussions with management bodies and workers, the benefits are their salaries/wages are very good and timely paid ; food and desert allowances; subsidized for food service; avail transport service in the project compound ; free houses(need improvement); free water(need improvement), electricity and health services; and cafeteria for workers(it has satellite TV and Video). The project has organizational structure (includes job description, position, salary scale, etc) , employment benefits and working policy manuals or a collective agreement which consist of working time schedule , overtime payment , perdium ,different allowances , etc.

7.2.4.6 Disruption of Access

The project involves in constructing canals, drainages and ditches. Canals' constructions may block the movements of livestock/wild animals to Omo River/ pasture lands, tourists, operators and park employees in the park.

7.2.4.7Grazing Land Loss

The project aggravated grazing land shortage hinders livestock movement to pasture and water points and thus create conflicts related to grazing lands with the communities and their surrounding tribes.

7.2.4.8 Energy Supply

The socio economy survey indicates that in the project compound the major energy source is electricity. In the settlement areas, the energy consumption characterized by wood biomass. Beside this, vegetation clearing and expropriation of bush land the intended for irrigation project to cause biomass shortage.

7.2.4.9 Gender Issues

The economy empowerments of women are limited in the project area/wereda. They are significantly suffered, as to the survey, with poverty ,heavy tasks as well as economy discrimination such as in the settlement village, females are dominantly collect water , the average total working hours(both in and out of home) for women is 15 hours. Besides, the women suffered with unavailability or not working of grain mills and safe water supply. The project has given equal chances for both sexes in employing process but the existing share of permanent women employees in the sugar project is 16% of total.

Polygamy, enormous gifts for marriage, marriage age differences and early marriage areamong others harmful culture and social practices widespread in the project area weredas.The women school dropouts in the project wereda aremainly due to early marriage and other social and economic problems.

The respondents of the surveyed indigenous people reveal that the husband is the only decision making in their common properties, but women are participating in community affairs.

The overall social, economic and social situations of women in the project area are at low level and needs the attentions of government, all stakeholders and development actors including the project to avert the situation.

7.2.4.10 Animal Fodders and Water

As to the pastoralists, the project and surrounding people lost their grazing lands and water sources so that they lost their cattle sources of foods.

7.2.4.11 World Heritage, Paleontological and Archaeological Sites

The expected impacts upon the heritage sites occurred by any activity and presented as follows:-

(i) Mechanical actions: Surface fossils and artifacts are extremely sensible to mechanical actions including displacement and abrasion by water and wind, trampling by cattle, humans and vehicles (heavy loaded trucks), deep excavations, road constructions and quarry sites for construction materials and breaking by plant roots. The misbalancing of water flows and wind powers/directions, changing the routes and quantities of the water, and other sensitive facts may lead to rapid alterations of the landscapes/destroy the equilibrium of balancing mechanisms of these sites.

(ii) Lack of Recording Data: The formation areas (Kibish, Mursi, Usno and Shungura) are very vast and the researches done on the areas are limited or not extensive. As a result, removing or replacing the areas by other activities without any record will lose the scientific information it carries.

(iii) Evidences from existing and previous studies: The studies on these sites indicate that the development of agricultural activities resulted in the areas threats on conservation of the paleontological and archaeological resources of the Lower Omo Valley. The topography is particularly chaotic, such as in the northern part of the Shungura Formation, important slopes considerably reduce the surface of land suitable for cultivation. Fossil-bearing outcrops and the recent sediments covering them contain significant amounts of swelling clays, or smectites (Heinzelin, 1983). These cycles result in altering the elevation of ground on centimetric to decimetric scales, in turn causing extensive damage to crops and to infrastructures (Boisserie et al., 2011). Parts of the Usno and Kibish fossil bearing formations are highly rugged and degraded topography that will not be convenient for cultivation.

By considering the above facts and others, the updated Kuraz Sugar Development Project expected to have limited impacts (manageable) on the Paleontological and Archaeological sites as of downstream areas since the heritage sites are significantly far away from even the nearest project border, physically 35km. The expected impacts caused by the project development described as follows:-

- The planed factory 4 and its plantations area (very urgent threat to the WHS/property) ,nearby the formations, were cancelled. Accordingly, the occurrences of landscape fragmentation and visual intrusion toward these formations eliminated.
- The sheet and gully erosion (vegetation loss) and soil irrigation water salinity levels, project site boundary, floodingand heritage impacts identified not at risk level.For detail

see 6.1.3.5 Drainage and Other Structures, Conservation Methods, Wind Break Trees, Natural Vegetations at Buffering Zone and others ,6.2.9 Omo River Water Quality, 7.2.2.2 Soil Salinity/ sodicity. About soil see 6.2.5 Soils and Land Suitability , 6.2.10 Flooding, 7.1.8 Moderated the Downstream Flooding , 7.2.2.1 Soil Erosion and Sedimentation, and Annex II: Description of Soil-landscape Mapping Units (SMU) of the Kuraz Sugar Development Project and their Extent.

- The movements of heavy loaded trucks ,workers and others in or around the sites for searching construction materials and others;
- If any problems occurred in the drainage systems of the designs or during the implementation and the operation phases of the project like water logs(cause to salinity and seep to the ground), flowing water to the heritage sites , detouring the natural water flow systems and others;
- The removing of natural vegetations in the project area may cause to increase wind power/change directions ; and
- Pastes' or herbicides' chemicals or fertilizers may affect the sites, through moving underground.

7.2.4.12 Social/ Cultures/ Conflicts

The project areas are pastoralists' areas. Pastoralists of the area have their own life styles socially and culturally. There are some extents social and cultural conflicts in the project area; however, the indigenous people are working together with the immigrant labor forces from other areas. The local communities of the area not significantly mixed with the peoples from other areas. There was no significant adverse issue raised by the community on the consultation meetings in relation to social and cultures conflicts.

The causes of these conflicts are mainly on livestock raiding, water points and accessing over the grazing lands. Sometimes conflicts within indigenous and migrants could be occurred in such case of vehicles' accidents and others.

7.2.5 Major Potential Cumulative Adverse Impacts

The potential cumulative impacts can be defined as: the effects of a group of activities throughout anarea or region including the Kuraz Sugar Development Project. Thus, the cumulative impacts of an action viewed as the total effects on resource, ecosystem or human community.

7.2.5.1 Human Health

The pollutants, chemicals, fertilizers, sewerage, solid wastes and other ruminants released from the farms and factories can affect the health of downstream residents, who are drinking the water or using for cooking. In our case, the sugar projects and downstream irrigation and rain feed farms, 9 agriculture investors (cotton farms) with around 30,000ha found in the Deanech , Nyangatom and Hamer Weredas, are expected to pollute the water. However, the sugar project has treatment plants that use to treat the effluents and send the final treated pollutants to the

sugar farm. On the farm sides, the projects are expected to use the exact amount what the crops need as to the chemicals' guideline of MoA to minimize the impacts including cumulative ones.

7.2.5.2 Livelihoods of Indigenous People

The reducing of the water levels of Omo River due to dominantly Gibe Hydro Power projects, Sugar Development project, and private irrigation projects affect the livelihoods of the downstream residents. For instance, community ecotourism, downstream areas, is taking tourists from Lake Turkana upstream on the Omo River by small hand operated as well as motorized boats. By this way, a tourist will visit the National Parks as well as the indigenous people of the area. Therefore, excessively fluctuating water levels (as at present) would be a hindrance to the afro mentioned operations.

7.2.5.3 Down stream's Surface WaterIncluding Lake Turkana

Omo River at the diversion site is 18.28 BCM and the total annual water demand by the project is 2.159 BCM. The pick water requirement of cotton farms of the down streams nine private agriculture farms estimated, on average, to be 0.24BM^3. This reduction may have an adverse impact on the downstream water requirements that comprise human, domestic animals, wildlife and environmental flow requirements. The total cumulative impacts will reduce the Omo water flows to Turkana by 13.1% of the total flow. The total balance flow into Turkana from Omo River is 15.9BCM per year. The cumulativeimpact upon the Lake Turkana level is very insignificant, maximum around 1%.

7.2.6 Evaluations of Significances of the Potential Impacts

By considering the above environmental impact elaborations, professional judgments , experiences ,political ,social and economical situations and other related factors , the potential identified impacts of the Kuraz Sugar Development Project on the socio-economic, physical and biological aspects the environmental resources found in the project sites have been evaluated.

The parameters used in evaluating the impacts of the project briefly addressed in the table 34. Projections of the major listed impacts formulated by visualized the impacts with and without the project.

The major potential impacts of the project were:

- Pastoralists, surrounding communities, lost their grazing lands ;
- Wildlife and their natural migratory routes;
- World heritage sites;
- Water utilization from Omo River for the irrigation development, and
- Downstream impacts including Lake Turkana

Table 34: Evaluations of Potential Environmental and Social Impacts

S/N	Main Identified Potential Impacts	Type		Reversibility if adverse		Impact Extent		Nature		Magnitude	Significance
		Beneficial	Adverse	Reversible	Irreversibl	Local	Trans-Region	Temporar	Permanent		
	Impacts of the Kuraz Sugar Development Project										
	I. Potential Positive Impacts										
1	Creation of Job Opportunities	Y				Y	Y	Y	Y	VH	VH
2	Contribution to Economy Growth	Y				Y		Y	Y	VH	VH
3	Changing the Live Hood of the People	Y				Y	Y	Y	Y	VH	VH
4	Urbanization	Y				Y	Y	Y	Y	VH	VH
5	Improved the Infrastructure Facilities	Y				Y	Y	Y	Y	VH	VH
6	Increased in Sugar and Other Sugar Related Products	Y				Y	Y	Y	Y	VH	VH
7	Electricity and fertilizer Generation	Y				Y	Y	Y	Y	VH	VH
8	Moderation of Flooding Downstream	Y				Y	Y	Y	Y	H	H
9	Improved Socio-cultural Relations and Integrations	Y				Y	Y	Y	Y	H	H
10	Increased Settled Lives	Y				Y	Y	Y	Y	M	M
11	Encouraged Agricultural Sector Development	Y				Y	Y	Y	Y	H	H
12	Skills and Technologies Transformation	Y				Y	Y	Y	Y	H	H
13	Reduces Women Burdens	Y				Y		Y	Y	M	M
14	Industrialization	Y				Y	Y	Y	Y	VH	VH
15	Cooled Local Climatic Conditions	Y				Y		Y	Y	M	M
II: Potential Adverse Impacts											
II.1: Impacts on Physical Environment											
1	Soil Erosion and Sedimentation		Y	Y		Y	Y	Y		M	M
2	Soil Salinity/ Sodicity		Y	Y		Y		Y		L	L
3	Water Balance and Downstream Release		Y	Y	Y	Y	Y	Y	Y	L	L
4	Impacts on Water Quality		Y	Y		Y		Y		M	M
5	Water-Logging /Groundwater Rise		Y	Y		Y		Y		L	L
6	Aquatic weeds and Others /Eutrophication		Y	Y		Y		Y		L	L
7	Aggravating Natural Resources Exploitations		Y	Y		Y		Y		L	L
8	Construction Materials Production		Y	Y		Y		Y		M	M
9	Air pollution		Y			Y		Y		M	M
10	**Impacts in Relation to the Factories**										

10.1	Effluents or Wastewaters	Y	Y		Y		Y	Y	H	H
10.2	Construction Wastes	Y		Y	Y		Y		L	L
10.3	Solid Waste Generation	Y	Y		Y		Y	Y	H	H
10.4	Air Emissions	Y	Y		Y		Y	Y	VH	VH
10.5	Land, Soils	Y		Y	Y		Y		L	L
10.6	Factory Sanitary	Y	Y		Y		Y		L	L
10.7	Health and Safety	Y	Y		Y		Y		H	H
10.8	Warehouse Keeping	Y	Y		Y		Y		H	H
10.9	Fire Hazards	Y	Y	Y	Y		Y		H	H
10.10	Hazardous Materials	Y	Y	Y	Y		Y		H	H
10.11	Sound/Noise pollution	Y	Y	Y	Y		Y		L	L
II.2: Impacts on Biological Environment										
1	Vegetation Cover and Biodiversity Loss	Y	Y		Y		Y		M	M
2	Wildlife/Parks	Y	Y		Y	Y		Y	H	H
3	Impacts on Aquatic Ecology	Y	Y		Y	Y	Y	Y	M	M
III.3: Impacts on Socio-economic Environment										
1	Displacement/Settlements	Y	Y		Y		Y		N	N
2	Health									
2.1	Malaria	Y	Y		Y		Y		H	H
2.2	Schistosomiasis	Y	Y		Y	Y	Y		H	H
2.3	Communicable Diseases including HIV/AIDS	Y	Y		Y	Y	Y	Y	H	H
2.4	Infections, Respiratory and Parasitic Diseases	Y	Y		Y	Y	Y	Y	H	H
3	Traffic Hazards	Y	Y	Y	Y		Y	Y	H	H
4	Pesticide Poisoning	Y	Y	Y	Y		Y	Y	H	H
5	Water Supply, Sanitation and Hygiene	Y	Y	Y	Y		Y	Y	H	H
6	Labor and Working Conditions	Y	Y	Y	Y	Y	Y	Y	H	H
7	Access Disruption	Y	Y		Y		Y	Y	H	H
8	Grazing Land Loss	Y		Y	Y		Y		H	H
9	Energy Supply/Fire Woods	Y	Y	Y	Y		Y		M	M
10	Women Burden	Y	Y		Y		Y		H	H
11	Animal Fodders and Water	Y	Y	Y	Y		Y	Y	H	H
12	World Archaeological and Historical Sites	Y	Y		Y	Y	Y	Y	L	L
13	Social/ Cultures/ Conflicts	Y	Y	Y	Y		Y		H	H

Y- Yes, VH-Very High, H- High, M- Medium, L-Low and N-Nile

From the above evaluations, the study understands that all the identified potential impacts have a possible mitigation measures that can mitigate or minimize them at tolerance level. At last, the revision of ESIA of Kuraz Sugar Development Project comes up with a conclusion that there is no environmental justification to say "no-go" option if the proposed mitigation measures properly implemented.

8 MITIGATIONS' AND PROJECT ALTERNATIVES' MEASURES

8.1 Mitigation Measures for the Impacts of the Integrated Sugar Manufacturing Process

8.1.1 Raw or Concentrated Water / Effluents or Wastewaters

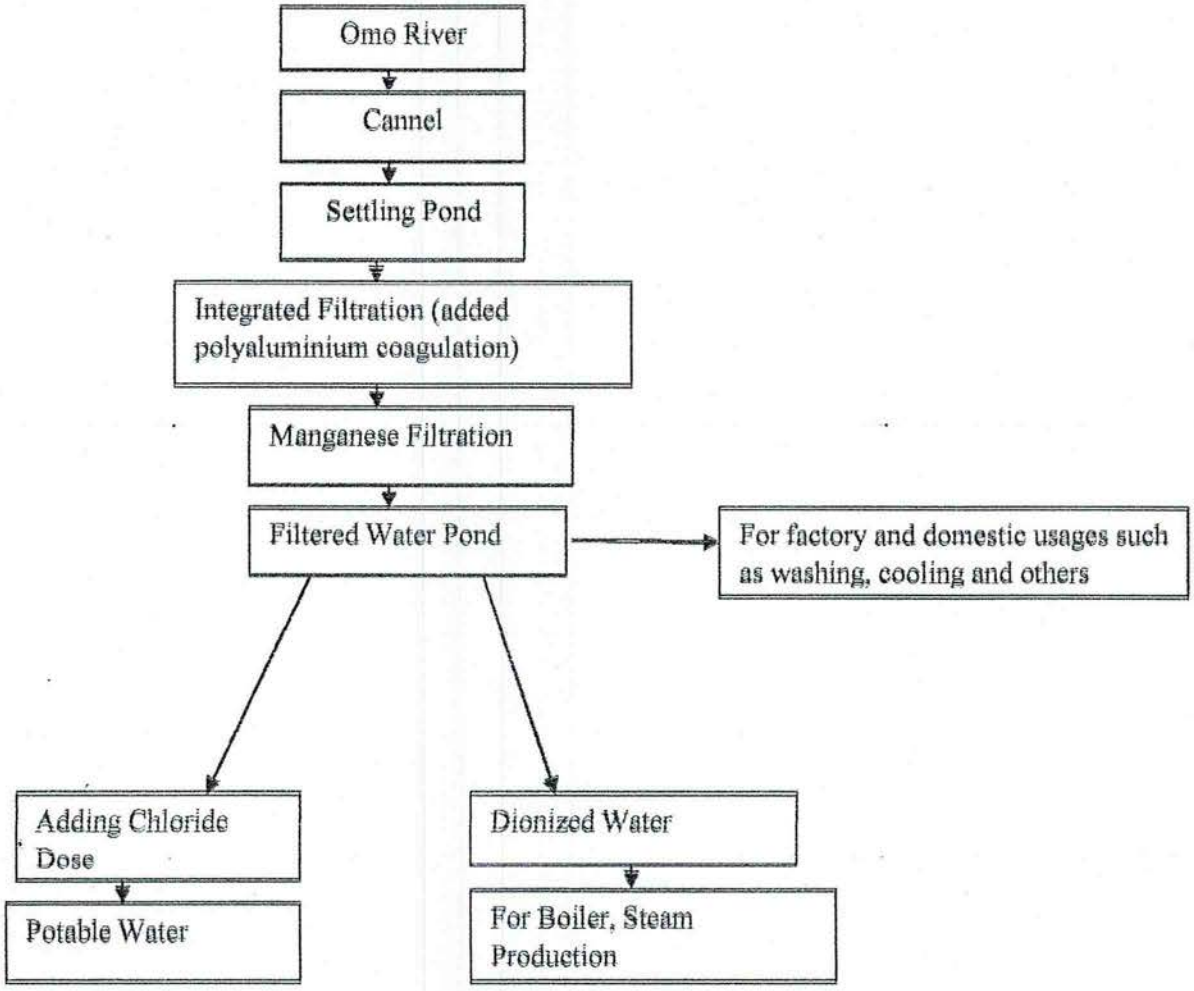
The major mitigation measures to reduce the wastewater or factory effluents are:

- Install water treatmentplant
- Install state of arts technology of wastewater/effluent treatment plant(Improved A/O(A for hydrolysis ,O for oxic)) ;
- Dispose liquid waste sludge at appropriate and recognized waste disposal site;
- **Sewer lines(option 1):** is connection to a main sewer line after prescribed pre-treatment solves the waste water management issue at a very minimal cost and in an environmental efficient manner if and only if the sewer lines exist and
- **Septic tanks (option 2):** involves construction of underground concrete-made tanks to store sludge with soak pits. It is expensive to construct, regular emptying required, and time consuming. However, in the absence of a sewer line in the project site, this remains the most appropriate option for the developer for some residential or workers housing estates.

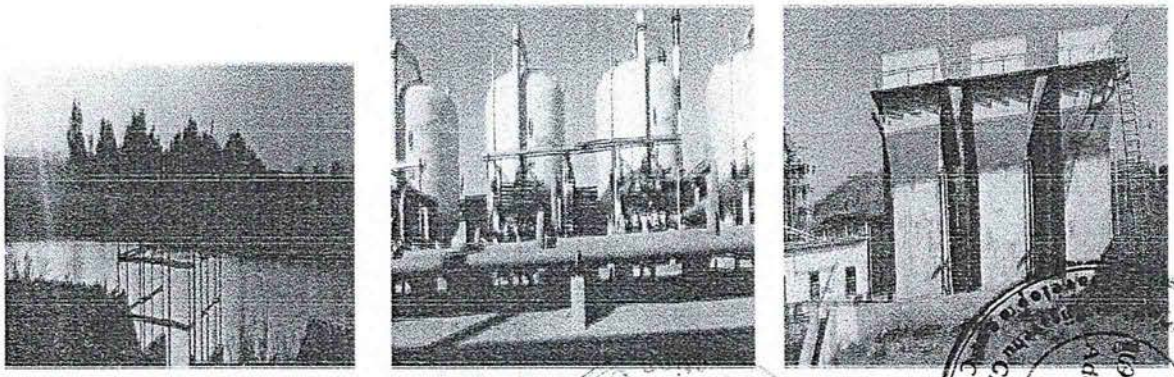
8.1.1.1 Water Treatment Plant

The water treatment plant selected by the corporation to treat the raw or river water for the purposes of factory and domestic usages, potable water andsteam production. The potable water process is at commissioning stage so that till now not utilized for drinking. Theprocess of the water treatment plant described by the following diagram:-

Figure 12: Design (Process) of the General Water Treatment Plant



Source : Own based on Observation and Sugar Corporation Data(2018)



Picture 29: Samples of Water Treatment Plant Components at Omo 3 Factory

8.1.1.2 Raw/Concentrated Water & Expected Treated Water Quality and National/WHO Standards

Table 12 and Table 33 explain the general characteristics of Raw or Omo river water and concentrated ones, respectively. The treated water quality fulfills the standards of WHO for potable water and as ISO 4001 for factory uses and steam production.

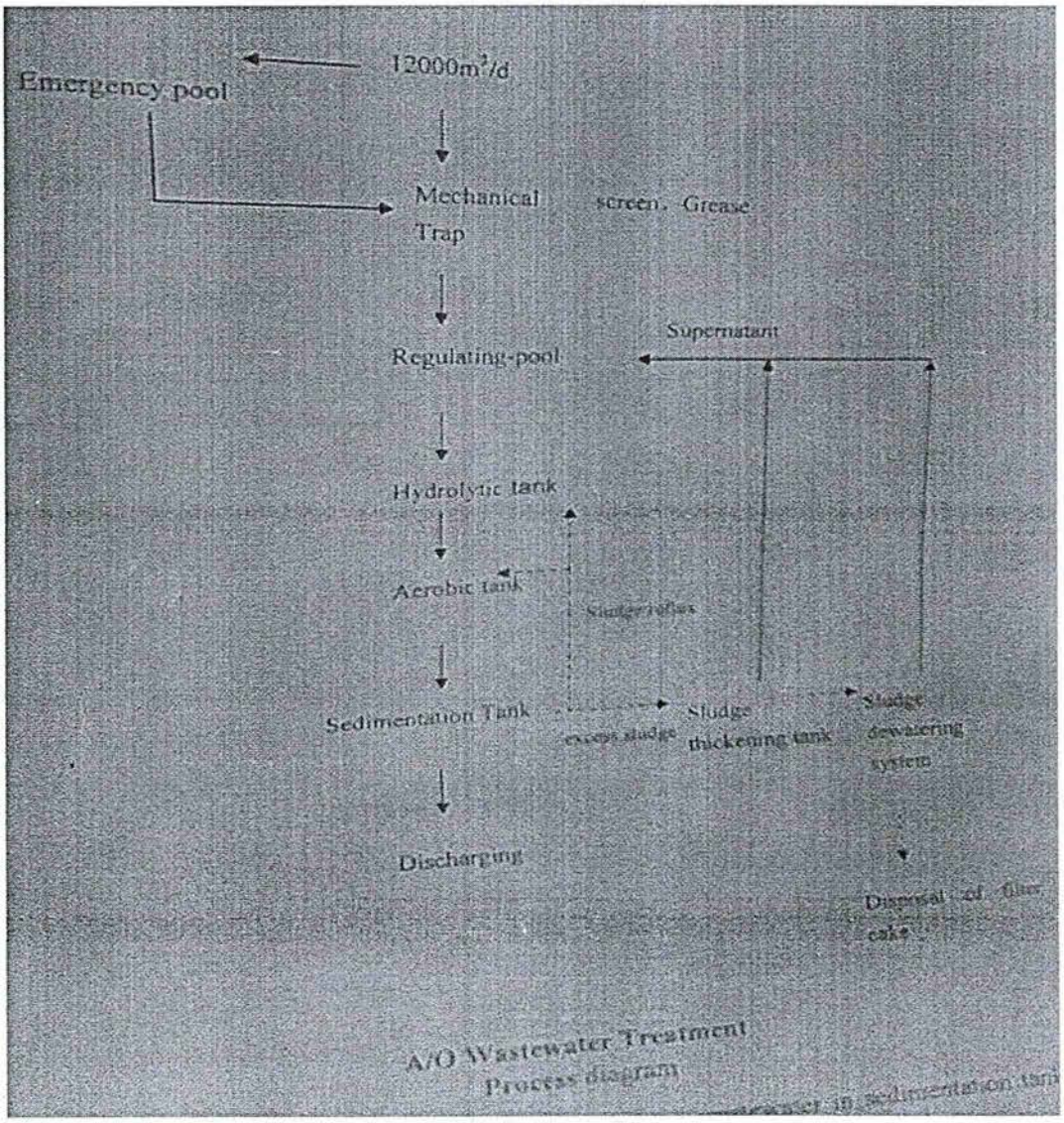
8.1.1.3 Wastewater/ Factory Effluent Treatment Plants

The improved wastewater/effluent treatment plant (improved A/O (A for hydrolysis, O for oxic) is the selected treatment plant technology by the corporation, combined both bio film and activated sludge processes. The process can effectively avoid contaminates in the wastewaters sourced from the factory. The treatment plant also considers the nation environmental quality standards of surface and irrigation waters. The plant finally discharges the treated water into the irrigation cannels. The filtered cake is also rich in organic and inorganic ingredients and is able to be used as fertilizer for sugarcane plantation, the volume of the mud is expected to be 9850 tons per year for each factory (Omo 1, 2 and 3). According to the Corporation Agronomy Study (2013), the total estimated fertilizer consumption is 3.5 quintals per ha/year (around current price of birr 2000 per quintal) . The total commercial fertilizers for 100,000 ha estimated to be 35,000 tons per year. Therefore, it has its own contribution in the reduction of fertilizer costs.

The sizes of the effluent treatment plants constructed or to be constructed varies as to the volumes of the released effluents from the factories. The designed capacity of each factory (Omo 1, 2 and 3) treatmentplant is 700 m3/hr where as for Omo 5 it is 1400 m3/hr.

The following diagramillustrates the process of treatment plant:-

Figure 13: Design (Process) of the Improved (A/O (A forHydrolysis, Ofor Oxic) Wastewater/Effluent Treatment Plant at Omo 3



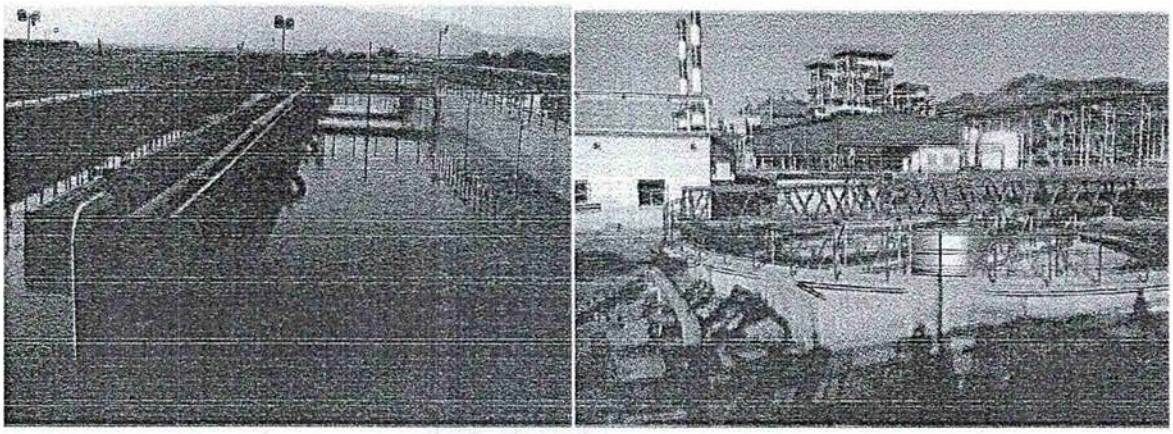
Source : Sugar Corporation Data(2018)

8.1.1.4 Raw & Expected Treated Effluents' Quality and National Standards

Table 35: Raw & Expected Treated Effluents' Quality and National Standards

S.No	Parameters	Unit	Expected Raw Effluent Quality	Expected Treated Effluent Quality by Factory	Recommended Minimum National Quality Standard
			Water Quality Standards		
1	PH		6.0-9.0	6.0-9.0	6.0-9.0
2	BOD	Mg/ltr	400-500	≤50	≤ 60 mg/l
3	COD	Mg/ltr	800-1000	≤250	≤ 250 mg/l
4	TSS	Mg/ltr	200	≤50	≤ 25 Mg/ltr (annual mean) , 50 Mg/ltr (maximum value)
5	TDS	Mg/ltr	1000-2000	450 - 2000	450 - 2000
6	Temperature	^{0}C	35 ^{0}C -45 ^{0}C	+3 ^{0}C above ambient temperature	+3 ^{0}C above ambient temperature
7	Total Phosphorous	Mg/ltr	-	≤2	≤10
8	Oil and Grease	Mg/ltr	-	≤10	≤15
9	Biocides	Mg/ltr	-	≤0.05	≤0.05

Source:Sugar Corporation and EFDRE Environmental and Protection Authority, Industrial Pollution Control Standards and Guidelines



Picture 30: Sample of Improved A/O (A forhydrolysis, O for oxic) Wastewater/Effluent Treatment Plant at Omo 3 Factory

8.1.2 Construction Wastes

- maximize re-use of all excavated materials in the project construction activities and

- collect, transport and dispose surplus excavated soil particles at designated sites.

8.1.3 Solid Waste Generation

An integrated solid waste management system , therefore, recommended by considering by the following priorities.

- Solid waste reduction atsource. This option will demand solid waste management awareness of the management and employees.
- Consider recycling, second priority, reuse and compositing of wastes. Separation at sources of wastes. The recyclables sold to waste buyers or waste recyclers within the surrounding areas.
- The third priority in the hierarchy of solid waste management options considered combustion of wastes that is not recyclable in order to produce energy.
- Finally, sanitary landfilling will be the last option for the proponent to consider. Over left wastes should be disposed at recognized disposal site selected by multi-disciplinary team in which environmental or regulatory body is a part. The responsible environmental unit should supervise /control the waste disposal sites regularly.

8.1.4 Air Emissions

- Install cyclone dust collector and electrostatic precipitator ash hoppers;
- dust collectors or water spray systems must be used to prevent high dust emissions from plant operations;
- machinery and vehicles should be maintained to reduce excessive exhaust emissions;
- workers should be provided with appropriate safety wears such as footwear, dust masks, respirators, gloves, ear protection;
- cultivating potential trees, surrounding the fctory, to absorb CO_2 (sugar plantation also absorbs it),
- Toproduce the refinery sugar, the factories will use stalk gas to generate CO_2 for carbonation (absorb CO_2 from air),etc.

8.1.4.1 Cyclone Dust Collector and Electrostatic Precipitator Ash Hoppers

The project has selected the updated technologies of Cyclone Dust Collector and Electrostatic Precipitator Ash Hoppers to install in the factories to minimize the particulates and emissions.

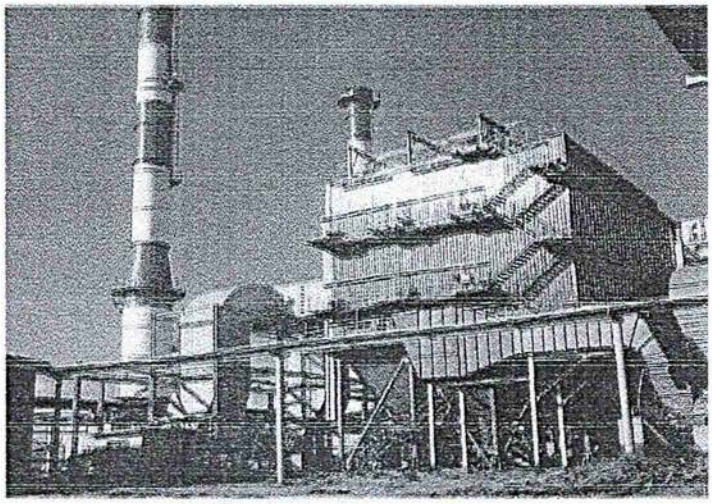
The major dusts come out from the factory's four sources including grate bottom, pre heater bottom ash, cyclone dust collector and electrostatic precipitator ash hoppers. All the accumulated ashes in ash hoppers go to ash pond by water. The removed flue gas content dusts including CO,CO_2 ,SO_2 and others , content does not greater than 55mg/Nm3.

8.1.4.2 Raw & Expected Treated Emissions' Quality and National Standards

Table 36: Major Raw & Expected Treated Emissions'Quality and National/World Bank Standards

S.No	Parameters	Unit	Expected Raw Emission Quantity/Quality	Expected Treated Emissions by the Factory	Recommended National/World BankMin.Emissions Quality Standard
			Air Quality Standards		
1	Total Particulates Emissions	Mg/Nm3	30 = 35 % of cane crashed	55 mg/ Nm^3	100 mg /Nm^3 /(50 mg/Nm^3**)
2.	Carbon oxides (COx)	Mg/Nm3	12-14 % of cane crashed	<55mg/ Nm^3	800mg/ Nm^3**
3.	Sulphur oxides (SOx)	Mg/Nm3	Insignificant*	<55mg/ Nm^3	400mg/ Nm^3**
4.	Nitrogen oxides (NOx)	Mg/Nm3	Insignificant*	<55mg/ Nm^3	600mg/ Nm^3**

*The factory uses the tracing amount
** World Bank Standards



Picture 31: Boilers' Setup with a Chimney of 65m Height and 3.0 m of Outlet Diameter at Omo 3 Factory

The study recommends the treated emissions (including the particulate matters) to full fill the minimum National or World Bank standards

8.1.5 Land, Soils Pollutions

- limit agrochemicals application based on soil fertility and sugarcane plantations nutrient needs and use appropriate dose and selective types;
- undertake frequent soil testing, at least twice annually;
- dispose solid and liquid wastes only at recognized waste disposal sites;

- strengthen best farm practices and management; and
- Conduct periodic water quality monitoring.

8.1.6 Sanitary Wastes

- ensure appropriate drainage networks;
- ensure safe drainage, septic tanks and latrines in order to control over flowing into residences and the factory compound;
- provide basic environmental health education for sugar factory employees ;and
- Maintain clean and healthy working camps as to the international/local workers health and safety standards.

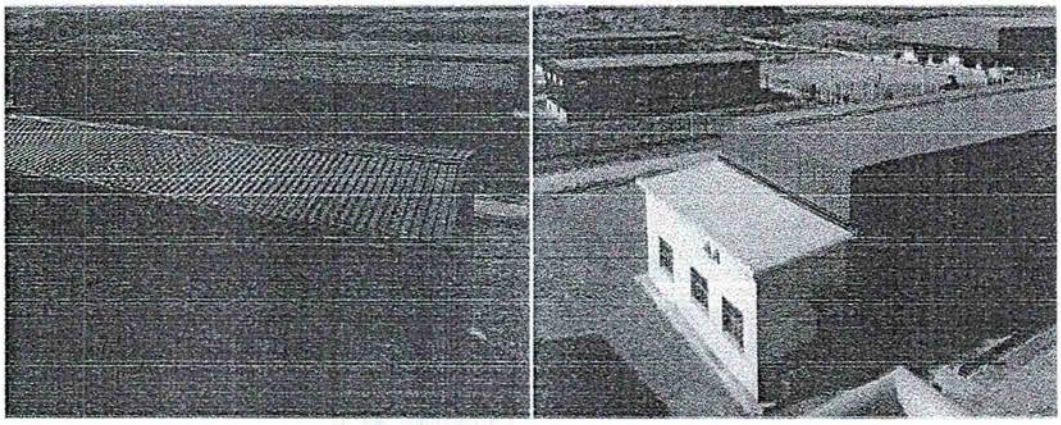
8.1.7 Environmental Health and Safety

- train first aid personnel from workers and management staff and undertake awareness creation on occupational health and safety of factory workers;
- provide adequate facilities for treating emergency cases for any risk occurrences and reporting mechanisms in dangerous cases;
- place fire extinguishers at proper places and recognized sites in the factory production floors, stores and compounds;
- all machines and other moving parts of equipments must be in order to protect workers from injury;
- establish factory environment, health and safety committee, in which the employer and employees are the members;
- ensure employees medical examination before, during and after termination;
- establish emergency plan and evacuation routes in cases of hazards and communicated to employees;
- install ventilation at proper sites; in manufacturing floors, general stores and in other essential rooms;
- provide appropriate safety wears such as footwear, dust masks, respirators, gloves, ear protection of factory workers based on working area conditions and
- incorporate occupational health and safety issues in for specific tasks in contract agreement, etc.

8.1.8 Poor Warehouse Keeping

- factory floors should be concreted in order to prevent surface contamination, keep chemicals and dry especially for pallets chemicals;
- ensure appropriate warehouse rooms layout and housekeeping;
- Segregate and store raw materials and products in separate stores based on their characteristics: powder, solid and liquids. Flammable and combustible chemicals and materials must be properly stored. Litter must be stored in non-combustible containers with lids. Drips and spills must be cleaned up immediately.
- fire extinguishers should be placed at appropriate distance and sites;

- keep factory materials, stairs, aisles and exits clear;
- Scrap materials must be cleaned daily or often enough to prevent them from collecting on floors, tabletops, in aisle ways, or other areas. Building roofs and roof drains must be kept clean and unclogged;
- all production and warehouse rooms should have ventilators, etc. Heating, ventilation and air conditioning systems must be cleaned and maintained regularly;
- chemicals must be stored in an organized way, following guidelines for recommended storage compatibilities to avoid contact between incompatible chemicals. All chemicals must be properly labeled in the language(s) spoken by workers. Chemicals must be stored and used in designated areas which are well ventilated;
- workers who handle chemicals must have immediate access (within 10 seconds) to an eyewash/shower that can be easily operated;
- factories must meet legal requirements to notify government or other local agencies about chemicals used or stored on site and
- material safety data sheets must be kept on site and must be available for review by workers.

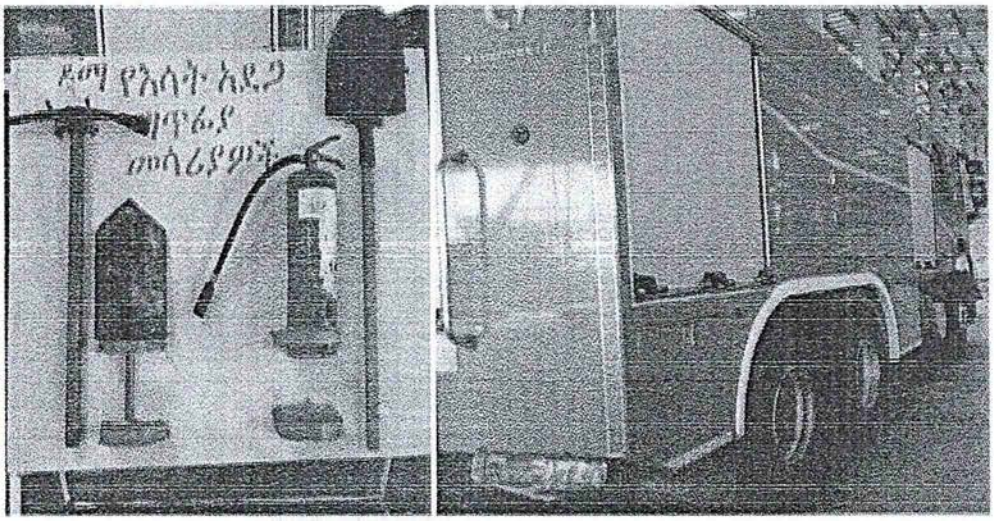


Picture 32: Samples of Standard Warehouses for Spare parts, Chemicals, Oil and Greases, and Others at Omo 3 factory

8.1.9 Fire Hazards

- install smoke detectors at strategic locations in the factory compound and manufacturing floors;
- install fire detectors, sirens and control indicator panels comprising break glass call points within the premises;
- install hose reels systems with permanent connection to pressurized water supply running along the perimeter wall for easy fire fighting;

- provide portable firefighting equipment compliance with the current standards and requirements at conspicuous locations , storage tanks, loading and unloading system, generator room etc;
- include speedy evacuation plans and place possible fire event and evacuation signs (exit) in the factory buildings at strategic locations;
- install sprinklers connections to pressured water supply in bagasse shed to douse any fire outbreaks;
- display procedures to follow in case of fire along corridors, individual offices and in public ways to ensure safe and speedy evacuation of personnel and visitors;
- providewide-open fire escape routes to allow speedy exit in case of fire hazards. The fire escape must be fitted with ladders on outside of the building and mechanically fabricated in steel format comprising of chequered plates and handrails;
- make ready Fire Extinguishers of Tools and Vehicle;
- train staff and workers on fire fighting and fire drill and first aids;
- giving alarm sign before burning the matured canes; and
- no fire or cooking shall be allowed on factory site and near cane farms due to possible fire hazards



Picture 33: Fire Extinguishers of Tools and Vehicle at Omo 2 Factory

8.1.10 Hazardous Materials

- develop a spill prevention plan;
- ensure that chemical containers are labeled and documentation regarding safe handling or first aid measures is accessible in storage and use locations;
- make spill clean-up equipment readily and available in chemical storage areas;

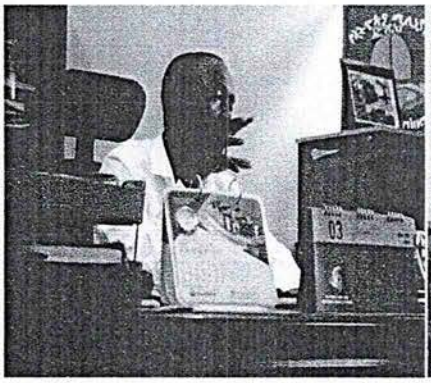
Annex III: List of Major Contacted Officials and Professionals

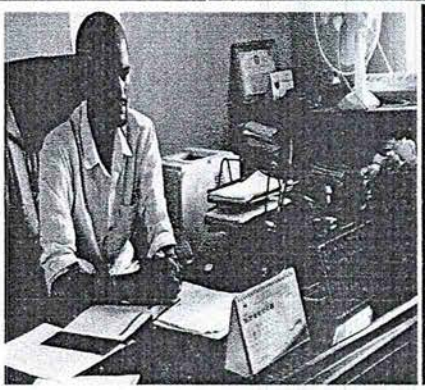
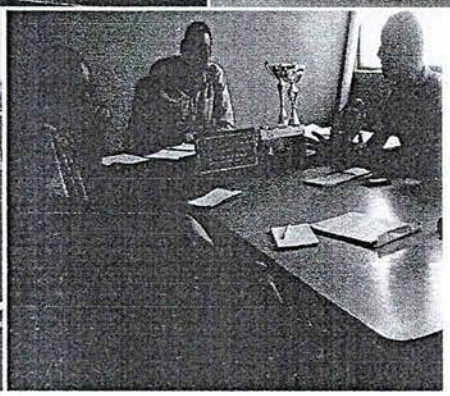
No	Name of informant	Sex	Place	Position	Institution	Phone
I	**Federal Level**					
1.	Ato Tegenu Gena mo	M	Addis Ababa	Public Participation & Development Executive Head	FDRE Sugar Corporation	115571010
2.	Ato Ramato Anito	M	Addis Ababa	Investment Executive Head	FDRE Sugar Corporation	
3.	Ato Habib Delsbo	M	Addis Ababa	Irrigation Executive Head	FDRE Sugar Corporation	
4.	Ato Derese Kassaye	M	Addis Ababa	Public Participation & Development , ESIA Counterpart	FDRE Sugar Corporation	115571010
5.	W/ro Lensa Tefere	F	Addis Ababa	Irrigation Executive, Expert	FDRE Sugar Corporation	911455994
6.	Ato Ephrem Chane	M	Addis Ababa	Factory Construction Administration	FDRE Sugar Corporation	911380083
7.	Ato Teshome Nega	M	Addis Ababa	Agronomist	FDRE Sugar Corporation	913282228
8.	Ato Asegd Gebre	M	Addis Ababa	South Region Parks Coordinator	Ethiopian Wildlife Conservation Authority	932715143
9.	Ato Teshome Jarso	M	Addis Ababa	South Region Parks Officer	Ethiopian Wildlife Conservation Authority	936486780
10.	Ato Tolessa Yadessa	M	Addis Ababa	Environment and Social Impact Assessment Directorate Director	Commission of Forest, Environment and Climate Change	913754227
11.	Ato Maikel	M	Addis Ababa	Environment and Social Impact Assessment Directorate ,Expert	Ministry of Water ,Irrigation and Electricity	911467848
12	W/ro Belaynesh	F	Addis Ababa	Environment and Social Impact Assessment Directorate Director	Ministry of Water ,Irrigation and Electricity	
13.	Wro Tsehay Eshete	F	Addis Ababa	Immovable Heritage Development Directorate Director	Authority for Research and Conservation of Cultural Heritages	111540049
14.	Ato Alemayehu Bekele	M	Addis Ababa	Project Manager of Irrigation Cannel Construction	FDRE Ethiopian Construction Works Corporation	904032493
II	SNNPRS, Regional Level					
15	Ato Adisu Borsamo	M	Awassa	Bureau of Forest, Environment and Climate Change, Representative	BoFECC	942470482

16	Ato Dagnet Lene	M	Awassa	Higher Expert of Heritage	BoCT	916029014
III	**South Omo Zone**					
17	Ato Tesfaye Edjem	M	Jinka	Vise President of South Omo Zone		
18	Ato Gidalk Alkim	M	Jinka	Principal Advisor of the South Omo Zone President	Zone Administrator Office	920044082
19	Ato Belachew Alamrw	M	Jinka	Investment Office Head	Zone Investment Office	
20	Ato Nuressa Mirkana	M	Jinka	Team Leader of Environmental Protection	Zone Forest and Environment Office	
IV	**OMO Park**					
21	Ato Nur Ymer	M	Omo Park	Omo Park Head	Omo Park Office	
22	Ato Bandrachn Mulugeta	M	Omo Park	Researcher	Omo Park Office	
V	**Selemago Wereda**					
23	Ato Cherenet Eshete	M	Hana	Principal Advisor of the Selamago Wereda President	Wereda Administration Office	
24	Nigatu Nerdikios	M	Hana	Expert	Pastoralist Office	
25	Mekuria Gizachew	M	Hana	Pastoralist Office Head	Pastoralist Office	
26	Ashebir Marana	M	Hana	Trade & Industry Head	Trade & Industry	
27	Senidu Pankabu	M	Hana	Good Governor	Wereda Administration Office	
28	Saka Chirkori	M	Hana	Public Relation	Wereda Administration Office	
29	Melkamu Kelob	M	Hana	Expert	"	
30	Miret Aratu	F	Hana	Women Affair Head	"	
31	Yihun Belaf	M	Hana	Expert	"	
32	Kerker Biyokum	M	Hana	Expert	"	
33	Higue Kaqun	M	Hana	Expert	"	
34	Gashaw	M	Hana	Expert	Pastoralist Office	
VI	**Nyngatom Wereda**					
35	Ato Lyon Lowasia	M	Kangatee	Vise President of Nyngtom Wereda	Wereda Administration Office	967690738
36	Ato Mongstu Folla	M	Kangatee	Principal Advisor of the Wereda President	Wereda Administration Office	941036358
37	Ato Lokalobong Losekona	M	Kangatee	Head of Urban Development	Urban Development Office	
38	Lokoroma Maruk	M	Kangatee	Kebele Manager	Kebele Development Office	

39	Lokale Lotuku	M	Kangatee	Head of Industry and Trade	Industry and Trade	
VII	**Bench Maji Zone**					
40	Endiras Koyense	M	Mizan Aman	Principal advisor of the president	Zone President Office	913706954
41	Demisse Skiyab	M	Mizan Aman	Zone Culture and Tourism Head	Zone Culture and Tourism	
42	Wassa Kassa	M	Mizan Aman	Pastoralist Office Head	Zone Pastoralist Office	
43	Wbshet Zenebe	M	Mizan Aman	Zone Forest and Environment Office Head	Zone Forest and Environment Office	910284597
VIII	**Keffa Zone**					
44	Girma Gzaw	M	Bonga	Zone Administration Office Head	Zone Administration Office	928678540
45	Eyasu W/Girogis	M	Bonga	Forest Expert	Zone Forest and Environment Office	
46	Asres Adero	M	Bonga	Zone Culture and Tourism ,Head	Zone Culture and Tourism Office	
47	Tatk Kebede	M	Bonga	Environmental Issues Coordinator	Zone Forest and Environment Office	
48	Qcheto Desalgn	M	Bonga	Zone Forest and Environment Office ,Head	Zone Forest and Environment Office	
49	Teshome Lemma	M	Bonga	Zone Pastoral Office, Head	Zone Pastoral Office	
IX	**Project Site**					
50	Samson Yeshitla	M	Kuraz	Deputy Manager-Factory 1	KrazSugar Development Project	916876482
51	Dagmawi Ayele	M	Kuraz	Deputy Manager-Factory 3	Kraz Sugar Development Project	913034730
52	Alemu Adero	M	Kuraz	Factory Manager-Factory 3	Kraz Sugar Development Project	
53	Husen Esmael	M	Kuraz	Human Resource Manager-Factory 3	Kraz Sugar Development Project	
54	Tibebu Samuel	M	Kuraz	Deputy Manager-Factory 5	KrazSugar Development Project	968773939
55	Feleke Tomla	M	Kuraz	Operation Manager-Factory 2	KrazSugar Development Project	

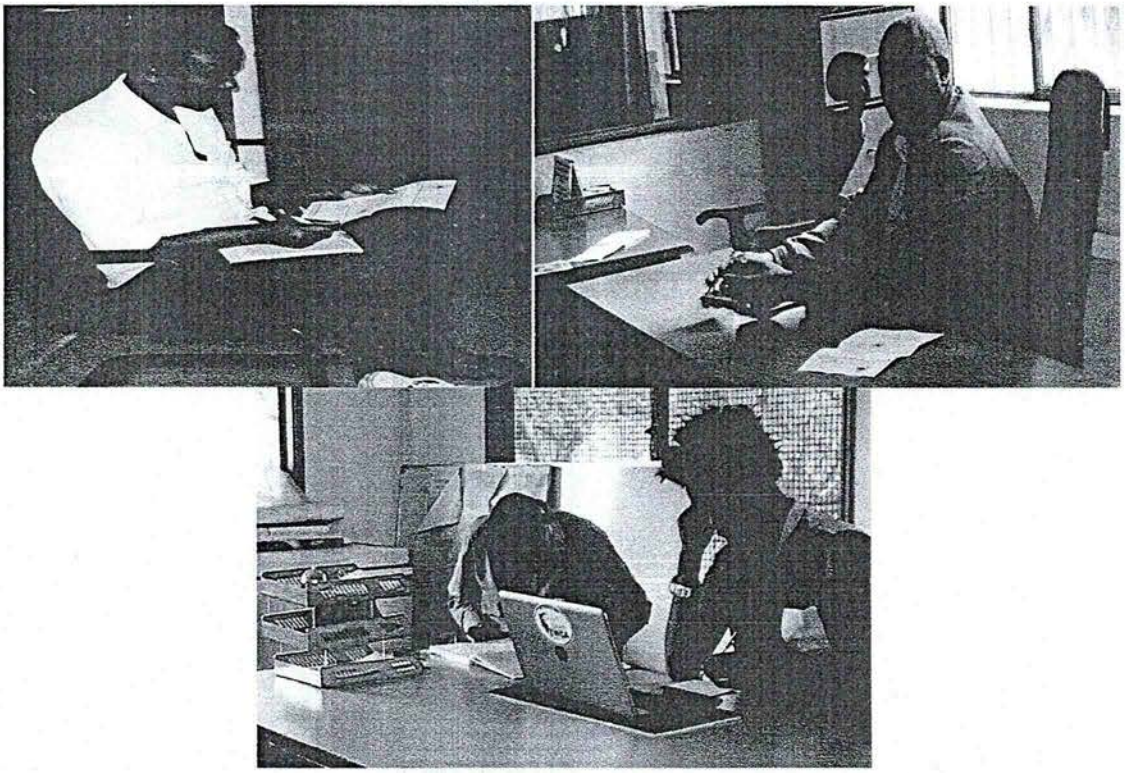
Annex IV: Discussions with Officials of South Omo Zone , Bench Maji Zone and Kefa Zone, Selamago Wereda and Nygatom Wereda from Left to Right



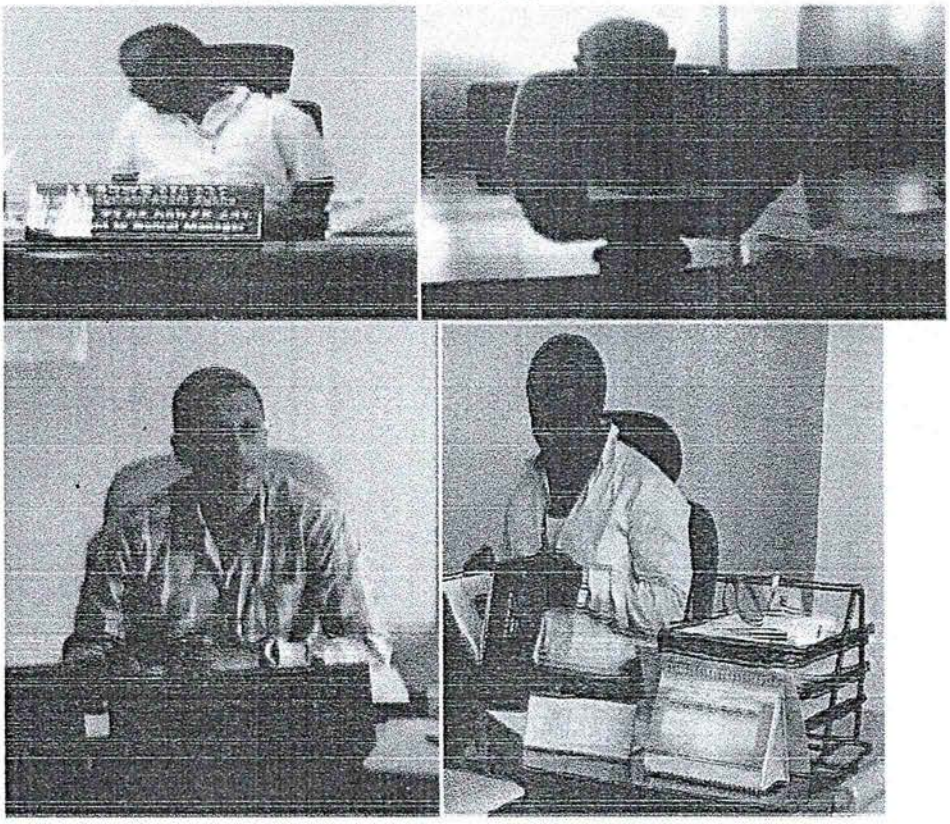
Abet Development Consultancy P.L.C. Addis Ababa Ethiopia 0911 220775
Ethiyechin Group Trading & Development Consultancy P.L.C. Addis Ababa 0911-659357
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Environment, Forest & Climate Change Record & Archive Commission

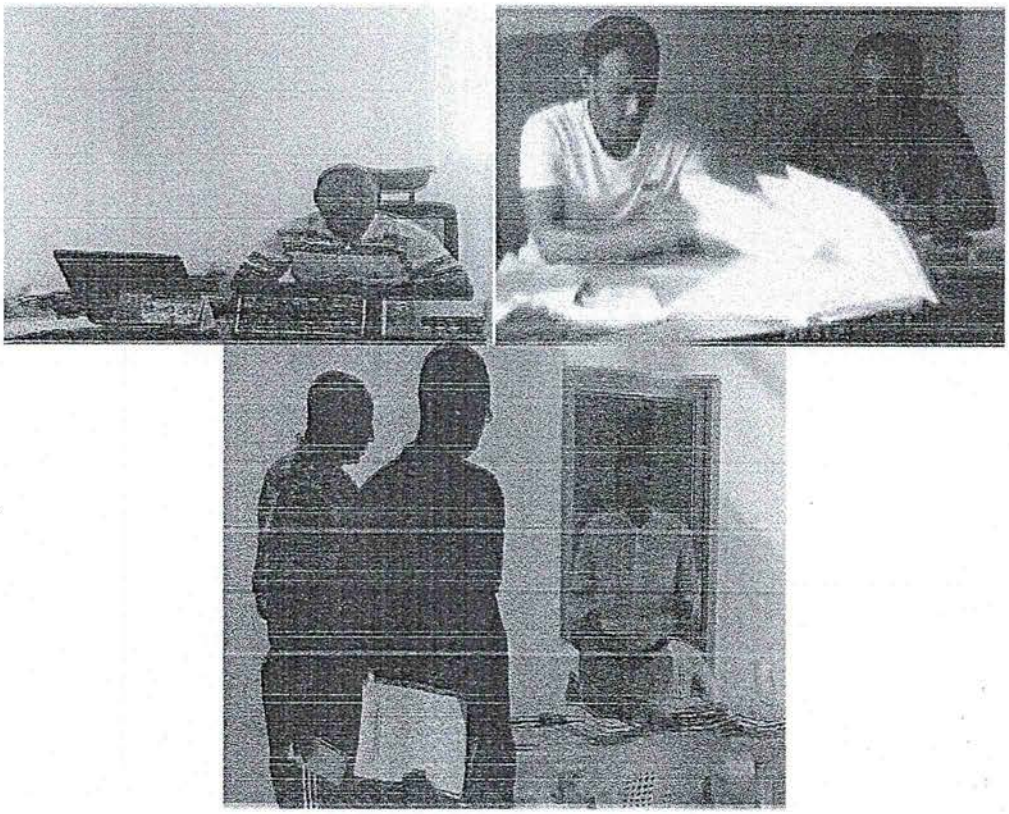
Annex V: Discussions with South Region's Forest and Environment ,Culture and Tourism and Omo Park Representatives from Left to Right



Environment,Forest & Climate Change Record & Archive Commission

Annex VI: Discussions with Major Kuraz Sugar Development Project Managerial Bodies, Administrative and Health Officers





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- ensure that chemical containers are stored in a safe manner to reduce risks of falling over and spilling;
- store fuels and other hazardous materials at or in designated locations only;
- monitor release of any deleterious substances during construction and factory manufacturing processes in order to ensure workers and factory healthy and safety;
- locate re-fuelling station and equipment maintenance sites only at designated areas in order to prevent and control risks;
- train workers who handle hazardous chemicals in chemical safety and adequate personal protective equipment uses;
- install emergency showers or eyewash stations in areas where some chemicals are handled and where occupational exposure to toxic powdered chemicals such as caustic soda and sulphur are expected;
- mix chemicals in a well-ventilated or open area, using appropriate personal protective equipment;
- use ventilators in the factory manufacturing floors, stores and in areas where chemicals handling or mixing are undertaken in order to ensure direct air flows away ;and
- Periodically evaluate ventilation system of the factory in order to ensure ventilation efficiencies and workability.

8.1.11 Sound/Noise Pollution

- Limit maximum speed/power for project vehicles, machineries, etc;
- Implement the national noise standards for all machinery and plants;
- Frequently service should be given to the construction vehicles and machineries to reduce nuisance noise ; and
- Workers should keep health and safety rules such as wearing ear protection ,etc

8.2 Mitigation Measures forthe Physical Environment Impacts

8.2.1 Soil Erosion and Sedimentation

- Updating design and construction of access and service roads with provision of sufficient side drains, longitudinal drains and culverts to accommodate run-off and combat soil erosion. Currently the project has implemented the measures
- Re-use on canals embankment slopes and roads re-filling the topsoil from road construction, canals and others;
- Reducing at maximum of land clearing and disturbances;
- Regular de-silting and maintenance of irrigation canal system;

- Promote plantation with appropriate trees species in recommended conservation areas and wastelands to maintain the soil structure;
- Maximize to re-use of all excavated materials in the construction works; and
- Dispose surplus materials only at the designated sites and approve methods.

8.2.2 Soil Salinity/ Sodicity

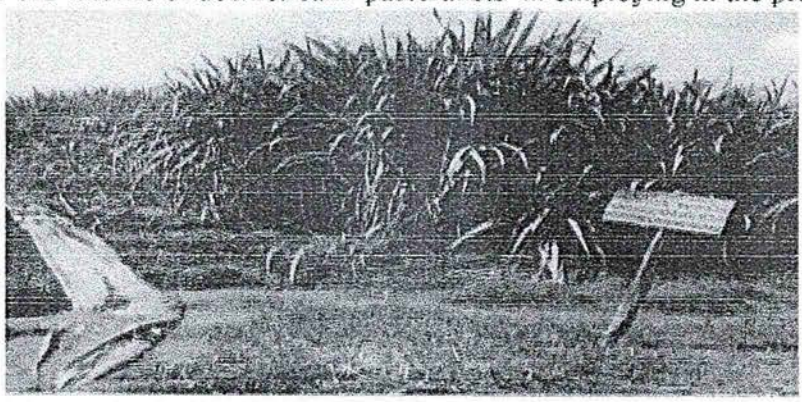
To alleviate the soil and land limitations/constraints identified in the current survey and ensure the sustainability of irrigated furrow sugar cane development, thus the following major soil and land management practices or ameliorative measures recommended:

a) Application of artificial fertilizers (such as N, P, K as appropriate) to improve soil fertility;
b) For the soils having high soil pH coupled with high air temperature, due attention should be given during N containing fertilizer selection and method of application to avoid loss of N due to volatilization and also to use alternatives (such as ammonium sulphate) to lower the high soil pH;
c) Incorporation of organic matter including farmyard manure, green manuring, planting legumes and addition of straw and crop residues to improve the soil fertility as well as to improve the soil structure, soil compaction, soil permeability and to reclaim sodic soils;
d) Application of appropriate ameliorative measures such as gypsum application and organic matter incorporation in sodicity risk soils;
e) Regularly monitoring and controlling the sodicity and salinity levels through conducting soil tests;
f) Monitoring and control of the availability of phosphorus and micronutrients;
g) Subsequent to project development a program of regular monitoring of sodicity/salinity levels should be undertaken;
h) In slightly to very strongly alkaline soils monitoring the availability of phosphorus and micronutrients (Fe, Cu, Zn, Mn), especially Fe, as well as effect of K and Fe-fertilization through conducting trials should be undertaken;
i) Some areas in the project area (in low-lying lands) are subjected to seasonal flooding risks or overflows, thus application of appropriate protection measures such as construction of diversion ditches, and bunds is required; and
j) Application of appropriate surface and sub-surface drainage improvements practices in the soils with drainage problems.

8.2.3 Water Balance and Downstream Release Including Turkana

- The water requirements of the project was computed by assuming that the project to work at full capacity, net 100,000 ha. But as learning period of time, it is better to start it is better to start as the plan of the project to use from 27% of the requirements in 2018, 34% in 2020, 45% in 2020, 57% in 2021, 70% in 2022,79% in 2023and 100% to reach in 2024 GC.

- Involve in sufficient compensation flows for downstream requirements. The compensation flow can be attained by strengthening conservation of the buffer zones of the tributary rivers.
- Use water save technology such as influx tube, sprinkler and others; currently the project uses influx tube at Omo2 factory.
- Gives priority to the victims of downstream pasteralists in employing in the project



Picture 34: Practicing of Influx Tube Irrigation at Omo 2 Sugar Plantation Farm

- Alternative water supply sources like ground and others springs, etc shall be promoted as they help in decreasing the direct water use from Omo River and enables more downstream flow;
- The river flows to downstream should be properly monitored and the release pattern should consider the river levels. The EPCCO has dominant role in releasing water in case the water level is low at down streams.

8.2.4 Water Quality

- optimize agrochemicals utilization based on soil fertility and sugarcane plantations agrochemicals needs;
- use appropriate dose and selective type of agrochemicals;
- proper monitoring of chemicals application ;and
- Conduct periodic water quality monitoring.

8.2.5 Water Logging

- Implement/update efficient irrigation and proper drainage system;
- avoid over watering;
- control seepage and water losses from canals;
- construct drainage system with appropriate slope and de-siliting condition;
- remove excess irrigation water and
- Conduct time series pizeometric ground water level monitoring, surface and subsurface drainage.

8.2.6 Aquatic weeds and Others

- ensuring efficient and optimized agrochemicals uses;
- continues weed control and
- Canal embankment monitoring and de-silting.

8.2.7 Natural Resource

- strengthening biological environmental conservation measures;
- promote off-farm activities in lowering pressure on the environment;
- promote introduction of energy savings stoves and
- Strengthen community awareness on conservation of wood biomass of the project area etc.

8.2.8 Construction Materials

- maximize the re-use of excavated materials in construction activities as filling materials;
- level quarries sites and borrow pits carefully so as to minimize impacts on existing land users;
- obtain archaeological sites clearance for all proposed borrow pits and quarry sites in advance;
- restore topsoil from borrow pits and quarry sites and use that safely;
- avoid creation of steep slopes when opening quarries and borrow pits that may result in risks to livestock and human;
- keep quarry sites and borrow pits to drain naturally so as to avoid creation of potentially malarial pools and
- Close all borrow pits and quarries to maximize their long-term biological productivity (capacity for plant growth) and minimize health and safety risks, etc.

8.2.9 Air Pollution

- establish specific maximum speeds for project vehicles at and/ or around community areas on project access routes;
- dust collectors or water spray systems must be used to prevent high dust emissions from batching plant operations;
- locate crushers on the leeward side and at sufficient distance of about 1.5 to 2 km far from settlement areas or labor camps;
- provide and use occupational safety equipment;
- diesel engines of construction equipment should be subjected to regular checking and clean their injectors to minimize exhaust emissions and
- Diesel powered machinery and vehicles well maintained to reduce excessive exhaust emissions.

8.3 Mitigation Measures for Biological Environment/Parks Impacts

8.3.1 Vegetations Losses

- As to the Environmental Code of Practice for Agricultural Investment(MoA) ,10% of the vegetations will be left in the farm land, 23 trees per ha for open wood land and 10 trees per ha for scarce open wood. The weighted mean of trees left in the farm project will be 11 trees per ha, 154 ,000 sedlings for 5 years.
- The remaining trees(left being cut) types' decision should consider the scarcities, values , community interests and other factors focusing on high values of indigenous trees such as acacia species, giant trees on hills(with a minimum diameter of 2 m)and others.

- Indigenous trees are planted on 5% of the possessed land ; 77,000 sedlings for 5 years.
- Wind break indigenous trees are cultivated/ The vegetation along the river banks are not cut down;
- Settlements of the project workers should be far from protected forest/park areas at a reasonable distance(minimum 3kms)
- Proportional to the loss land, the seedlings should be re afforested; the land location selection and types of trees will be determined by discussion with the affected Wereda Agriculture Offices.
- Establish a buffer zone between the project and protected park /others, a minimum of 0.5 km
- Protect near-by vegetation covers from fire and encroachments(especially during burning of the sugar canes);
- Avoiding over exploitation, accidental or deliberate introduction of exotic or imported species and
- Seeds or germ plasm imported from abroad should be certified by an authorized body and vouchers showing origin of the seeds or germplasm are should be documented and information showing the certification and application of seeds or germplasm should be shown to MoA, etc.

8.3.2 Wildlife Resources/Parks

- The project should leave a buffer zone on average 2 km along Omo River, from Omo 5 Project, for Elephant corridor;
- The project should leave 5 km, starting from "Katakaro" Mountain up to Mui River, from Omo 3 Project, for wildlife breading, shelters and corridors. On the other hand, the Omo Park should also provide compensation areas to Omo 3, 3,500 ha, from starting point of the right main canal, in south direction between the canal and the main road found in the park;
- Natural or related bridges' designs should be revisited, suitable to wildlife's' environments, and constructed /implemented timely. In the redesigns and constructions processes , the Omo Park/Ethiopian Wildlife Conservation Authority, Ethiopian Construction Works Corporation(ECWC) and Sugar Corporation should be involved;
- Revisiting the sub canal design (sourced from the right main canal), Omo 5 project, which cross the "Tngn" and "ililbey" plains as to the recommendations(more suitable to wildlife's) forwarded by the technical team;
- The projects (Kuraz 3&5) are more responsible in removing the soil hills (due to cannel works) found in the park territory including the invasive tiren species like

mesquite (prosopis juliflora) which adversely affect other vegetation. The Omo Park also assists the projects in the removing process.

- Create awareness on safety, especially speed and loading, for drivers, workers , passengers and residents;
- Construct speed breaks on sensitive areas such as park, residents' areas, etc bumps are constructed in every 500m of access road taking to the park;
- Posting suitable posters in the important wildlife areas and movement corridors to increase the awareness of road users towards wildlife conservation;
- The project shall assist the stakeholders/park office so as to bring sustainable developments in the project areas;
- .The project should assist them by setting mechanisms to sustain the habitats at least in the remaining parts of the park such as by establishing technical assistances and others to set up the habitats of the wildlife in the existing parks' boundaries;
- Continuously creating awareness for local, immigrants(employees) and international residents about illegal hunting activities;
- ESIA document should be given to the stakeholders/park office/ Zone Environmental Office for monitoring and working together with the project;
- When burning the matured sugar canes for harvesting ,the burning process should consider the wild animals found in the plantation;
- Utilizations of chemicals, the experiences of Latin American Countries. It needs further study, it may be considered in long run to harvest the sugar canes so as to protect wild animals from migration;
- The in-house experiences including factory 1 &2can be taken as a model for others in such as community handling, conservations, in implementing Environmental Management Plan (EMP), wildlife protection, protecting buffer zones of the Omo and tributaries' rivers and others;
- Strictly adhere to provisions stipulated in the wildlife regulation regarding to the prohibited activities that include undertaking exploration and quarry;
- Control any unsustainable planned practices to be carried in the wildlife protected areas and wildlife corridors of the project area;
- Any economic activity including the proposed project to be undertaken within a wildlife conservation area (national park) shall be carried out in accordance with wildlife proclamation and regulation;
- Conserve trees especially the riverine and some important areas within the periphery of the project area;
- Strengthen ban on purchase and trade of wildlife products (e.g. skins, leathers) by all members of staff and workforce and stakes of the area;

- Maintain adequate downstream water release for wildlife consumption and maintaining the riverine vegetation(mainly by EPCO);
- Improve local economy through promoting different income generating activities or off-farm activities related to wildlife and community conservation areas to internalize wildlife conservation and protection in the ethnic groups of the area, build up trust and create partnership through creating awareness;
- Actively participation of the project in the protections of wildlife, parks, heritages and archaeological sites by assisting them in providing training/awareness ,strengthen patrol services in quality and number of scouts and others;
- Construct water points in the park to minimize the effects on wildlife movement; and
- Work closely with Ethiopian wildlife conservation authority, the parks managements, local communities and concerned national, regional, zone and woreda institutions, etc to promote and strengthen wildlife conservation and development of the area.

8.4 Mitigation Measures for the Impacts on Socio-economic and Heritages Environment

8.4.1 Displacement/Settlements

- The ESIA document should be given to the Zone Environmental Office for monitoring the implementations of ESIA;
- The project is expected to work with the stakeholders to bring sustainable developments and solutions in the project areas;
- Encourages local people to be employed in the project by upgrading their working culture and disciplines , and skills;
- Consider the live changing experiences of the pastoralists' communities, better experiences of the sugar corporation including Omo 1& 2 projects ;
- Quota of employees should be given to the project surrounding people, by considering the Sugar Corporation Working Manual and local community's capacity ;
- Balanced infrastructures and economic developments should be done for all settlements found nearby the project areas;
- In-house experiences including factory 1 & 2 can be taken as a model for others in such as community handling and working together with them ; and
- Encourages the residents of the project to use energy saving electrical or traditional stoves and related items.

8.4.2 Health Environment

8.4.2.1 Malaria

- Ensures timely canals and drainages maintenances , avoid open water containers , discarded watery wastes , etc;
- Avoids creation of water pools , favour mosquitoes' breeding ;
- Spraying anti mosquito chemicals such chemoprophylaxis in the farm workers' houses (the project is working on it together with health office) ;
- Timely distributing parathyroid treated mosquito nets for all workers (distributed to the farm workers). The project should have an annual budget to purchase the nets;
- Refilling the pits after use to avoid mosquito breeding site;
- Regular canals, drainages and other areas possible vector breeding sites monitoring; and Strengthen health workers capacity in malaria control.

8.4.2.2 Schistosomiasis

- drain canals and clearing all aquatic vegetation;
- create awareness and local people behavioural change to use latrines by the local population to break the transmission cycle; and
- Periodical local residents mass treatment against adult Schistosoma worms, using a drug such as praziquantel.

8.4.2.3 Communicable Diseases

- The farm camps should be constructed on far away areas from the community living places.
- Prepare physical and financial plans of anti HIV/AIDS activities
- Create sustainable awareness/education on HIV/ AIDS ;
- Create favourable situations(such as focal person) for workers to access to HIV counselling and testing;
- Facilitate the distribution of anti-retrieval treatments at clinic or nearest health centre;
- In general promote preventive and curative measures in reducing the transmission of communicable diseases;
- Establish a permanent system for caring HIV infected workers;
- Empower local women economically (not to be exposed for commercial sex), the project should strengthen its positive views towards women, by giving job priority for local women.

8.4.2.4 Infections, Respiratory and Parasitic Diseases

- Strengthen the promoting works on health awareness for the project daily labourers and permanent workers, to enhance a knowledge on basic environmental sanitation:

- Strengthen a proper waste management of the camp site;
- Providing safe drinking water; and
- Establish a potable water quality monitoring system

8.4.2.5 Traffic Hazards

- Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials;
- The code should focus on safety, especially speed and loading, workers and passengers;
- Increase an awareness of accidents by teaching to the society and related ones ; and
- Construct speed breaks on sensitive areas such as park, residents' areas, etc bumps are constructed in every 500m of access road taking to the park.

8.4.3 Pesticide

- Use environmentally friendly agrochemicals as to the MoA rules and regulations.
- Implement as of the MoA's SECPAI guide line, annex 2, 2.1- 2.12.

8.4.4 Water Supply, Sanitation and Hygiene

- continue the project to provide potable water till gotten permanent solutions;
- provide safe water sustainable for workers and surrounding communities/settlers;
- control the water quality of the project area together with regular water testing;
- construct appropriate latrines and drainage systems;
- basic environmental health education should be given for employees and surrounding people so as to ensure environmental health;
- provide adequate health services and sanitary facilities for the project area population; and
- Working camps should be clean and maintain healthy condition prescribed by the international workers health standards.

8.4.5 Labor and Working Conditions

- provide the employment benefits as to working policy's manuals or a collective agreement such as health and safety materials, overtime payment , perdium ,different allowances , etc; and implement them;
- conduct a training /awareness on Ethiopian Labour law and ILO regulations to the main project workers and managers/supervisors; and
- Implement strictly Ethiopian Labour law and ILO Regulations.
- provide adequate facilities for treating emergency cases and reporting mechanisms in the cases of dangerous occurrences;

- formulate an Environment, Health and Safety committee, in which the employer and workers are represented;
- all machines moving parts should be covered to protect workers from injury;
- first aid workers should be trained by recognized body;
- emergency evacuation routes should be marked and communicated to employees; and
- no fire or cooking shall be allowed on factory site and near cane farms due to possible fire hazards

8.4.6 Grazing Land Loss

- Encourages/strengths settlement pastoralists with their livestock by fulfil full packages services such as water points, grazing areas, veterinary clinics, drugs and vaccines;
- promote pastoralists awareness on livestock husbandry and management;
- promote uses of improved forages, train pastoralists on how to use sugarcane tops and by-products for livestock feeds;
- creating awareness of the community with special emphasis to clan leaders and elders;
- promote rangeland development, management and improved livestock development practices and
- Develop off-farm activities such as community tourism and fishing development which are potential resources bases of the area.

8.4.7 Energy Supply

- Create sustainable an awareness works on rehabilitation and conservation of the wood resources;
- Encourage the project and surrounding areas' residents to use energy saving stoves such as "lakch"; and
- Encourage the project to install solar lighting systems

8.4.8 Gender Issues

- provide safe domestic water supplies near to the residences;
- promote local health care services;
- encourage them to be employed in the project;
- promote Women's' Affairs Offices to actively support and protect women's right;
- create an access to micro credit program for women that is linked to gender-focused technical extension; and
- Strengthen awareness creation activities to harmonize cultural based problems.

8.4.9 Animal Fodders and Water

- Together with the weredas' agricultures offices, by considering intensive discussions with the pastoralists, establish the full packages of the animal husbandries at their settlement areas.

8.4.10 World Heritage, Paleontological and Archaeological Sites

- Conduct further study on the potential for salt tolerant plants and of the possible factors that accelerate erosion of fossil outcrops adjacent to the river, and install soil salinity and wind erosion monitoring system in the World Heritage Property.
- Afforest tree plantations (water and chemical absorbers due to fertilizers and pesticides) at the border of sugarcane farm, buffer zone, nearby the UNESCO acknowledged archaeological sites such as, Shungura, Mursi ,Kibish,Usno and other formations;
- Avoid construction of camps/villages and frequently machinery and people/workers movements in the areas or nearby of the formations;
- Design and implement properly or carefully the drainage system so as to protect water logs(cause to salinity and seep to the ground), and water flows directions to the sites or make toward Omo River(already done), and the irrigated water to be fully consumed in the plantation field;
- Cultivate windbreak trees and others in the project area in replacing the cleared lands;
- Manage, in addition to Gibe III dam flood controlling mechanisms , the Omo river natural flowing system;
- Ensure full protection and conservation from any the project activities that possibly threaten the Shungura, Kibish ,Usno and Mursi Formation outcrops;
- Avoid negative impacts during construction and operation phases of the irrigation project for any activities within the core sites and buffer areas;
- Previously delineated areas should be preserved and kept by avoiding any interventions that affects the pale ontological and archaeological sites. Consult the line sector, the Authority for Research and Conservation of Cultural Heritage (ARCCH), to avoid any negative impact on the tentatively delineated core and buffer areas of the formations expected for having outcrops;
- Delineate buffer zone within one kilometre radius of the heritage sites; and
- Any constructions of the project should not be located within one of the palaeoanthropological/ archaeological sites of lower Omo. The Project direct activities will not directly affect the Lower Omo WHS, as these heritage sites are located ranges from physical distance 35 km to 50km away from the project area. Therefore, direct impacts on key heritage sites are not expected. Nevertheless, in case the discovery of buried archaeological and paleontological heritages in the project command area

happened , the project will work together with ARCCH for any possible to rescue the heritage excavations or other types of activities(in the project command area).

- The ARCCH experts or consultant archaeologists shall be invited, based on the proclamation NO. 209/2000, to monitor site clearance, excavations and other soil disturbance and report any findings to relevant authorities for further investigation before the construction and quarry works continue in the immediate areas of the site
- Cultural heritage management plan increases cultural awareness and sets standards of behavior for project personnel. It prevents illegal acquisition, misuse and export of discovered cultural heritage materials.
- The consultation activities to be set out in the plan will include the following: Cultural heritage specialists from the ARCCH or SNNPRS Culture and Tourism Bureau and from South Omo Zone Culture and Tourism Office will involve local communities and local authorities in the protection and salvage of sites. Consideration will also be given to the cultural heritage recommendations to involve communities in the cultural awareness activities.

8.4.11 Social/ Cultures/ Conflicts

- Select/priority set up harmful cultures(such as discrimination of economy empowerment, heavy works for women(men are not encouraged in farming activities),polygamy , marriage age differences , early marriage ,injuring own bodies, conflicting each other and others) and teach the community members by involving tribe leaders, elders, women and youth groups;
- creates employees' awareness on about the indigenous community cultures;
- encourages indigenous community to involve in culture tourism and
- Participates or helps in financial or in kind in conserving the local positive cultures and work in-collaboration with the line sector offices.
- Before conflicting issues occurred or after they are coming or other issues, the project should have a sustainable communication programs with the community, workers and the wereda/zone administrators so as to minimize or mitigate the conflicts in sustainable manure.

8.5 Project Alternatives

From the baseline study and stakeholders' discussions including the residents, the importance of the project very high weighted compared to its adverse impacts as far as the proposed mitigation measures implemented. The implementation process should consider the concerned stakeholders such as community, administrators, parks, conservation agents and others to have win-win solutions for both the project and the stated concerned bodies.

This ESIA has considered three project alternative scenarios i.e. no action scenario, no sugar project development, and design and technologies alternatives.

8.5.1 No Action Scenario

Do nothing alternative seem very unlikely from resource utilization aspects especially for a country (like Ethiopia) which suffers with deep poverty. It is expected from some extremists of environmental issues who support such an alternative especially in relation to in such a cross boarder river, Omo River. However, the project can be go on by setting win -win solutions with environmental and socio- economy issues.

8.5.2 Decreased the Size of the Project

The current size of the project decreased from net 175,000 ha to net 100, 000 ha, from 5 to 4 sugar factories. It increases the water balance of the down streams, may harmonizes international environmental conflicts, decreases the number of affected people, and protects heritages, archaeological and biological effects of the area, decreases project costs and others.

8.5.3 Leave Some Areas of the Project to Wildlife Corridor

By considering, the wild animals what encountered hazardous situations and the current project conditions, the project may leave additionallands, by discussing with the park, for wild animals corridors. Besides, the project expected to work together with the park in sustainable manner.

8.5.4 Revisions of Designs and Layouts

Currently the design and layouts works were completed; however, there may have limitations observed when the discussions held with the concerned stakeholders including Omo Park/Ethiopian Wildlife Conservation Authority, Ethiopian Construction Works Corporation(ECWC) and Sugar Corporation. Therefore, the updating works should be done by discussing with the park or related stakeholders. The revision layouts of the bridges or fences at the critical/risk areas of the main canals found at border and in the territory of Omo Park should consider the project activities and the movements of wild animals , tourists ,operators and park employees.

8.5.5 Farm and Factory Technology Alternatives

8.5.5.1 Pressurized (Sprinkler or Pivotal and Drip) Irrigation

Sprinkler or Pivotal and Drip irrigation systems apply water to the entire irrigated area via a pressurized pipe through single or multiple nozzles. They supply adequate moisture for plant growth, as well as for crop cooling during dry months. The systems facilitate the applications of pesticides and fertilizers. Both Spray and Drip systems are excellent techniques for managing water efficiently, about 70% and 95% respectively, but requires high investment and operation costs and technical skills (more complex technology). This alternative may not be recommended from financial view but has more advantages from the environmental aspect.

8.5.5.2 Surface (Furrow) and Influx Tube Irrigation

Furrow is a small, evenly spaced, shallow channel installed down or across the slope of the fi parallel to the row direction. It is relatively an inefficient system for managing water efficient (50%). It requires relatively low investment and operation costs, and technical skills. It is the proposed irrigation system, by considering water availability and investment costs, for the

project. On the other hand, the influx tube technology is relatively better than that of the conventional surface irrigation in terms of saving water, reducing evaporations, increasing in the efficient utilizations of time, labor, and other resources. Currently the project uses influx tube technology. The recommended mitigation measures can manage the environmental problems.

8.5.5.3 Utilization of Improved Cane Varieties

Best cane varieties can be one of mitigation measures by considering such as shorter harvesting time, high productivity, less water consumption, high capacity to resist weeding and pest side effects, less harvesting costs, environmental friendly and others.

8.5.5.4 Utilizations of more Baggas than Furnace Oils

In the factory process, reducing the consumptions of furnace oils for steam productions and milling processes reduce the air pollution in terms of the released pollutants and operation costs.

8.5.5.5 Optimize Energy Utilizations in the Production Process

There are energy utilizations' alternatives in the production process to minimize the environment and social effects and at large to optimize the economic benefits of the project including state of art manufacturing technology, shorter product cycles, automation, etc. For instance, it could be maximized the potential use of bagasse to generate electricity by producing flexible proportions or mixes of commercial sugar, raw sugar and by products (different grades of molasses and filtered cake). For instance, by producing 100% diluted juice; raw sugar A(77 % raw sugar and type A molasses); commercial A and B raw sugar(89% raw sugar and B molasses) ; A and B commercial sugar ; and non-commercial C sugar(low-grade) and C or final molasses. Then the amount of surplus or saved bagasse are estimated to be 50 - 60 %, 25 -40% , 20 - 35 % ,10-30% and 5-20% of the total amount of bagasse needed to produce vapors, respectively.

8.5.5.6 Right Main Cannel Construction Alternative

The study advisesto be constructed natural bridges or fenced at sensitive areas at the boarder and inside the park at the right main cannel by consultations or discussions ofthe Ethiopian Construction Works Corporation(ECWC) , Omo Park/Ethiopian Wildlife Conservation Authority and Sugar Corporation. The joint team should consider the costs, the animal behaviors, and the intensities of the movements of wild animals, tourists, operators and park employees before reaching at some point.

9 ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS

The environmental impacts of the project can be managed at different phases of the project including design, construction and operation periods. The design stage is very crucial to identify and control the impacts of the project as early as possible. The impacts during project construction and operation phases are also included in the environmental mitigation or management plan.

Impacts of any development depend on inputs, products and stresses of the development activities. The project management body harmonizes such activities through the implementation of the proposed mitigation measures during the project construction and operation of the project. The Corporation runs the Kuraz Sugar Development Project environmental management & monitoring plans and conduct environmental audit. As a result, an environmental management plan is essential with accountability. Table 37 shows the environmental management and monitoring plans of the project.

9.1 Institutional Frame and Environmental Affairs

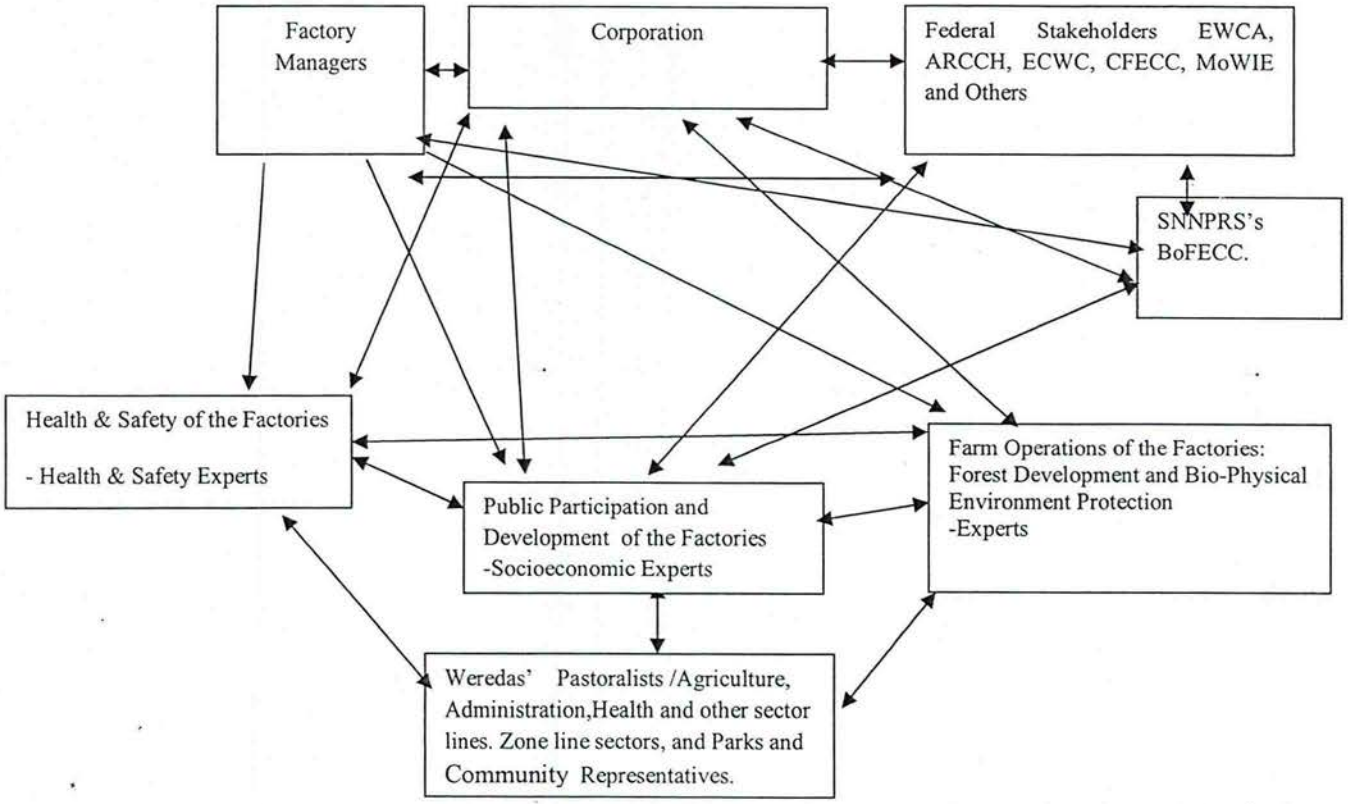
Institutional frame is very important to support a cross-sectoral interaction among the different concerned sectors together with the Project.

Establishing its own, Body/Environmental Affairs,considered as project, is crucial as far as to address the environmental issues in compliance with the MoA Social and Environmental Code of Practice for Agricultural Investment. It should be accountable directly to the farm manager; and will have a direct relation with Forest, Environment and Climate Change Commission (CoFECC), and SNNPRS's BoFECC.

Major issues to be considered in the unit are assessing current environmental practices, maintaining a clear environmental policy ,establishing a transparent communication with community ,developing an internal audit system, reviewing environmental monitoring reports, identifying required control measures, healthy and safety , working together with concerned governmental and non-governmental agencies and others.

The unit will have capable experts as stated in the figure 14 to do or to co-ordinate the concerned activities, focusing on the implementation of the EMP.

Figure 14: Proposed Net Work and Environmental Affairs Structure



Source : Own based on Sugar Corporation Data and Others (2018)

9.2 Capacity Building

The implementation process of the identified EMP needs capable human resources. The project has full-fledged structure to implement the EMP. As to our observation and discussions, the experts found in the project area and its environs have limitedcapacities in environmental management, monitoring and planning. .

Some of the human resource capacities building activities to undertake through training/awareness creation are:

- Environmental policy, laws and regulations, environmental management planning, natural resources conservation
- Social and Environmental Code of Practice issued by MoA/CoFECC
- Labour Law
- Training on International Environmental Convention like 14001

9.3 Environmental Management Plan

Table 37: Environmental Management Plan

S/N	Phases the Project	Potential Environmental Impacts	Proposed Mitigation Measures	Schedule for Implementation of Mitigation Measures	Responsible Institution	Location	Budget	
							Source	Estimated Cost, ETB
I PHYSICAL ENVIRONMENT								
I-1	CONSTRUCTION	Soil Erosion/ Sedimentation	- Currently the project has implemented the following physical mitigation measures but needed to be strengthen:- Updating the design if any and construction of access and service roads with provision of sufficient side drains, longitudinal drains and culverts to accommodate run-off and combat soil erosion. Re-use on canals embankment slopes and roads re-filling the topsoil from road construction, canals and others. -Reducing at maximum of land clearing and disturbances. - Maximize to re-use of all excavated materials in the construction works. -Dispose surplus materials only at the designated sites and approved methods.	Starting from their operation time or April /2020.	Consultant /Contractor/Project/ Wereds' Agricultural Office	Kuraz 3 and Kuraz 5	Project promoter	Project Cost
I-2		Construction Materials Production	maximise the re-use of excavated materials in construction activities as filling materials; Quarries sites and borrow pits should be carefully selected so as to minimise impacts on existing land users; obtain archaeological sites clearance for all proposed borrow pits and quarry sites in advance; restore topsoil from borrow pits and quarry sites and use that safely; avoid creation of steep slopes when opening quarries and borrow pits that may result in risks to livestock and human; keep quarry sites and borrow pits to drain naturally so as to avoid creation of potentially malarial pools and close all borrow pits and quarries to maximize their long-term biological productivity (capacity for plant growth) and minimize health and safety risks, etc	Starting from April/2020.	Contractor and Project Promoter	Kuraz 3 and Kuraz 5	Project Promoter	Project Cost

I-3		**Air Pollution from constructions**	establish specific maximum speeds for project vehicles at and/ or around community areas on project access routes; dust collectors or water spray systems must be used to prevent high dust emissions from crashing plant operations; locate crushers on the leeward side and at sufficient distance of about 1.5 to 2 km far from settlement areas or labor camps; provide and use occupational safety equipment; diesel engines of construction equipment should be subjected to regular checking and clean their injectors to minimize exhaust emissions and diesel powered machinery and vehicles should be well maintained to reduce excessive exhaust emissions.	"	Project Promoter	Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-4		**Impacts of factory effluents or wastewaters**	-Install state of arts technology of wastewater/effluent treatment plant(Improved A/O(A for hydrolysis ,O for oxic)) .	"	Project Promoter	Kuraz 1 and Kuraz 5	Project Promoter	Project Cost
I-5		**Factory construction wastes**	-maximize re-use of all excavated materials in the project construction activities and -collect, transport and dispose surplus excavated soil particles at designated sites.	"	Project Promoter	Kuraz 1 and Kuraz 5	Project Promoter	Project Cost
I-6		**Factory air emissions**	-Install cyclone dust collector and electrostatic precipitator ash hoppers. .	"	Project Promoter	Kuraz 1 and Kuraz 5	Project Promoter	Project Cost
I-7	**OPERATION AND MAINTENANCE**	**Soil Erosion/ Sedimentation**	The project has implemented the following biological mitigation measures in some area but needed to be strengthen:- Promote plantation with appropriate trees species in recommended conservation areas and wastelands to maintain the soil structure such as: - Strengthen conserving the existing plant vegetation of the area ; shrubs and trees with deep roots that helps to control soil erosion - Strengthen wind break trees, planting indigenous trees such as Acacia species, , etc together with the Wereda Agriculture Office, as to the Code of Practice (on 5% of total land), it could be on the river bank, on both sides of internal farm roads, homestead tree plantation in the camp sites ,etc.17.8 sedllings for ten years. - Strengthen planting appropriate agro-forestry practices using intercropping system such as pensium Americana (avocado), magnifera indica (mango), papaya, etc. Strengthen planting appropriate grasses on canals, drain banks and other exposed areas.	Starting from their operation time or April /2020.	Project/Wereds' Agricultural Office	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project promoter	1,775,000

I-8		**Soil Salinity/ sodicity**	Promote efficient water use to avoid over watering, provide proper drainage, use high levels of drain maintenance both on and off-farm, switch to other irrigation technologies if necessary, in the case of non-sodic salinisation, increase the application of acidifying fertilizers and manures and attempt leaching by excess surface irrigation, and conduct regular soil and water quality monitoring in full-scale trial.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-9		**Impact on Water Balance and Downstream Environmental Release**	The water requirements of the project was computed by assuming that the project to work at full capacity, net 100,000 ha. But as learning period of time, it is better to start as the plan of the project to use from 27% of the requirements in 2018, 34% in 2020, 45% in 2020, 57% in 2021, 70% in 2022, 79% in 2023and 100% to reach in 2024 GC.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5/Project Dam	Project Promoter	Project Cost
			Involve in compensation flows for downstream requirements. The compensation flow attained by strengthening conservation of the buffer zones of the tributary rivers.	"	Project Promoter, ECWC , Woredas' Agriculture Offices	"	Project Promoter(leader), ECWC	250,000, decided by the detail study and stakeholders
			Use water save technology such as influx tube, sprinkler and others; currently the project uses influx tubes.	"	Project Promoter	"	Project Promoter	Project Cost
			Alternative water supply sources like ground and others springs, etc as necessary for downstream users particularly for human and domestic animals shall be promoted as it helps in decreasing the direct water use from Omo River.	"	Project Promoter, ECWC , Woredas' Agriculture Offices	"	Project Promoter(leader), ECWC	Project cost, decided by the detail study and stakeholders
			-Monitor properly downstream release pattern as the discharges vary during the years so as to reduce the downstream impacts to acceptable level(EEPCO) -Assisting in providing water pumps for the downstream semi farmers as necessary	"	EEPCO	"	Project Promoter, ECWC , EEPCO	EEPCO
			-Strengthen project water use efficiency through training and awareness creation - Gives priority to the victims of downstream pastoralists in employing in the project	"	Project Promoter	"	Project Promoter	100 000

I-10		**Impacts on Water Quality**	Optimize agrochemicals utilization based on soil fertility and sugarcane plantations agrochemicals needs ; use appropriate dose and selective type of agrochemicals; proper monitoring of agrochemicals application and conduct periodic water quality monitoring	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-11		**Impacts of Water-logging and Groundwater Rise**	Implement/update efficient irrigation and proper drainage system; avoid over watering; control seepage and water losses from canals; construct drainage system with appropriate slope and de-siliting condition; remove excess irrigation water and conduct time series pizeometric ground water level monitoring, surface and subsurface drainage.	"	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-12		**Aquatic weeds and Others/Eutrophication**	ensuring efficient and optimized agrochemicals uses; continues weed control and canal embankment monitoring and de-silting	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-13		**Natural Resource Exploitations**	strengthening biological environmental conservation measures; promote off-farm activities in lowering pressure on the environment; promote introduction of energy savings stoves and strengthen community awareness on conservation of wood biomass of the project area etc.	Starting from their operation time or April /2020.	Project Promoter, Weredas' Line Sectors	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost, 150,000.00 for training/awareness
I-14		**Impacts of effluents or wastewaters**	-Dispose liquid waste sludge at appropriate and recognized waste disposal site; -Sewer lines(option 1): is connection to a main sewer line after prescribed pre-treatment solves the waste water management issue at a very minimal cost and in an environmental efficient manner if and only if the sewer lines exist and -Septic tanks (option 2): involves construction of underground concrete-made tanks to store sludge with soak pits. It is expensive to construct, regular emptying required and time consuming. However, in the absence of a sewer line in the project site, this remains the most appropriate option for the developer for some residential or workers.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost

I-15		**Solid waste generation**	-First priority to solid waste reduction at source. This option will demand solid waste management awareness of the management and employees. -Consider recycling, second priority, reuse and compositing of wastes. This calls for a source separation program to be put in place. The recyclables will be sold to waste buyers or waste recyclers within the surrounding areas. -The third priority in the hierarchy of solid waste management options shall be considered is combustion of wastes that is not recyclable in order to produce energy. -Finally, sanitary land-filling will be the last option for the proponent to consider. Over left wastes should be disposed at recognized disposal site selected by multi-disciplinary team in which environmental or regulatory body is a part. The waste disposal site must be supervised and controlled by the recommended environmental unit of the proponent regularly.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-16		**Air emissions**	-dust collectors or water spray systems must be used to prevent high dust emissions from plant operations; -machinery and vehicles should be maintained to reduce excessive exhaust emissions; -workers should be provided with appropriate safety wears such as footwear, dust masks, respirators, gloves, ear protection; -Cultivating potential trees, surrounding the fctory, to absorb CO_2 (sugar plantation also absorbs it), stalk gas to generate CO_2 for carbonation(absorb CO_2 from air), etc	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-17		**Impact on land, soils**	-limit agrochemicals application based on soil fertility and sugarcane plantations nutrient needs and use appropriate dose and selective types; -undertake frequent soil testing, at least twice annually; -dispose solid and liquid wastes only at recognized waste disposal sites; Strengthen best farm practices and management; and conduct periodic water quality monitoring.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-18		**Factory sanitary**	ensure appropriate drainage networks; ensure safe drainage, septic tanks and latrines in order to control over flowing into residences and the factory compound; provide basic environmental health education for sugar factory employees ;and Maintain clean and healthy working camps as to the international/local workers health and safety standards.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost

I-19		**Environmental Health and Safety**	Train first aid personnel from workers and management staff and undertake awareness creation on occupational health and safety of factory workers; provide adequate facilities for treating emergency cases for any risk occurrences and reporting mechanisms in dangerous cases; place fire extinguishers at proper places and recognized sites in the factory production floors, stores and compounds; all machines and other moving parts of equipments must be in order to protect workers from injury; establish factory environment, health and safety committee, in which the employer and employees are the members; ensure employees medical examination before, during and after termination; establish emergency plan and evacuation routes in cases of hazards and communicated to employees; install ventilation at proper sites; in manufacturing floors, general stores and in other essential rooms; provide appropriate safety wears such as footwear, dust masks, respirators, gloves, ear protection of factory workers based on working area conditions and Incorporate occupational health and safety issues in for specific tasks in contract agreement, etc.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project cost,150,000 for training/awareness

I-20		**Impacts Due to Poor Warehouse Keeping**	The project has implemented the following mitigation measures in some area but needed to be strengthen:- factory floors should be concreted in order to prevent surface contamination, keep chemicals and dry especially for pallets chemicals; ensure appropriate warehouse rooms layout and housekeeping; Segregate and store raw materials and products in separate stores based on their characteristics; powder, solid and liquids. Flammable and combustible chemicals and materials must be properly stored. Litter must be stored in non-combustible containers with lids. Drips and spills must be cleaned up immediately; fire extinguishers should be placed at appropriate distance and sites; keep factory materials, stairs, aisles and exits clear; Scrap materials must be cleaned daily or often enough to prevent them from collecting on floors, tabletops, in aisle ways, or other areas. Building roofs and roof drains must be kept clean and unclogged; All production and warehouse rooms should have ventilators, etc. Heating, ventilation and air conditioning systems must be cleaned and maintained regularly; Chemicals must be stored in an organized way, following guidelines for recommended storage compatibilities to avoid contact between incompatible chemicals. All chemicals must be properly labelled in the language(s) spoken by workers. Chemicals must be stored and used in designated areas which are well ventilated; workers who handle chemicals must have immediate access (within 10 seconds) to an eyewash/shower that can be easily operated; factories must meet legal requirements to notify government or other local agencies (such as fire departments) about chemicals used or stored on site and Material safety data sheets must be kept on site and must be available for review by workers.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	

I-21		**Fire hazards**	The project has implemented the following 1 mitigation measures in some area but needed to be strengthen:- Install smoke detectors at strategic locations in the factory compound and manufacturing floors; install fire detectors, sirens and control indicator panels comprising break glass call points within the premises; install hose reels systems with permanent connection to pressurized water supply running along the perimeter wall for easy fire fighting; provide portable fire fighting equipment compliance with the current standards and requirements at conspicuous locations , storage tanks, loading and unloading system, generator room etc; include speedy evacuation plans and place possible fire event and evacuation signs (exit) in the factory buildings at strategic locations; install sprinklers connections to pressured water supply in bagasse shed to douse any fire outbreaks; display procedures to follow in case of fire along corridors, individual offices and in public ways to ensure safe and speedy evacuation of personnel and visitors. provide wide open fire escape routes to allow speedy exit in case of fire hazards. the fire escape must be fitted with ladders on outside of the building and mechanically fabricated in steel format comprising of chequered plates and handrails giving alarm sign before burning the matured canes train staff and workers on fire fighting and fire drill and first aids. no fire or cooking shall be allowed on factory site and near cane farms due to possible fire hazards	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	

I-22		**Impacts of hazardous materials**	develop a spill prevention plan; ensure that chemical containers are labeled and documentation regarding safe handling or first aid measures is accessible in storage and use locations; make spill clean-up equipment readily and available in chemical storage areas; ensure that chemical containers are stored in a safe manner to reduce risks of falling over and spilling; store fuels and other hazardous materials at or in designated locations only; monitor release of any deleterious substances during construction and factory manufacturing processes in order to ensure workers and factory healthy and safety; locate re-fuelling station and equipment maintenance sites only at designated areas in order to prevent and control risks; train workers who handle hazardous chemicals in chemical safety and adequate personal protective equipment uses; install emergency showers or eyewash stations in areas where some chemicals are handled and where occupational exposure to toxic powdered chemicals such as caustic soda and sulphur are expected; mix chemicals in a well-ventilated or open area, using appropriate personal protective equipment; use ventilators in the factory manufacturing floors, stores and in areas where chemicals handling or mixing are undertaken in order to ensure direct air flows away and Periodically evaluate ventilation system of the factory in order to ensure ventilation efficiencies and workability.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
I-23		**Sound/noise pollution**	Limit maximum speed/power for project vehicles, machineries, etc; Implement the national noise standards for all machinery and plants; Frequently service should be given to the construction vehicles and machineries to reduce nuisance noise; and workers should keep health and safety rules such as wearing ear protection, etc.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
II. BIOLOGICAL ENVIRONMENT								

II-1	CONSTRUCTION	Vegetation Cover and Biodiversity	As to the Environmental Code of Practice for Agricultural Investment(MoA) ,10% of the vegetations will be left in the farm land, 23 trees per ha for open wood land and 10 trees per ha for scarce open wood. The weighted mean of trees left in the farm project will be 11 trees per ha, 154 ,000 sedlings for 5 years. The remaining trees(left being cut) types' decision should consider the scarcities, values , community interests and other factors focusing on high values of indigenous trees such as acacia species, giant trees or oaks(with a minimum diameter of 2 m)and others. Indigenous trees are planted on 5% of the possessed land ; 77,000 sedlings for 5 years. Wind break indigenous trees are cultivated/ The vegetation along the river banks are not cut down; Settlements of the project workers should be far from protected forest/park areas at a reasonable distance(minimum 3kms) Proportional to the loss land, the seedlings should be re afforested; the land location selection and types of trees will be determined by discussion with the affected Wereda Agriculture Offices. Establish a buffer zone between the project and protected park /others, a minimum of 0.5 km. Protect near-by vegetation covers from fire and encroachments(especially during burning of the sugar canes); Avoiding over exploitation, accidental or deliberate introduction of exotic or imported species and Seeds or germ plasm imported from abroad should be certified by an authorized body and vouchers showing origin of the seeds or germplasm are should be documented and information showing the certification and application of seeds or germplasm should be shown to MoA, etc.	Starting from April /2020.	Project Promoter / Weredas' Agriculture Offices	Kuraz 3 and Kuraz 5	Project Promoter	250,000

	Impacts on the Wildlife Resources	The project should leave a buffer zone on average 2 km along Omo River, from Omo 5 Project, for Elephant corridor; The project should leave 5 km, starting from "Katakaro" Mountain up to Mui River, from Omo 3 Project, for wildlife breading, shelters and corridors. On the other hand, the Omo Park should also provide compensation areas to Omo 3, 3,500 ha, from starting point of the right main canal, in south direction between the canal and the main road found in the park; Natural or related bridges' designs should be revisited, suitable to wildlife's' environments, and constructed /implemented timely. In the redesigns and constructions processes , the Omo Park/Ethiopian Wildlife Conservation Authority, Ethiopian Construction Works Corporation(ECWC) and Sugar Corporation should be involved; Revisiting the sub canal design (sourced from the right main canal), Omo 5 project, which cross the "Tngn" and "ililbey" plains as to the recommendations(more suitable to wildlife's) forwarded by the technical team; The projects (Kuraz 3&5) are more responsible in removing the soil hills (due to cannel works) found in the park territory including the invasive alien species like mesquite (prosopis juliflora) which adversely affect other vegetation. The Omo Park also assists the projects in the removing process. Create awareness on safety, especially speed and loading, for drivers, workers , passengers and residents; Construct speed breaks on sensitive areas such as park, residents' areas, etc bumps are constructed in every 500m of access road taking to the park; Posting suitable posters in the important wildlife areas and movement corridors to increase the awareness of road users towards wildlife conservation; The project shall assist the stakeholders/park office so as to bring sustainable developments in the project areas; The project should assist them by setting mechanisms to sustain the habitats at least in the remaining parts of the park such as by establishing technical assistances and others to set up the habitats of the wildlife in the existing parks' boundaries; Continuously creating awareness for local, immigrants(employees) and international residents about illegal hunting activities; ESIA document should be given to the stakeholders/park office/ Zone Environmental Office for monitoring and working together with the project; When burning the matured sugar canes for harvesting ,the burning process should consider the wild animals found in the plantation; Utilizations of chemicals, the experiences of Latin American Countries. It needs further study, it may be considered in long run to harvest the sugar canes so as to protect wild animals from migration;	Starting from April /2020.	Project Promoter(leader) / CoFFEC , Zone Environmental Office/ ECWC /Appropriate Parks/Weredas' Agriculture Offices	Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project cost, 200,000

II-2 cont.		**Impacts on the Wildlife Resources**	The in-house experiences including factory 1 &2can be taken as a model for others in such as community handling, conservations, in implementing Environmental Management Plan (EMP), wildlife protection, protecting buffer zones of the Omo and tributaries' rivers and others; Strictly adhere to provisions stipulated in the wildlife regulation regarding to the prohibited activities that include undertaking exploration and quarry; Control any unsustainable planned practices to be carried in the wildlife protected areas and wildlife corridors of the project area; Any economic activity including the proposed project to be undertaken within a wildlife conservation area (national park) shall be carried out in accordance with wildlife proclamation and regulation; Conserve trees especially the riverine and some important areas within or in the periphery of the project area; Strengthen ban on purchase and trade of wildlife products (e.g. skins, feathers) by all members of staff and workforce and stakes of the area; Maintain adequate downstream water release for wildlife consumption and maintaining the riverine vegetation(mainly by EPCO); Improve local economy through promoting different income generating activities or off-farm activities related to wildlife and community conservation areas to internalize wildlife conservation and protection in the ethnic groups of the area, build up trust and create partnership through creating awareness; Actively participation of the project in the protections of wildlife, parks, heritages and archaeological sites by assisting them in providing training/awareness ,strengthen patrol services in quality and number of scouts and others; Construct water points in the park to minimize the effects on wildlife movement; and Work closely with Ethiopian wildlife conservation authority, the parks managements, local communities and concerned national, regional, zone and woreda institutions, etc to promote and strengthen wildlife conservation and development of the area.	Starting from April /2020.	Project Promoter(leader) / CoFFEC , Zone Environmental Office/ ECWC /Appropriate Parks/Weredas' Agriculture Offices	Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Part of II-2. Ditto

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II-3	OPERATION AND MAINTENANCE	Vegetation Cover and Biodiversity	Indigenous trees are planted on 5% of the possessed land ; 77000 sedlings for three years. Wind break indigenous trees are cultivated/ The vegetation along the river banks are not cut down; Settlements of the project workers should be far from protected forest/park areas at a reasonable distance(minimum 3kms) Proportional to the loss land, the seedlings should be re afforested; the land location selection and types of trees will be determined by discussion with the affected Wereda Agriculture Offices. Establish a buffer zone between the project and protected park /others, a minimum of 0.5 km. Protect near-by vegetation covers from fire and encroachments(especially during burning of the sugar canes); Avoiding over exploitation, accidental or deliberate introduction of exotic or imported species and Seeds or germ plasm imported from abroad should be certified by an authorized body and vouchers showing origin of the seeds or germplasm are should be documented and information showing the certification and application of seeds or germplasm should be shown to MoA, etc. Enhance homestead tree plantation in camp areas, settlement areas and along road networks. Strengthen woodland and shrub land conservations	Starting from their operation time or April /2020.	Project Promoter / Weredas' Agriculture Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	135,000
II-4	OPERATION	Impacts on Aquatic Ecology	Releasing the treated water to sugar cane farm, treat sugar factory effluents to the permissible level; Close follow up the drainage systems, waste disposal and sewerage lines, if any, to the river water, avoid excess water/water logs which in turn reduces sedimentations/salinity; The project villages should far away as to the Code of Practice (more than 1 km far away) Encourages aquaculture development including recording fishery data, awareness activities on management and monitoring fishing activities together with the zone and Woreda agricultural offices and researches; and Optimizes the utilizations of fertilizers/agrochemicals as to the allowed standards.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III. SOCIO-ECONOMIC ENVIRONMENT								

III-1	CONSTRUCTION	Communicable Diseases including HIV/AIDS	The farm camps should be constructed on far away areas from the community living places. Create sustainable awareness/education on HIV/ AIDS ; Create favourable situations(such as focal person) for workers to access to HIV counselling and testing; Facilitate the distribution of anti-retrieval treatments at clinic or nearest health centre; In general promote preventive and curative measures in reducing the transmission of communicable diseases; Establish a permanent system for caring HIV infected workers; Empower local women economically (not to be exposed for commercial sex), the project should strengthen its positive views towards women, by giving job priority for local women.	Starting from April /2020.	Project Promoter	Kuraz 5 and Kuraz 3	Project Promoter	Project Cost 150,000 for training/awareness
III-2		Traffic hazards	Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed and loading, workers and passengers; Increase an awareness of accidents by teaching to the society and related ones ; and Construct speed breaks on sensitive areas such as park, residents' areas, etc; bumps are constructed in every 500m of access road taking to the park.	Starting from April/2020.	Project Promoter	Kuraz 3 and Kuraz 5	Project Promoter	

	Impacts on World Archaeological and Historical Sites	Conduct further study on the potential for salt tolerant plants and of the possible factors that accelerate erosion of fossil outcrops adjacent to the river, and install soil salinity and wind erosion monitoring system in the World Heritage Property. Afforest tree plantations (water and chemical absorbers due to fertilizers and pesticides) at the border of sugarcane farm, buffer zone, nearby the UNESCO acknowledged archaeological sites such as, Shungura, Mursi ,Kibish,Usno and other formations; Avoid construction of camps/villages and frequently machinery and people/workers movements in the areas or nearby of the formations; Design and implement properly or carefully the drainage system so as to protect water logs(cause to salinity and seep to the ground), and water flows directions to the sites or make toward Omo River(already done), and the irrigated water to be fully consumed in the plantation field; Cultivate windbreak trees and others in the project area in replacing the cleared lands; Manage, in addition to Gibe III dam flood controlling mechanisms , the Omo river natural flowing system; Ensure full protection and conservation from any the project activities that possibly threaten the Shungura, Kibish ,Usno and Mursi Formation outcrops; Avoid negative impacts during construction and operation phases of the irrigation project for any activities within the core sites and buffer areas; Previously delineated areas should be preserved and kept by avoiding any interventions that affects the pale ontological and archaeological sites. Consult the line sector, the Authority for Research and Conservation of Cultural Heritage (ARCCH), to avoid any negative impact on the tentatively delineated core and buffer areas of the formations expected for having outcrops; Delineate buffer zone within one kilometre radius of the heritage sites; and Any constructions of the project should not be located within one of the palaeoanthropological/ archaeological sites of lower Omo. The Project direct activities will not directly affect the Lower Omo WHS, as these heritage sites are located ranges from physical distance 35 km to 50km away from the project area. Therefore, direct impacts on key heritage sites are not expected. Nevertheless, if in case the discovery of buried archaeological and paleontological heritages in the project command area happened, the project will work together with ARCCH for any possible to rescue the heritage excavations or other types of activities. The ARCCH experts or consultant archaeologists shall be invited, based on the proclamation NO. 209/2000, to monitor site clearance, excavations and other soil disturbance and report any findings to relevant authorities for further investigation before the construction and quarry works continue in the immediate areas of the site Cultural heritage management plan increases cultural awareness and sets standards of behavior for project personnel. It prevents illegal acquisition, misuse and export of discovered cultural heritage materials. The consultation activities to be set out in the plan will include the following: Cultural heritage specialists from the ARCCH or SNNPRS Culture and Tourism Bureau and from South Omo Zone Culture and Tourism Office will involve local communities and local authorities in the protection and salvage of sites. Special care will also be given to the cultural heritage presentations to involve communities in the cultural awareness activities.	Starting from April /2020.	Project Promoter , Federal Authority for Research and Conservation of Cultural Heritages ,Weredas' Administeration /Pastoralist /Culture and Tourism Offices	Kuraz 5	Project Promoter	100000

III-5	OPERATION AND MAINTENANCE	Impacts on Settlements	The ESIA document should be given to the Zone Environmental Office for monitoring the implementations of ESIA; The project is expected to work with the stakeholders to bring sustainable developments and solutions in the project areas; Encourages local people to be employed in the project by upgrading their working culture and disciplines , and skills; Consider the live changing experiences of the pastoralists' communities, better experiences of the sugar corporation including Omo 1& 2 projects ; Quota of employees should be given to the project surrounding people, by considering the Sugar Corporation Working Manual and local community's capacity ; Balanced infrastructures and economic developments should be done for all settlements found nearby the project areas; In-house experiences including factory 1 & 2 can be taken as a model for others in such as community handling and working together with them ; and Encourages the residents of the project to use energy saving electrical or traditional stoves and related items.	Construction /Operation /starting from April /2020.	Project Promoter ,Weredas' Pastoralist /Agriculture and Administration Offices	Kuraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III-6		Malaria	Ensures timely canals and drainages maintenances , avoid open water containers , discarded watery wastes , etc; Avoids creation of water pools , favour mosquitoes' breeding ; Spraying anti mosquito chemicals such chemoprophylaxis in the farm workers' houses (the project is working on it together with health office) ; Timely distributing parathyroid treated mosquito nets for all workers (distributed to the farm workers). The project should have an annual budget to purchase the nets; refilling the pits after use to avoid mosquito breeding site; regular canals, drainages and other areas possible vector breeding sites monitoring and Strengthen health workers capacity in malaria control.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III-7		Schistosomias	drain canals and clearing all aquatic vegetation; create awareness and local people behavioural change to use latrines by the local population to break the transmission cycle and periodical local residents mass treatment against adult Schistosoma worms, using a drug such as praziquantel	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost

III-8		**Communicable Diseases including HIV/AIDS**	Prepare physical and financial plans of anti HIV/AIDS activities Create sustainable awareness/education on HIV/ AIDS ; Create favourable situations(such as focal person) for workers to access to HIV counselling and testing; Facilitate the distribution of anti-retrieval treatments at clinic or nearest health centre; In general promote preventive and curative measures in reducing the transmission of communicable diseases; Establish a permanent system for caring HIV infected workers; Empower local women economically (not to be exposed for commercial sex), the project should strengthen its positive views towards women, by giving job priority for local women.	Starting from their operation time or April /2020.	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III-9		**Infections, Respiratory and Parasitic Diseases**	Strengthen the promoting works on health awareness for the project daily labourers and permanent workers, to enhance a knowledge on basic environmental sanitation; Strengthen a proper waste management of the camp site, and Providing safe drinking water; and Establish a potable water quality monitoring system	"	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III-10		**Pesticide poisoning**	Use environmentally friendly agrochemicals as to the MoA rules and regulations. Implement as of the MoA's SECPAI guideline, annex 2, 2.1- 2.12.	"	Project Promoter ,Weredas' Pastoralist /Agriculture and Administration Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost

III-11		**Water supply, sanitation and hygiene**	continue the project to provide potable water till gotten permanent solutions; provide safe water sustainable for workers and surrounding communities/settlers ; control the water quality of the project area together with regular water testing; construct appropriate latrines and drainage systems construction; basic environmental health education should be given for employees and surrounding people so as to ensure environmental health; provide adequate health services and sanitary facilities for the project area population and Working camps should be clean and maintain healthy condition prescribed by the international workers health standards.	"	Project Promoter ,Weredas' Pastoralist /Agriculture and Administration Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III-12		**Labor and Working Conditions**	Provide the employment benefits as to working policy's manuals or a collective agreement such as health and safety materials, overtime payment , perdium ,different allowances , etc; and implement them; Conduct a training /awareness on Ethiopian Labour law and ILO regulations to the main project workers and managers/supervisors; and Implement strictly Ethiopian Labour law and ILO Regulations. provide adequate facilities for treating emergency cases and reporting mechanisms in the cases of dangerous occurrences; formulate an Environment, Health and Safety committee, in which the employer and workers are represented; all machines moving parts should be covered to protect workers from injury; first aid workers should be trained by recognized body; emergency evacuation routes should be marked and communicated to employees; and no fire or cooking shall be allowed on factory site and near cane farms due to possible fire hazards	"	Project Promoter	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	200,000

III.13		**Grazing land loss**	Encourages/strengths settlement pastoralists with their livestock by fulfill full packages services such as water points, grazing areas, veterinary clinics, drugs and vaccines; promote pastoralists awareness on livestock husbandry and management; promote uses of improved forages, train pastoralists on how to use sugarcane tops and by-products for livestock feeds; creating awareness of the community with special emphasis to clan leaders and elders; promote rangeland development, management and improved livestock development practices and Develop off-farm activities such as community tourism and fishing development, which are potential resources bases of the area.	Starting from their operation time or April /2020.	Project Promoter ,Weredas' Pastoralist /Agriculture and Administration Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	Project Cost
III.14		**Impacts on Animal Fodders and Water**	Together with the weredas' agricultures offices, by considering intensive discussions with the pastoralists, establish the full packages of the animal husbandries at their settlement areas	Starting from their operation time or April /2020.	Project Promoter ,Weredas' Pastoralist /Agriculture and Administration Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	250000 for training /awarness
III.15		**Impact on energy supply/fire woods**	Create sustainable an awareness works on rehabilitation and conservation of the wood resources; Encourage the project and surrounding areas' residents to use energy saving stoves such as "lakch"; and Encourage the project to install solar lighting systems	Starting from their operation time or April /2020.	Project Promoter ,Weredas' Pastoralist /Agriculture /Women and Youth Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	
III.16		**Impacts on women**	provide safe domestic water supplies near to the residences; promote local health care services; encourage them to be employed in the project; promote Women's' Affairs Offices to actively support and protect women's right; create an access to microcredit program for women that is linked to gender-focused technical extension; and Strengthen awareness creation activities to harmonize cultural based problems.	Starting from their operation time or April /2020.	Project Promoter ,Weredas' Pastoralist /Agriculture /Women and Youth Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promoter	

III.17		**Impacts on Social/ Cultures/ Conflicts**	Select/priority set up harmful cultures(such as discrimination of economy empowerment, heavy works for women(men are not encouraged in farming activities),polygamy , marriage age differences· , early marriage ,injuring own bodies, conflicting each other and others) and teach the community members by involving tribe leaders, elders, women and youth groups; creates employees' awareness on about the indigenous community cultures; encourages indigenous community to involve in culture tourism and Participates or helps in financial or in kind in conserving the local positive cultures and work in-collaboration with the line sector offices. Before conflicting issues occurred or after they are coming or other issues, the project should have a sustainable communication programs with the community, workers and the wereda/zone administrators to minimize or mitigate the conflicts in sustainable manure.	Starting from their operation time or August /2020.	Project Promoter ,Weredas' Pastoralist /Culture and Tourism Offices	Kraz 1, Kuraz 2, Kuraz 3 and Kuraz 5	Project Promot er	
Total birr(including training, study and awareness ; excluding the main costs of EMP) per year								**3,460,000**
Total birr(including training, study and awareness ; excluding the main costs of EMP) for three years								**10,380,000**

9.4 Environmental Monitoring Plan

Table 38: Environmental Monitoring Plan

S.No	Project phases	Mitigation Measures	Parameters to be monitored	Approach/Methodology to Monitor the Parameter	Frequency of Measurements	Location	Responsible Institution	Annual Cost (Birr)
1.	Construction	Mitigation measures stated in EMP to minimizing the soil erosion , sedimentation , salinity and sodicity and toxicity status	Drainage system, longitudinal drains and culverts to minimize run-off and soil erosion; and soil conservation plan.	Project design or MoA standards, Reviewed ESIA and soil samples	-Once in two-three years period for soil samples -Monitoring one time per year	Kuraz 3 and Kuraz 5	Project promoter and Zonal Environment	**50,000**
2	Construction	Mitigation measures stated in EMP to construction materials production	- Health and safety , archaeological ,land degradation or excavation conditions to limit .	Health and safety ,mining or CoFFEC or construction , archaeological or cultural standards. Clearance certificates from culture or construction or mining offices, site visiting, , Reviewed ESIA and professional views.	Once in six months	Kuraz 3 and Kuraz 5	Project Promoter, Zonal Environment /Mining Offices and Culture and Tourism Office	**50,000**
3	Construction	Mitigation measures stated in EMP to factory effluents or wastewaters, construction wastes and air/sound emissions ;and air/sound pollution from other construction activities	- Health and safety , effluents, air pollutions , land degradation or excavation or construction wastes conditions to minimize the problems.	Comparing from factory design or health and safety or CoFFEC or construction standards, Reviewed ESIA and samples taking	Every three months , commissioning stage	Kuraz 1, Kuraz 3 and Kuraz 5	Project Promoter, Zonal Environment /WeredaHealth Offices	**50,000**
	Construction	Mitigation measures stated in EMP to vegetation cover and biodiversity, aquatic Ecology	Vegetation cover and biodiversity, aquatic conditions	Environmental Code of Practice for Agricultural Investment(MoA) , Reviewed ESIA and CoFFEC standards , visiting ,professional views, samples taking	Every six month	Kuraz 3 and Kuraz 5	Project Promoter, Omo park, Zonal Environment /Wereda Agriculture Offices	**100000**

5	Construction	Mitigation measures stated in EMP to Parks/Wildlife Aspects/Tourism	Monitoring the activities EMP, change in population of key wildlife species during in and out migration period, effects of the development plan on wildlife and tourism	Environmental Code of Practice for Agricultural Investment(MoA) , Reviewed ESIA and CoFFEC standards , visiting ,professional views, samples taking	Every month	Kuraz 3 and Kuraz 5	Multidisciplinary team consisting of Omo park, zonal environmental office and project promoter)	**150000**
6.	Construction,	Mitigation measures stated in EMP to mosquitoes and water born diseases	Malaria and water born diseases conditions	MoA (SECPAI) and Health Standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter ,Regional and Wereda Health/ zonal environmental offices	**100000**
7.	Construction	Mitigation measures stated in EMP to Communicable diseases (HIV/AIDS)	Communicable diseases (HIV/AIDS) conditions	MoA (SECPAI) and Health Standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter ,Regional and Wereda Health Offices and zonal environmental	**100000**
8.	Construction	Mitigation measures stated in EMP to sanitation and water supply	Sanitation and water supply conditions, minimum requirements the nation.	MoA (SECPAI), Health and WHO Standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter ,Regional and Wereda Health Offices and zonal environmental	**100000**
9.	Construction	Mitigation measures stated in EMP to Social/ Cultures/Heritages/Archaeology/ Conflicts	Develop a sustainable communication programs with the community, workers and the wereda administrators	Communicate the community, workers and the wereda administrators	Once per month	Project(Kuraz 3 and Kuraz 5) site's kebeles and wereda	Project promoter, Wereda Administrators, zonal environmental and concerned bodies stated in the EMP.	**100000**

10.	Construction	Mitigation measures stated in EMP to labor and working conditions	Labor and working conditions	Visiting workers and project administrators. MoA (SECPAI)/ CoEFCC and Ethiopian Labor Law standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter, , zonal environmental and Regional Bureau of Labor and Social Affair	**100000**
11	Construction	Mitigation measures stated in EMP to settlers /community/ traffic hazards issues	Settlers /Community/Traffic Conditions. Promoter plans to settlers /community/ traffic hazards issues	Communicate/train/aware the settlers, community, drivers and the wereda administrators	Every month	Project(Kuraz 3 and Kuraz 5) site's kebeles and wereda	Multidisciplinary team consisting of Wereda Pastoralist and Administrative Offices ,Zone Environmental Bureau and Project Promoter	**200000**
12.	Operation	Mitigation measures stated in EMP to minimizing the soil erosion , sedimentation , salinity and sodicity and toxicity status	Drainage system, longitudinal drains and culverts to minimize run-off and soil erosion; and soil conservation plan.	Project design or MoA or FAO standards, Reviewed ESIA and soil samples	-Once in two-three years period for soil samples -Monitoring one time per year	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Project promoter, Wereda Agricalture and Zonal Environment	**Project cost**
13	Operation	Mitigation measures stated in EMP to factory effluents or wastewaters, construction wastes and air/sound emissions ;and air/sound pollution from other construction activities	- Health and safety , effluents, air/sound pollutions , land degradation or excavation or construction wastes conditions to minimize the problems.	Comparing from factory design or health and safety or CoFFEC or construction or labor law standards, Reviewed ESIA and samples taking	Once per six month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Project Promoter, Zonal Environment /WeredaHealth Offices	**100,000**
14	Operation	Mitigation measures stated in EMP to vegetation cover and biodiversity, aquatic Ecology	Vegetation cover and biodiversity, aquatic conditions	Environmental Code of Practice for Agricultural Investment(MoA) , Reviewed ESIA and CoFFEC standards , visiting ,professional views, samples taking	Once per six month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Project Promoter, Omo park, Zonal Environment /Wereda Agriculture Offices	**150,000**

15	Operation	Mitigation measures stated in EMP to Parks/Wildlife Aspects/Tourism	Monitoring the activities EMP, change in population of key wildlife species during in and out migration period, effects of the development plan on wildlife and tourism	Environmental Code of Practice for Agricultural Investment(MoA) , Reviewed ESIA and CoFFEC standards , visiting ,professional views, samples taking	Every month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Multidisciplinary team consisting of Omo park, zonal environmental office and project promoter)	**150000**
16	Operation	Mitigation measures stated in EMP to minimizing downstream and the project farm or compound water pollutions	Downstream and the project farm or compound water pollutions	Basic water quality parameters tests as to FAO/WHO standard, etc. Optimize, agrochemicals utilization/selectivity based on soil fertility and crops agrochemicals needs; establish a proper monitoring of agro-chemicals systems of applications as to MoA/ CoEFCC guide lines;	Once per six month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5and down stream	Project promoter and Zonal Environment	**100000**
17.	Operation	Mitigation measures stated in EMP to farm lands	Introduction of new species and crops. Agrochemicals conditions	Use MoA rules and regulations. Use environmentally friendly agrochemicals as to the MoA/CoEFCC rules and regulations. Implement as of the MoA's guideline, annex 2, from 2.1up to 2.12.	Once per six month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Project promoter and Zonal Environment	**100000**
18	Operation	Mitigation measures stated in EMP to mosquitoes and water born diseases	Malaria and water born diseases conditions	MoA (SECPAI) and Health Standards	Once per six month	Kuraz1,Kuraz 2,Kuraz 3 and Kuraz 5	Project promoter ,Regional and Wereda Health/ zonal environmental offices	**Project Cost**
21	Operation	Mitigation measures stated in	Communicable	MoA (SECPAI) and	Once per six	Kuraz 3 and	Project promoter	**Project**

		EMP to Communicable diseases (HIV/AIDS)	diseases (HIV/AIDS) conditions	Health Standards	month	Kuraz 5	,Regional and Wereda Health Offices and zonal environmental	**Cost**
22	Operation	Mitigation measures stated in EMP to sanitation and water supply	Sanitation and water supply conditions, minimum requirements the nation.	MoA (SECPAI), Health and WHO Standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter ,Regional and Wereda Health Offices and zonal environmental	**Project Cost**
23	Operation	Mitigation measures stated in EMP to Social/ Cultures/Heritages/Archaeology/ Conflicts	Develop a sustainable communication programs with the community, workers and the wereda administrators	Communicate the community, workers and the wereda administrators	Once per month	Project(Kuraz 3 and Kuraz 5) site's kebeles and wereda	Project promoter, Wereda Administrators, zonal environmental and concerned bodies stated in the EMP.	**Project Cost**
24.	Operation	Mitigation measures stated in EMP to labor and working conditions	Labor and working conditions	Visiting workers and project administrators. MoA (SECPAI)/ CoEFCC and Ethiopian Labor Law standards	Once per six month	Kuraz 3 and Kuraz 5	Project promoter, , zonal environmental and Regional Bureau of Labor and Social Affair	**Project Cost**
25	Operation	Mitigation measures stated in EMP to settlers /community/ traffic hazards /women/energy/ animal fodders and water issues	Settlers /Community/Traffic Conditions. Promoter plans to settlers /community/ traffic hazards issues	Communicate/train/aware the settlers, community, drivers and the wereda administrators	Every month	Project(Kuraz 1,kuraz2, Kuraz 3 and Kuraz 5) site's kebeles and wereda	Multidisciplinary team consisting of Wereda Pastoralist and Administrative Offices ,Zone Environmental Bureau and Project Promoter	**Project Cost**
26	Operation	Kuraz Sugar Industries Environmental Management	Evaluate achievements of the	Project site observation, investigation and other	Once per six month	Project site(Kuraz	Multidisciplinary team(Composed	**300000**

		trends	environmental management and monitoring plan	approaches		1,kuraz2, Kuraz 3 and Kuraz 5)	by CoFFEC)	
27	Operation	Environmental Audit	Effectiveness of EMP	Project site observation, investigation and other approaches	Once per two years	Project site(Kuraz 1,kuraz2, Kuraz 3 and Kuraz 5)	Multidisciplinary team	**300000**
			Total Annual Proposed Budget(birr)					**2300000**
			Total Three Years' Proposed Budget(birr)					**6900000**

9.5 Environmental Budget

9.5.1 Training Costs

The estimated budget for environmental training costs was also estimated at ETB 600 000 per year.

Table 39: Environmental Training Budget

S/N	Description of Cost Item	Cost, ETB
1	An Environmental (including wildlife impacts)/labor and working condition trains of trainees, Ethiopian Labor law and ILO regulations to the selected project workers and managers/supervisors.	200 000
2	Training courses (per diem and course material)	100 000
3	International Environmental Convention like 14001 including perdium and related costs	300 000
Total per year		**600 000**
Total for the first three years		**1 800 000**

9.5.2 Summary of the Total Environmental Budget

Table 40:Summary of the Total Environmental Budget

S/N	Environmental Cost Description	Estimated Cost, ETB per year	Estimated Cost, ETB for three years
1	Environmental Management Budget(excluding main costs)	3,460, 000.00	10,380,000.00
3	Environmental Monitoring budget	2,300,000.00	6,900,000.00
4	Environmental Training budget	600 000.00	1,800,000.00
Total		**6,360,000.00**	**19,080,000.00**

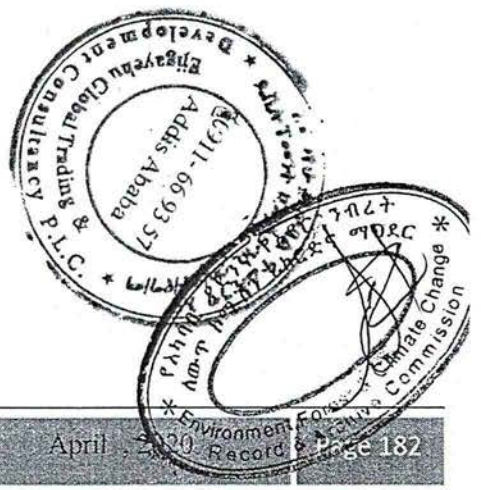
9.6 Environmental Reporting

Reporting is a tool for summarizing the status of the implementation of the environmental management plan activities, and it helps in providing information to decision makers to decide a right /timely actions. There is always an action plan to follow up easily the implementation of EMP, in both physical and financial planning. In addition to reporting, compiling or recording the data in relation to EMP activities should be crucial since information is a backbone of this issue as of any project activity. Both internal and/or external environmental audits have their own roles in assisting in correcting or strengthen the implementation and evaluation processes of the EMP; and make finally the EMP efficient and effective in solving environmental issues' problems in the area.

Quarterly Report: Usuallythe action plan is segregated quarterly basis so that the reports on environmental monitoring activities and findings as well as the financial performances reported to the senior management body with quarterly basis. The management body will take an action timely for the problems encountered and gives a strategic direction for implementers. The main aim of this reporting is to make the farm project more concern on environmental issues, which in turn maintain environmentally friendly mechanized farm duties.

- **Site Report:** This is a report prepared at least weekly by site experts of environmental management plan about the performances of EMP. This report and the data avail help to identify the weakness and the strengthen parts of the plan; and correcting timely theweakness of the plans.
- **Record Keeping and Reporting:** Environmental data will be recorded daily basis in the developed system. Besides monthly, quarterly and annual information compiled and reported at least annually to the appropriate line and regulatory bodies.





10. CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The ESIA Review, Study and Validation of Kuraz Sugar Development Project assessment has showed the positive and negative impacts of the project on the local and surroundings , regional and at large to national/international levels. The assessment concludes that the positive impacts are by far better than that of the adverse if the project implements strictly the proposed mitigation measures as to present in the EMP. In short, the project is viable from the environmental resources and socio economy aspects.

10.2 Recommendations

The ESIA review considers both natural resources and socio economic parts of the project area. The major potential adverse impacts of the project screened; and proposed mitigation measures for them. In general, the assessment recommends the major following points:-

- It is mandatory to work with the community, local administrations' bodies(Zones and Wereda), stakeholders such as Ethiopian Wildlife Conservation Authority, Authority for Research and Conservation of Cultural Heritage, local sectoral offices, Parks and others so as to bring sustainable solutions during the design revisions , construction and operation phases.
- Strengthen/scaling up the existing positive performances/relations or in house experiences including Omo 1 and 2 factories in environment and social relations with the community.
- The project should implement the updated ESIA, the EMP.
- The ESIA should be given to the concerned stakeholders to work with them.
- This reviewed ESIA will be served for the next five years (2020-23).In the year of 2024 ,the overall impact assessment will be conducted. The results of the overall outputs of the impact assessment will determine whether the further revision of ESIA to be conducted or not.

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Annex I: Environmental &Social Impact Assessment (ESIA) Socioeconomic Household Survey Questionnaire Kuraz Sugar Development Project

Region _____ **Woreda** _____ **Kebele** ____ **Place** _____

Enumerator: Introduce yourself and explain the purpose of this survey, which is to collect data on the issues of socio economy with regard to mainly the project area. The collected data will be used only for ESIA study ; and kept confidential by the Client or not transferred to any third party .

Code ----------

1. Basic Data

Date in GC (dd/mm/yyyy) | | | | | | | | |

Name of enumerator .....

For enumerator: use NA for "Not Applicable"

2. Household characteristics and related:

2.1) Name of household head.....

2.2) Respondent's name (if a household head, write NA) .....

2.3) House hold's social characteristics

Household head information						Number of family members' ages by group and sex					Number of family members' school enrollment by sex				
Sex(M)	Age	Major occupation (1Farmer, 2.Trader,3. Off farm, 4. Employed 5. Others)	Marital status (1.Married 2. Single 3. Divorced 4. Widowed)	Religion (1. Protestant 2.Ortodox, 3.Muslim,4. Catholic 5.Traditional)	Level of education (1.Illiterate ,2.Read and writing, 3. Grade 1-8 , 4.Grade 9-12 , 5. Above 12)	Sex	<7	7-13	14-64	>64	Sex	Not attend(kg, others)	1-8	9-12	>12
						M					M				
						F					F				
						T					T				

2.4) Types and number of housing units of the household

S.No	Types of housing units	Number of housing units			
		Main house	kitchen	Cattle shed	Toilet
2.4.1	Corrugated sheet covered housing units with wood and mud wall				
2.4.2	Thatched (grass) roofed housing units with wood and mud wall				

2.5 How long have you lived here

1. Born here, 2. Less than 10 years 3 . Above 10 years

2.6 How many of your family members are unemployed? Male--------Female --------

2.7) Do you and/or your spouse practice family planning service? 1. Yes 2. No

2.8) Do you in the favor of many children? 1. Yes 2. No

2.9) If yes for 2.8 why? ----------

2.10) What kinds of modern housing equipments you have? ----------

3. Agriculture and Food Supply

3.1 HH's Land Use

Land utilization	Possessed in Sq.M		Total
	Owned	Rented	
-Cultivated -Grazing -Tree -Residence, others			
Total			

3.2 HH's Crop Production and Consumption

3.2.1What kind of farming system mainly you use ?----------

1. Traditional using hoe 2. Traditional using oxen 3.Small irrigation 4.Others ----------

3.2.2 HH's Crop Production and Consumption			
Major crops	2010E FY		
	Cultivation. land in ha	Prod. in Qu	Average consumption per month in kg
Rain feed			
1. Maize			
2.Sorghum			
Irrigation			
1.Vegetables			

3.3 Agriculture Extension and Inputs

3.3.1 What kinds of agriculture extension services you have been provided? ----------

3.3.2 Do you use different inputs (fertilizers, pest controls ,etc.) ------1. Yes 2. No

3.3.3 .If no why, ----------

3.3.4 What are the major problems in agriculture production? ----------

3.3.5 If your production is not enough for HH consumption, how do you manage mainly to fill this gap?----------

3.4 Livestock

3.4.1 Average number of livestock held by the household ?

S.no/year in FY	Livestock type	2010E FY
1	Cattle	
2	Oxen	
3	Donkeys	
4	Horses	
5	Mules	
6	Sheep	
7	Goats	
8	Camel	
9	Others	
10. Beehives	Modern	
	Traditional	

3.4.2 What are the major types of livestock diseases in your area? ----------

3.4.3 Do you have veterinary service with fair price in your kebele ? 1. Yes 2. No

3.4.4 If no, where have you been going mainly in case of getting livestock diseases ?----------

3.4.5 Do you like/have you practiced carrying out fattening and /or dairy programs with improved breeds? If you are provided with the necessary training and material.-----1. Yes 2. No

3.4.6 Have you ever received any extension service, credit, and training for livestock production? ---------- 1. Yes 2. No

3.4.7 What are the main problems of livestock keeping? ----------

3.4.8 Do you practice aquiculture? ---------- 1. Yes 2. No

4. Social and Development Services

4.1 Education

4.1.1 State the name/s and type/s of school in your area ----------, ----------

4.1.2 The nearest school distance from your home----------km

4.1.3 Do you regularly send your children to school? ------ 1. Yes 2. No

4.1.4 If no for 4.1.3 why? ----------

4.1.5 What are the major problems of education in your area? ----------

4.2. Health Service

4.2.1 State the major common diseases which affect your family ----------

4.2.2 Where have you been going mainly when getting sick (state the name) ---------- ----------

4.2.3 The nearest health institution distance from your home----------km

4.2.4 Have you ever received health education on prevention and control?-----1. Yes 2. No

4.2.5 Have you had an awareness of sexual diseases/HIV/AIDS transmissions? ---1. Yes 2. No

4.2.6 Do you know how to protect yourself / your family from HIV/ AIDS? ----- 1. Yes 2. No

4.2.7 What are the major constraints in health services?----------

4.3 Drinking Water Supply

4.3.1What is the main source of water used for drinking and food cooking? ------

1. River 2. Pond 3. Deep and shallow boreholes 4. Hand dug borehole 5. Protected spring 6. Un protected Spring 7. Piped water 8. Others

4.3.2 How far do you travel to fetch water from the major supply source?

Round trip distance: KM _____OR _____Minutes

4.3.3 Do you pay for water? ----- 1. Yes 2. no

4.3.4 If yes for question 4.3.3 how much on average per month in birr? --------

4.3.5 Who mainly collect water for the family? -------- 1. Wife 2. Female children 3. Male children 4. Husband 5. All HH members

4.3.6 What are the major problems with the existing water supply scheme? ----------

4.4. Sanitation Facilities

4.4.1. Do you have toilet? ---------- 1. Yes 2. No

4.4.2 Where are you disposing your domestic dry waste? ----------

1. Everywhere 2. In the nearby farming plots 3. In the pit 4. In the nearby natural depression 5. Other

4.5 Transports and Communication

4.5 .1 Do you have transportation problems ?------- 1. Yes 2. No

4.5 .2 If yes, what is the major two problems? First ----and second ---

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1. There is no road at all 2. The tariff is high 3. The road is not paved

4. The road is too far 5. Other problem (Specify) _____

4.5 .3 Which communication properties do you use? ----------

1. Radio 2. TV 3. Telephone 4. 1&3 5. 1&3 6. All 7.none

4.6 Household Source of Energy

4.6.1 What is your major source of energy for the household consumption? ------

1. Fuel wood 2. Charcoal 3. Cow dung 4. Kerosene 5. Others ----------

4.6.2 From where you obtain fuel wood for household consumption?----------

1. Natural forest 2. Own planted forest 3. Market 4. Others ----------

5. Socio Cultural Issues

5.1 Social Organizations

5.1.1How do you usually discuss the issues of community concerns, judiciary activities and managing of communal scarce resources , respectively? through -------

1) Government administration bodies (Kebele, Sub kebele, etc) 2)Iddir and/or other related informal social organization, 3) Religious leaders 4)Esteemed elders 5) Others----------

5.1.2 Do you organize or participate in the informal organizations such as Iddir, Debo, Wonfel, Mahiber and other similar informal social organizations? --------- 1. Yes 2. No

5.1.3 If yes for question 5.1.2, state the name of the most important one ? ----------

5.2 Community Participation

5.2.1Have you participated in any community development program (Afforestation ,soil and water conservation, social services (water supply, education, health etc.) ,road construction)?----1. Yes 2. No

5.2.2 In what form mainly do you participate? ----------

1. Labor contribution 2. Money contribution 3. Material provision 4 . Idea generation

5.3 Attitudes on the Sugar Development Project

5.3.1 At first time ,who told you about this project?-----1. Agriculture expert (DA) 2. Friends 3. Government administration agent 4. Project owner 5.others

5.3.2 Did you accept the proposed development project? -------1. Yes 2. No

5.3.3 If yes, what did you expect from it?

1. Job opportunity 2. Knowledge transfer

3. Better infrastructure & social services 4. All 5. Other _____

5.3.4 How many of your family members are working in this farm project?----------

5.3.5 If you have a negative perception towards this project, what is the main reason:---------

1. Fear of losing land 2.Fear of losing house 3.Fear of losing trees(Fire wood, Herbal Medicine, Wild Edible Items etc) 4. Reduction of income from crop production 5.Reduction of income from livestock 6.Fear of social disruption 7. Others----------

5.3.6 Is there any change in you or your family live hood /working culture, etc after the development of this project ? ----- 1. Yes 2. No

5.3.7 if yes for 5.3.6 what is the main change ------1. Family income increase 2. Working culture changed 3. Gained technical skills 4. Others ----------

5.3.8 Have your part of land or other properties (fence, tree, crops, house etc) taken/ affected by this project so far?---------- 1. Yes . 2. No .

5.3.9 If yes for 5.3.8, have you gotten the adequate compensation for the part of properties you lost due to this project? ------ 1. Yes 2. No

5.4 Gender Issues

5.4.1Who is the decision maker on the household assets (land, livestock, etc) in your household?

1. Husband only 2. Wife 3. Both 1&2 4. All house hold members

5.4.2 The average working hours for men and women per day:

Description	In the house (hr)	Out side the house (hr)
Male		
Women		

5.4.3 Do women participate in the decision making of community affairs and development activities?

1. Yes 2. No

5.4.4 What are the most two pressing needs of women in this area?

1. Grinding mills 2. Safe water supply 3.Mathernal and child health care services 4. Credit and saving schemes

6. Micro Finance and Marketing

6.1 Do you have an access for credit and saving facilities? ------ 1. Yes 2. No

6.2 If no for question 6.1 why?---------1. Lack of collaterals 2.No financial institution 4. High interest payment 3. I am not interested 4. Other----------

6.3 If yes for question 6.2, does it bring a positive change in you/your family live hood? --- 1. Yes 2. No

6.4 Is there any agricultural products' marketing problem due to high production long marketing channel, low price, etc ? ---- 1. Yes 2. No

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6.5 If yes for question 6.4, which one is very serious---------- 1.High production 2. Long market channel 3.Low price 4. Others----------

6.6 What kinds of the first two major agricultural products' marketing systems you adopt ? -----1. Sale at local market by your self 2. Selling through the unions 3. Sale to brokers/wholesalers 4. Other ----------

7. HOUSEHOLD'S INCOME, SAVING AND EXPENDITURE

7.1. Estimates of average monthly income of the household from different sources

S.No	Income Sources	Average income per month in birr
1	Crop production	
2	Sale of vegetables and fruits	
3	Sale of forest and its products	
4	Sale of livestock and livestock products	
5	Sale of fish	
6	Off farm activities	
7	Petty trade	
8	Salary and wages	
9	Remittance	
10	Others	
	Total	

7.2 . Average monthly expenditure and saving of the household

S.No	Expenditure/saving by types	Average expenditure /saving per month in birr
1	Food	
2	Clothing	
3	Fuel	
4	Salt, sugar, oil etc	
5	Soap and other sanitation	
6	Medical/treatment	
7	Education	
8	Farm inputs and livestock expenses	
9	Social cost and others (idder, etc)	
	Total	
10	Saving (iquib, etc)	

Annex II: Description of Soil-landscape Mapping Units (SMU) of the Kuraz Sugar Development Project and Their Extent

No	SMU	Area		Description
		ha	%	
1	1a1A-bVR	8460.9	6.5	Soils develop on a very gently sloping plain; heavy clay; very deep (>150cm); dark gray (10YR 4/1, moist);surface soil pH 8.29 (strongly alkaline) to 9.12 (very strongly alkaline); very strongly saline and sodic(ESP:15 – 30%) within the top one meter depth. Area coverage of the unit is 8,660.13ha and HaplicVertisols (Hyposodic) and Salic Vertisols (Calcaric, Hyposodic) are the major soil units.
2	1a1B-a/bVR	9293.0	7.1	The soils occur on a very gently sloping plain; heavy clay; very deep (>150cm); dark gray (10YR 4/1, moist) to very dark gray (10YR 3/1, moist); surface soil pH 8.02 (strongly alkaline) to 9.54 (very strongly alkaline); slightly to very strongly saline within one meter depth; sodic; strongly calcareous. Area coverage of the unit is 9674.04 ha of land (11.24%). HaplicVertisol (Calcaric, yposodic), Salic Vertisol(Hyposodic) and Salic Vertisol(Calcaric, Hyposodic) are the dominant soil units.
3	1a1C-c/dVR	62.5	0.0	Soils develop on a very gently sloping plain; heavy clay; very deep (>150cm): dark yellowish brown (10YR3/4, moist) to dark grayish brown (10YR4/2, moist) Surface soil pH 8.25 to 8.75 (strongly alkaline); strongly saline in one meter depth of the soil profile; non-sodic. This unit covers 62.50 ha and HaplicVertisols and HaplicVertisols (Calcaric) are the major soil units
4	1a1F-c/dVR	913.1	0.7	Soils develop on a very gently sloping plain; heavy clay; very deep (>150cm); very dark grayish brown (10YR 3/2, moist); surface soil pH 7.55 to 8.50 ; slightly to moderately saline within the top one meter depth ;non-sodic and it is strongly calcareous. This unit covers about 913.12ha and HaplicVertisols, HaplicVertisols (Calcaric) and HaplicVertisols (Hyposodic) are the dominant units
5	1a3B-cVR	17261.6	13.3	Soils developed on a very gently sloping plain; heavy clay; deep (100-150cm) to very deep (>150 cm); very dark brown(10YR 2/2), moist); surface soil pH 7.57(slightly alkaline) to 8.84 (strongly) alkaline; strongly to very strongly saline within one meter depth of the soil profile; ESP ranges from 8 to 15%(non-sodic) within the top 1m depth and moderately calcareous. The total extent of the unit is 18,011.1 ha of the gross area and the dominant major soil units are Salic Vertisols and HaplicVertisols.
6	1a3C-bVR	236.9	0.2	Soils develop on a very gently sloping plain; heavy clay; deep (100-150cm) to very deep (>150cm); dark gray (10YR 4/1, oist); surface soil pH range from 8.58 to 8.74 (strongly alkaline) ; strongly saline on top to 1meter depth; ESP ranges from 15 to 30 % (sodic) within the top one meter depth and moderately calcareous. The total area coverage of the unit is 236.91 ha. The major soil types of the unit are HaplicVertisols (Hyposodic) and HaplicVertisols (Calcaric)

7	1a3D-c/dVR	10572.8	8.1	Soils developed on a very gently sloping plain; heavy clay; very deep (>150 cm); dark brown (10YR 3/3), moist) surface color; surface soil pH 6.68 (neutral) to 8.32 (strongly alkaline); slightly to moderately saline; non-sodic and moderately calcareous. Area extent of the unit is 10,851.65 ha. HaplicVertisols and HaplicVertisols (Calcaric) are the dominant soil type of the unit.
8	1a3G-dVR	765.4	0.6	Soils develop on a very gently sloping plain; heavy clay; deep to very deep (>100 cm); very dark grayish brown (10YR 3/2, moist); Surface soil pH 7.34 (neutral) to 8.47 (strongly alkaline); none saline; none sodic and moderately calcareous. The total extent of the unit is 3,192.90 ha. HaplicVertisols and HaplicVertisols (Calcaric) are the dominant soil type of the unit.
9	1b2A-cCM	1437.2	1.1	The soils occur on a very gently sloping plain; clay to loam; very deep (>150 cm); dark brown (10YR 3/3, moist); surface soil pH 7.96 (slightly alkaline) to 8.90 (strongly alkaline); none saline on the surface; none sodic with in one meter; moderately to strongly calcareous with in one meter. The total area of the unit is 4887.57 ha. HaplicCambisols (Calcaric), HaplicCambisols and EndosalicCambisols (Calcaric) are the major soil unit.
10	1b2F-dCM	235.9	0.2	The soils occur on a very gently sloping plain; clay; very deep (>150 cm); reddish brown (7.5YR 4/3, moist) to dark brown (10YR 3/3, moist); surface soil pH 7.3 (neutral) to 7.9 (slightly alkaline); none saline on the surface; none sodic with in one meter; moderately to strongly calcareous within one meter. The total area of the unit is 598.88 ha. HaplicCambisols and HaplicCambisols (Calcaric) are the major soil unit.
11	1b3B-bFL	1198.1	0.9	The soils develop on a very gently sloping plain; clay to loam; very deep (>150 cm), brown (10YR 4/2, moist) to dark grayish brown (10YR 4/2, moist); surface soil pH 7.24 (neutral) to 8.34 (strongly alkaline); none saline to strongly saline throughout the unit and within the profile; sodic (15 to 30 %); moderately calcareous within one meter depth. The total area of the unit is 3753.75 ha. HaplicFluvisols (sodic) are the dominant soil unit.
12	1c3G-dCM	2287.5	1.8	The soils develop on a very gently sloping plain; clay loam; very deep (>150 cm); brown (10YR 4/3, moist) to dark yellowish brown (10YR 3/4, moist); surface soils pH 6.46 (slightly acid) to 7.37 (neutral); none saline on the surface; none sodic with in one meter; moderately to strongly calcareous with in one meter. The total are of the unit is 3050.44 ha. HaplicCambisols (Calcaric) and HaplicCambisols are the major soil units.
13	1d1A-bSC	69.9	0.1	The soils develop on a very gently sloping plain; loamy; very deep (>150 cm); dark yellowish brown (10YR3/4,moist); surface soils pH 8.8 (very strongly alkaline); sodic with in one meter; strongly alcareous with in one meter. The total area of the unit is 80.05 ha. HaplicSolonchacks (Sodic) is the major soil unit
14	1f2E-c/dVR	827.9	0.6	Soils develop on a very gently sloping plain; sandy loam to clay loam; very deep (>150cm); dark brown (10YR 3/3, moist); surface soil pH 6.07 (slightly acidic); moderately saline within the top one meter depth of the soil profile; none sodic and moderately to strongly calcareous. Area coverage of the unit is 854.09 ha.

				%). HaplicVertisol and HaplicVertisol (Calcaric) are the major soil units.
15	1g3G-dFL	5088.9	3.9	The soils occur on a very gently sloping plain; silt clay to sandy loam; very deep (>150 cm); brown (10YR 4/3, moist) to dark brown (10YR 3/3, moist); surface soils pH of 7.04 (neutral) to 7.91 (slightly alkaline); none saline on the surface; none sodic with in one meter depth and moderately calcareous. The total extent of the unit is 6351.71 ha. HaplicFluvisols (clayic) and HaplicFluvisols are the dominant soil unit.
16	1h2G-b/cCA	94.5	0.1	The soils occur on a very gently sloping plain; sandy clay loam to sandy loam; deep (1-150cm) to very deep (>150 cm); brown (10YR 4/3, moist) to dark grayish brown (10YR 3/3, moist); surface soil pH 8.27 to 8.50 (strongly alkaline); none saline on the surface; none sodic to sodic with in one meter; moderately to strongly calcareous within one meter depth. The total area of the unit is 740.30 ha. HaplicCalcisols (Sodic) and HaplicCalcisols are the major soil units.
17	1i2A-bCM	422.2	0.3	The soils occur on a very gently sloping plain; clay to loam; very deep (>150 cm); brown (10YR 4/3, moist) to grayish brown (7.5YR 4/3, moist); surface soils pH 8.65 to 8.77 (strongly alkaline); none to moderately saline on the surface; sodic (15 – 30 %) with in one meter; moderately to strongly calcareous within one meter. The total area of the unit is 1185.09 ha. EndosalicCambisols (Calcaric,Sodic) are the major soil unit.
18	2j1G-bCM	293.5	0.2	The soils develop on a very gently sloping plain; loam to loamy sand; very deep (>150 cm); brown (10YR 4/3, moist) to dark yellowish brown (10YR 4/3, moist); surface soils pH 7.74 (slightly alkaline) to 8.34 (strongly alkaline); none saline on the surface; sodic with in one meter; strongly calcareous with in one meter. The total area of the unit is 411.42 ha. HaplicCambisols (Calcaric, Sodic) and HaplicCambisols (Sodic) are the major soil unit.
19	4j1G-bCM	1762.8	1.4	The same as 2j1G-bCM except slope class 2-4%. The total area of the unit is 2096.71 ha.
20	A1f/hz	160.3	0.1	Deep; moderately well drained; fine clay stratified over sandy loam and fine clay and loam texture; brown to dark grayish brown and dark brown; moderately alkaline and very strongly alkaline; non-saline; flat (0-1% slope) alluvial plains soils (HaplicFluvisols (Sodic, Calcaric)).
21	A1f/m	829.9	0.6	Same as above; clay loam over clay, clay loam and loam; dark brown over dark yellowish brown; moderately alkaline; non-sodic; flat alluvial plains (0-1%) soils (HaplicFluvisols (Calcaric, yposalic)).
22	A1f/mz	568.9	0.4	Same as above; fine over heavy clay texture; very dark grayish brown and dark brown; very strongly alkaline; highly to extremely sodic; non-saline; flat alluvial plains (with slopes of 0-1%) soils (VerticSolonetz).

23	A1m/hZ1	420.8	0.3	Very deep, moderately well drained; very dark grayish brown over dark yellowish brown; medium texture clay loam stratified over heavy clay, silty clay loam and silty clays top to sub-soils; very slightly acidic and moderately to strongly alkaline; endo-sodic; non-saline; moderately calcareous; flat to nearly level (0-1 %) alluvial plains soils (MollicFluvisols (Endo-sodic, Calcaric).
24	A2f/mz	944.1	0.7	Very deep; well drained; fine clay texture stratified over medium texture; dark yellowish brown, brown and dark brown; moderately alkaline and very strongly alkaline; non-saline; very gently sloping alluvial plains (slopes 1 – 2%) soils (FluvicCambisols (SodicCalcaric)).
25	A2fZ2	614.2	0.5	Same as above but moderately deep to deep; dark brown over dark yellowish brown; fine clay texture; slightly alkaline over strongly alkaline; sodic; very gently sloping (1-2 %) alluvial plains soils (HaplicFluvisols (Sodic, Clayic, Calcaric).
26	A3m/s	274.2	0.2	Deep; moderately well drained; medium over sandy textures; dark brown over very dark brown and dark yellowish brown; moderately alkaline over very strongly alkaline; gently sloping alluvial plains (2-5%) soils (FluvicCambisols (Hyposodic, Endosalic)).
27	A4m	371.1	0.3	Point bar and/or gully complex (slope 2-5%) regions exceeding 0.5 m relative height requiring excessive leveling
28	A5m	196.7	0.2	Very shallow & shallow, somewhat excessively drained, loamy textured in areas with common rock outcrops, and abundant fine to coarse fragments, developed on sloping (5-8%) topography near river banks (Lithic Leptosols&mollicLeptosols).
29	D1f/h(z)	203.2	0.2	Same as above; poorly drained; dark brown to very dark grayish brown; flat to level alluvial plains (<0.5%) soils (StagnicVertisols (Hyposodic, Calcarc)).
30	D1f/hZ1C2	234.3	0.2	Same as above but slightly alkaline to very strongly alkaline; dark brown over very dark grayish brown; strongly calcareous; level (0.2 – 0.5% slopes) alluvial plains soils (HaplicVertisols (Endosodic, Calcaric)).
31	D1f/m(z)	100.3	0.1	Same as above; fine over medium textures; dark brown to brown; flat (0-0.2% slopes) depression alluvial plains soils (StagnicFluvisols (Hyposodic)).
32	D1h(z)	464.0	0.4	Same as above; imperfectly to poorly drained; dark gray, very dark gray to very dark grayish brown; no structural degradation; flat to level depression alluvial plains (<0.5%) soils (StagnicVertisolsHyposodic, Calcarc)).
33	D1hz	94.1	0.1	Same as above; very dark gray to dark grayish brown; show some structural degradation in the form of clay pans; non-saline; flat to level depression alluvial plains (<0.5%) soils (VerticSolonetz)
34	D1hZ1C2	2445.5	1.9	Same as above but imperfectly drained; very dark grayish brown and very dark brown; moderately sodic heavy clays; non-saline; moderately to strongly calcareous; level (0.2 – 0.5% slopes) alluvial plains soils (HaplicVertisols (Hyposodic, Calcaric)).
35	D1hZ2(C1)	8015.7	6.2	Very deep, imperfectly to poorly drained; moderately to very strongly alkaline; very dark grayish brown and dark gray; sodic heavy clays; moderately to strongly calcareous; flat to level (0.5% slopes) plains soils (SodicVertisols (Calcaric)).

36	D1hZ2C1	3913.2	3.0	Same as above but moderately to very strongly alkaline; black and very dark gray; moderately calcareous; flat (0 – 0.2% slopes) depression alluvial plains soils (SodicVertisols (Pellic, Calcaric)).
37	D1hZ2C2	462.0	0.4	Same as above but very strongly alkaline; dark gray and dark brown over very dark grayish brown; sodic heavy clay; level (0.2 – 0.5% slopes) depressional alluvial plains soils (Calcic Sodicvertisols).
38	D1hZ2S1C1	3470.4	2.7	Same as above but dark gray over dark grayish brown; moderately saline; flat (0 – 0.2% slopes) depression alluvial plains soils (SodicVertisols (Hyposalic, Calcaric)).
39	D1hZ3C1	1594.4	1.2	Same as above but very dark gray and very dark brown; heavy clay; slightly alkaline to strongly alkaline and moderately to very strongly alkaline; level (0.2 – 0.5 % slopes) depression alluvial plains soils VerticSolonetz.
40	D1hZ3C2	37.0	0.0	Very deep, imperfectly to poorly drained; highly sodic; moderately to very strongly alkaline; non-saline; gray over very dark gray; heavy clay textured; level (0.2 – 0.5% slopes) depressional alluvial plains soils (Calcic VerticSolonetz).
41	F2f(z)	311.7	0.2	Same as above; black and very dark grayish brown to dark brown; clay textured over clay loam; very strongly alkaline; endosalic; very gently sloping(1-2%) alluvial plains soils (HaplicVertisols (Hyposodic, Pellic)).
42	F2f/mz	392.1	0.3	Same as above; moderately well drained; dark yellowish brown over yellowish brown; very strongly alkaline; very gently sloping (1-2%) plains soils (VerticCambisols (Sodic)).
43	F3f(z)	330.6	0.3	Moderately deep; well drained; clay texture; dark brown to brown; moderately alkaline to very alkaline; moderately sodic and non-saline; gently undulating (2-5%) plains soils LepticCambisols (Calcarc,Skeletic).
44	F3hC2	227.6	0.2	Very deep, moderately well to imperfectly drained; very strongly alkaline; very dark gray brown over very dark brown & very dark gray; highly sodic; heavy clay texture; sodic; non-saline; gently sloping (4-6%) foot slope plains soils (Calcic VerticSolontez).
45	F3hZ1C1	1243.9	1.0	Same as above but very dark grayish brown and very dark gray;heavy clay texture; gently sloping (2-6%) foot slope plains soils (VerticCambisols (Hyposodic, Calcaric)).
46	F3m/fZ1	1647.0	1.3	Very deep, well drained; moderately to very alkaline; dark reddish brown over dark brown; medium texture stratified over fine clay texture; non-saline; gently sloping (2-6%) foot slope plains soils (HaplicCambisols (Endosodic)).
47	F4f/hZ2C1	640.0	0.5	Same as above but moderately well drained; very dark brown over dark brown; fine texture stratified over heavy clay texture; sodic; moderately calcareous; gently sloping (2-6%) foot slope plains soils (VerticCambisols (Sodic, Calcaric)).
48	F4hZ3C2	518.3	0.4	Very deep, moderately well to imperfectly drained; very strongly alkaline; very dark gray brown over very dark brown & very dark gray; highly sodic; heavy clay texture; sodic; non-saline; gently sloping (4-6%) foot slope plains soils (Calcic VerticSolontez).

49	H5m	102.1	0.1	Very shallow & shallow, well to somewhat excessively drained, very shallow, loamy texture with common rock outcrops and dominant stone cover, developed on dissected side slopes with slopes 5-8% (Lithic Leptosols and MollicLeptosols).
50	H6	11129.7	8.6	Very shallow, excessively drained dissected hills with slopes 8-30% (Lithic Leptosols)
51	L1f/hZ1	889.8	0.7	Same as above but very dark gray over dark grayish brown; fine clay over heavy clay texture;slightly alkaline to moderately alkaline; hypo-sodic; non-saline; nearly level (0.5-1 %) alluvial plains soils (HaplicVertisols (Pellic, Hyposodic).
52	L1f/m(z)	893.3	0.7	Very deep; moderately well drained; fine over medium textures; very dark grayish brown over dark brown/ brown; moderately alkaline over very strongly alkaline; non-saline; flat to level alluvial plains (with slopes <0.5%) soils (VerticCambisols (Hyposodic, Calcaric))
53	L1h	5954.3	4.6	Deep to very deep, imperfectly drained; very dark gray (10YR 3/1) top soils and very dark brown (10YR 2/2) over very dark greyish brown (10YR 3/2) in sub-soils; heavy clay texture; slightly acidic to moderately alkaline with pH 6.0-8.5 in top soils and pH 6.27-8.46 in sub-soils; moderately to highly calcareous; non-saline and non-sodic; flat alluvial plains (0 - 1 %) soils soils*(HaplicVertisols (Pellic, Calcaric))*
54	L1h(z)	710.0	0.5	Very deep, moderately to imperfectly drained; very dark gray (10YR 3/1) top soils and black (10YR 2/1) over very dark grayish brown (10YR 3/2) in sub-soils; heavy clay texture throughout; slightly alkaline (pH 7.07 - 7.8) on top soils and moderately to strongly alkaline (pH 8.0-8.87) in sub-soils and non-saline; hyposodic; nearly level (0.5 – 1% slopes) alluvial plains soils *(HaplicVertisols (Pellic, Hyposodic, Calcaric))*
55	L1hS1C1	156.0	0.1	Same as above but moderately alkaline; very dark gray; non-sodic; slightly to moderately saline; moderately calcareous; nearly level (0.5-1% slopes) lower plains soils (HaplicVertisols (Pellic, Hyposalic, Calcaric)).
56	L1hz	848.2	0.7	Very deep; imperfectly drained; black, dark gray to very dark gray; fine over heavy textures with some clay pans in sub-soils; moderately alkaline over very strongly alkaline; non-saline; flat alluvial plains (0-1%) soils (VerticSolonetz).
57	L1hZ1	564.4	0.4	Same as above but slightly alkaline to very alkaline; very dark gray over dark yelowyish brown; heavy clay textured; nearly level (0.5-1% slopes) lower terrace plains soils (HaplicVertisols (Pellic, Hyposodic)).
58	L1hZ1C2	2954.4	2.3	Very deep, imperfectly drained; strongly alkaline (pH 8.5-8.9) top to sub-soils; very dark gray (10YR3/1) over very dark greyish brown (10YR3/2); heavy clays; non-saline; strongly calcareous; nearly level (0.5-1 % slopes) lower terrace plains soils SodicVertisols (Pellic, Calcaric)
59	L1m/fZ1	189.1	0.1	Same as above but moderately well drained; very dark grayish brown over dark brown and brown; medium texture clay loam stratified over clay and sandy clay loam top to sub-soils; slightly alkaline and slightly to moderately alkaline; hyposodic; nearly level

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				(0.5-1 %) alluvial plains soils (HaplicCambisols (Clayic, Calcaric).
60	L2f(z)	173.4	0.1	Same as above; fine textures; moderately well drained; dark gray over dark brown, brown and very dark grayish brown; non saline; very gently sloping (1-2%) alluvial plains soils(VerticCambisols (Hyposodic,Calcaric)).
61	L2f/hZ2	222.3	0.2	Same as above but very dark grayish brown over very dark gray; fine clay texture over heavy clay; slightly alkaline over strongly alkaline; sodic; very gently sloping (1-2 %) alluvial plains soils (SodicVertisols (Calcaric).
62	L2f/m	41.7	0.0	Deep; moderately well drained; dark yellowish brown over brown and light gray; fine clay texture stratified over clay loam and sandy loam top to sub-soils; moderately alkaline; non-sodic; non-saline; moderately calcareous; very gently sloping (1-2 %) alluvial plains soils (FluvicCambisols (Calcaric).
63	L2h	442.6	0.3	Same as above but moderately well drained; very dark grayish brown over dark brown and brown; medium texture clay loam stratified over clay and sandy clay loam top to sub-soils; slightly alkaline and slightly to moderately alkaline; hyposodic; nearly level (0.5-1 %) alluvial plains soils (HaplicCambisols (Clayic, Calcaric).
64	L2hz1	72.4	0.1	Very deep; moderately well to imperfectly drained; very dark gray; heavy clay texture; slightly alkaline to moderately alkaine; hypo-sodic; non-saline; moderately calcareous; very gently sloping (1-2 %) alluvial plains soils (HaplicVertisols (Pellic, Hyposodic).
65	L2hZ2C2	1096.5	0.8	Same as above but moderately well drained; very dark grayish brown over dark brown and brown; medium texture clay loam stratified over clay and sandy clay loam top to sub-soils; slightly alkaline and slightly to moderately alkaline; hyposodic; nearly level (0.5-1 %) alluvial plains soils (HaplicCambisols (Clayic, Calcaric).
66	M1h	5064.2	3.9	Very deep; imperfectly to poorly drained; very dark gray (10YR3/1); heavy clay texturedthroughout, moderately acidic to slightly alkaline (pH 5.65-8.09) in top soils and slightly acidic to strongly alkaline (pH 6.23- 8.8) in sub soils; moderately calcareous; weak to moderately developed medium to coarse angular and sub angular blocky structures; slightly to moderately sodic and non saline; flat alluvial plains 0 - 1 % *soils (Stagnic/HaplicVertisols (Pellic))*
67	M1h(z)	1214.9	0.9	Deep; moderately well to imperfectly drained; dark gray (10YR 4/1) over very dark gray (10YR 3/1)/ dark greyish brown (10YR4/2); heavy clay over fine clay; weak coarse sub angular blocky structures; wide surface cracks; very slightly acidic to slightly alkaline (pH 6.7-8.0) at surface soils and moderately alkaline to strongly alkaline (pH 8.07 - 90) in sub-soils; slightly to moderately calcareous; flat alluvial plains (0 - 1 % slopes) soils (HaplicVertisols (Hyposodic, Calcaric))..
68	M1hD3	538.3	0.4	Moderately deep; moderately well to imperfectly drained; very dark gray (10YR 3/1) over very dark grayish brown (10YR 3/2); heavy clay; slightly acid to slightly alkaline soil reaction (pH 6.2 – 7.73)

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				top to sub-soils; non-saline and non-sodic; nearly level alluvial plains (0.5 - 1 % slopes) soils (*HaplicVertisols (Pellic)).*
69	M1hz	746.8	0.6	Very deep; moderately well to imperfectly drained; very dark gray (10YR 3/1) & dark gray (10YR 4/1) over very dark grayish brown (10YR 3/2)/ dark yellowish brown (10YR3/4); heavy clay; slightly to moderately alkaline (pH 7.15-8.4) at top soils and strongly alkaline to very strongly alkaline (pH 8.57 – 9.9) in sub-soils; moderately to highly calcareous; non-saline; sodic in sub-soils; nearly level alluvial plains (0.5 - 1 % slopes) soils (*SodicVertisols (Pellic, Calcaric))*
70	P1f/hD1	80.1	0.1	Very deep; imperfectly drained; very dark gray (10YR 3/1) over very dark grayish brown (10YR 3/2); fine texture overlaying heavy clay texture; slightly alkaline; none sodic; nearly level (0.5 – 1% slopes) alluvial plains soils (HaplicVertisols (Pellic, Calcaric)).
71	P1f/hZ1D1	38.2	0.0	Very deep; moderately well to imperfectly drained; dark brown (10YR 3/3) over dark yellowish brown (10YR 3/4); fine clay/silty clay texture soils stratified over heavy clays; slightly to strongly alkaline; moderatelysodic; nearly level (0.5 – 1% slopes) alluvial plains soils (HaplicVertisols (Hyposodic, Calcaric)).
72	P1fZ2D1	63.3	0.0	Very deep; moderately well to imperfectly drained; dark brown (10YR 3/3) over dark yellowish brown (10YR 3/4); fine clay texture throughout; slightly to very strongly alkaline; sodic; nearly level (0.5 – 1% slopes) alluvial plains soils (SodicVertisols (Calcaric)).
73	P1hD1	320.4	0.2	Very deep; imperfectly drained; very dark gray (10YR 3/1) over very dark grayish brown (10YR 3/2); heavy clay texture throughout; very slightly acidic to moderately alkaline; none sodic; nearly level (0.5 – 1% slopes) alluvial plains soils (HaplicVertisols (Pellic, Calcaric)).
74	P1hZ1D1	167.2	0.1	Very deep; imperfectly drained; very dark grayish brown (10YR 3/2) over very dark gray (10YR 3/1); heavy clay texture throughout; slightly to moderately alkaline; moderately sodic; nearly level (0.5 – 1% slopes) alluvial plains soils (HaplicVertisols (Hyposodic, Calcaric)).
75	P1hZ2D2	26.1	0.0	Very deep; imperfectly drained; black (10YR 2/1) and very dark gray (10YR 3/1) over very dark grayish brown (10YR 3/2); heavy clay texture throughout; moderately to strongly alkaline; sodic; nearly level (0.5 – 1% slopes) alluvial plains soils (SodicVertisols (Pellic, Calcaric)).
76	P2f/h D2	19.9	0.0	Very deep; moderately well drained; dark gray (10YR 4/1) over very dark grayish brown (10 YR 3/2); fine silty clay overlying heavy clays and clay loams; slightly alkaline; none sodic; very gently sloping (1. – 2% slopes) alluvial plains soils (HaplicVertisols (Calcaric)).
77	P2hD2	246.2	0.2	Very deep; moderately well to imperfectly drained; black (10YR 2/1) overlaying very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2); heavy clay texture throughout; slightly to moderately alkaline; none sodic; very gently sloping (1 – 2%

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				slopes) alluvial plains soils (HaplicVertisols (Pellic, Calcaric)).
78	P2hD4	5.9	0.0	Moderately deep; moderately well drained; very dark gray very dark gray (10YR 3/1) over very dark grayish brown (10YR 3/2); heavy clay textured; very slightly acidic to slightly alkaline; none sodic; very gently sloping (1 – 2% slopes) alluvial plains soils (EndolepticVertisols (Pellic, Calcaric)).
79	P2hZ2D2	249.2	0.2	Very deep; moderately well to imperfectly drained; black (10YR 2/1) and very dark gray (10YR 3/1); heavy clay texture throughout; moderately to strongly alkaline; sodic; very gently sloping (1 – 2% slopes) alluvial plains soils (SodicVertisols (Pellic, Calcaric)).
80	P3hD5	11.4	0.0	Shallow soils (25-50 cm); well to moderately well drained; dark brown (10YR3/3); clay and medium texture soils; common to many stones and many to abundant medium and coarse gravels; slightly alkaline; none sodic; very gently sloping to gently undulating (1 – 4% slopes) alluvial plains soils (MollicLeptosols).
81	R	1271.0	1.0	River beds and banks and stream channels; very shallow to shallow soils in most cases and moderately deep to deep soils in some cases with variable slopes (0.5 - 6%); common to abundant stones & common rocks in most areas (dominant soil type Lithic &MollicLeptosols)
82	U1f	213.5	0.2	Very deep, moderately well drained, black to dark grayish brown, fine clay to clay loam textured flat (0.5-1%) alluvial plain soils(HaplicVertisols (Pellic,Calcaric)
83	U1f/h(z)	686.5	0.5	Very deep; imperfectly drained; fine texture stratified over heavy clay textures; very dark grayish brown to dark gray and dark brown; moderately alkaline; non-saline; flat alluvial plains (0-1%) soils (HaplicVertisols (Hyposodic, Calcarc)).
84	U1f/hz	269.2	0.2	Very deep; imperfectly drained; fine texture stratified over heavy clay textures; very dark grayish brown to dark gray and dark brown; moderately alkaline; non-saline; flat alluvial plains (0-1%) soils (HaplicVertisols (Hyposodic, Calcarc)).
85	U2f/h(z)	464.4	0.4	Same as above; black over very dark grayish brown; moderately alkaline over very strongly alkaline; non-saline; very gently sloping alluvial plains (1-2%) soils (HaplicVertisols (Pellic, Hyposodic)).
	Total	**130,147**	**100**	

Annex VII: Minutes of Nyngatom Wereda,Kangate, Stakeholders and Public Consultations

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

Minutes of Public Consultation and /or Focal Group Discussion

Region ክልል Woreda ዓንጋቶም Kebele ካንጋቶ Place ካንጋቶ
Date 01/04/2012 Time 9:00

Discussion Points

1 የፕሮጀክቱ ገለፃ
2 የሠራተኞች ጥያቄ ጉዳዮ መልስ ስጠናል
3 ጎደሬል በሞተ ማደሻ መሬትና ካሳ ጥያቄዎችን ስለመመለስ ተወያይ
4 ማጠቃለያ
5

ሰላም ክቡራት ፡ ለዝርዝር ገለፃ ከመጣችሁ ጋር ስብሰባ ማካሄዳችን ፡
ጀምሮ ተወካዮችን ለመጋበዝ ፡ ትልቁን ጉዳይ ለማንሳት ፡ ይህም ፕሮጀክቱ
የሚተገበር መሆኑን ፡ ነገር ግን ከዚህ በፊት ከሚሰሩ ፕሮጀክቶች
ለየት ያለ ፡ ሰፊ ቦታ የሚሸፍን ፕሮጀክት ስለሆነ ፡ ከሚመለከተው
ሁሉ ጋር ውይይት ማድረግ አስፈላጊ ስለሆነ ፡ ከዚህ በፊት
ከሚሰሩ ፕሮጀክቶች ጋር ሲነፃፀር ፡ ከፍተኛ ሰው ኃይል
ስለሚያስፈልግ ፡ ከአካባቢው ማህበረሰብ ጋር ስለሚሰራ ፡ ከዚህ
አንፃር ከአካባቢው ማህበረሰብ ጋር ስለሚሰራ ፡ ከዚህ አንፃር
ከአካባቢው ማህበረሰብ ጋር ስለሚሰራ ፡ ከዚህ አንፃር
ከአካባቢው ማህበረሰብ ጋር ስለሚሰራ ፡ ከዚህ አንፃር

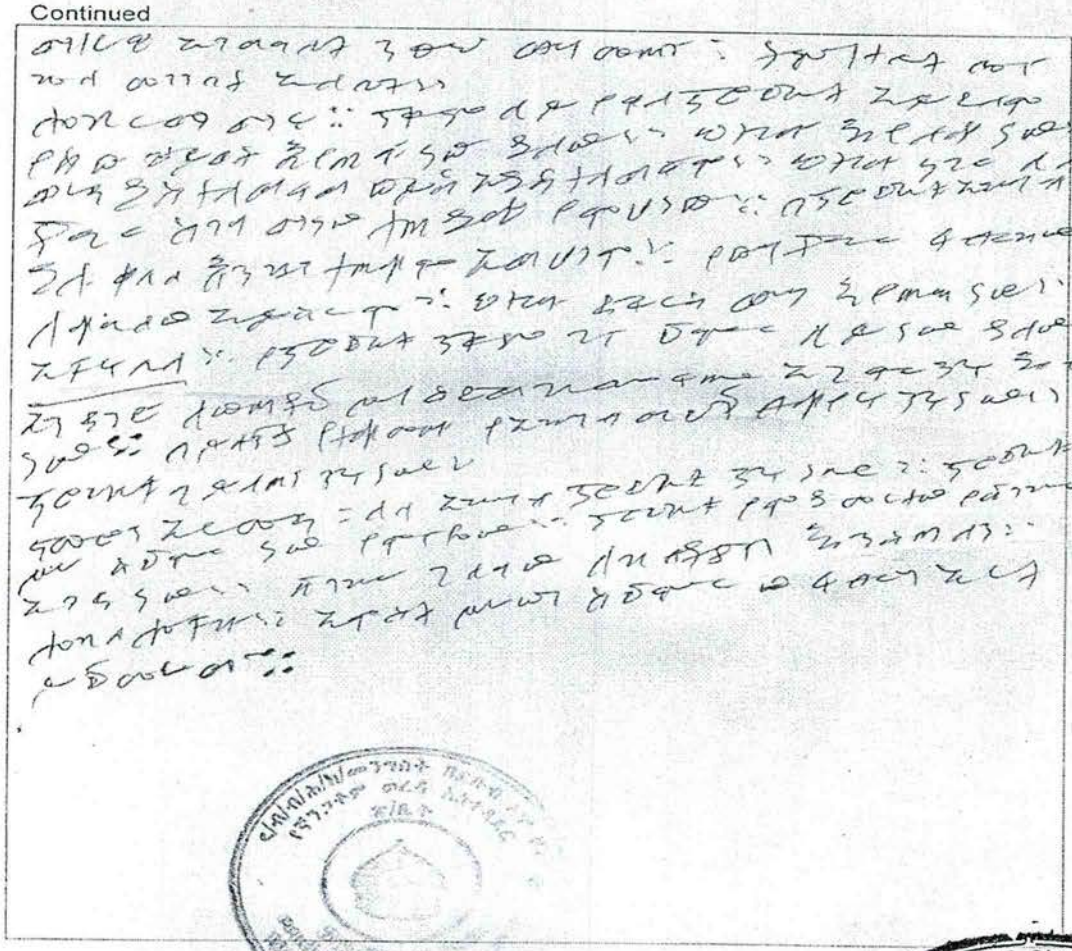
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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

Minutes of Public Consultation and /or Focal Group Discussion

Continued



-2-







ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJEC

List of Participants in Public Consultation/ Focus Group Discussion

Woreda Nyangatom Kebele Kangaten

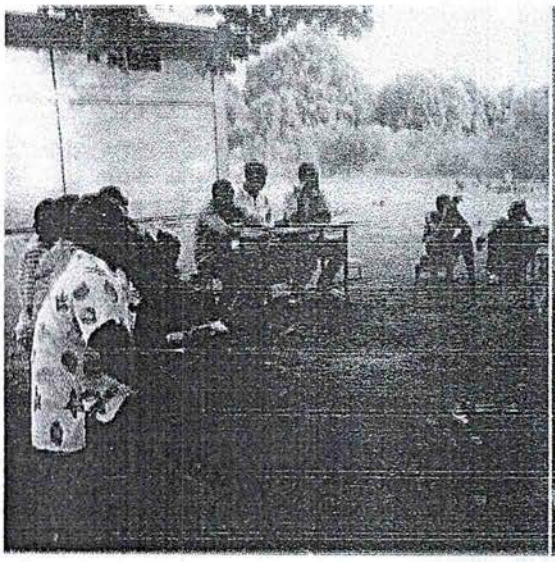
No	Name of Participant	Sex	Status	Signature
1	MENGISTU FOLLA	M	Advisor	
2	Lokalobong Lokeona	M	Urban Dev't & Housing	
3	Lotuko Logerewoy	F	pastoralist	
4	Namuroni Arumuda	F	pastoralist	
5	Apuun Billa	M	Revenues	
6	Markos Lokoli	M	Chief	
7	LOKAROMA MABOK	M	Kebele Manager	
8	Lokale Lobulu	M	Head Tribal	
9	Lito Lochoro	M	pastoralist	
10	Mora Korkon	M	Pastoralist	

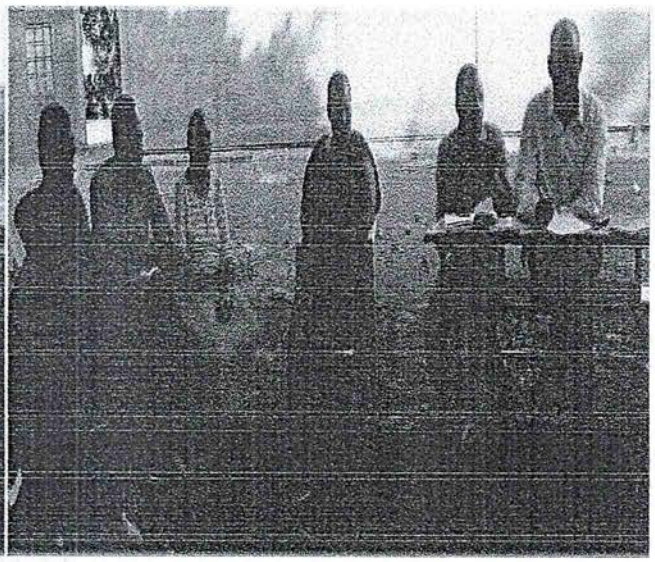
የአካባቢ ደንና የአየር ንብረት ለውጥ ኮሚሽን ሬኮርድና ማህደር
Environment,Forest & Climate Change Record & Archive Commission

Ethiopian Global Trading P.L.C. Development Consultancy Addis Ababa (011-66 93 57)

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Annex VIII: Photo slides by Study Team at Nyngatom ,Kangate, Consultation Meetings and Discussions







የአካባቢ የደንና የአየር ንብረት ለውጥ ኮሚሽን ሪከርድና ማህደር
Environment,Forest & Climate Change Record & Archive Commission

Annex IX: Minuit of Selamago Wereda ,Omo Hana,Hana Stakeholders and Public Consultations

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

Minutes of Public Consultation and /or Focal Group Discussion

Region ____ Woreda ____ Kebele ____ Place ____
Date 27/03/2011 E.C Time 4:20

Discussion Points

1 ____
2 ____
3 ____
4 ____
5 ____

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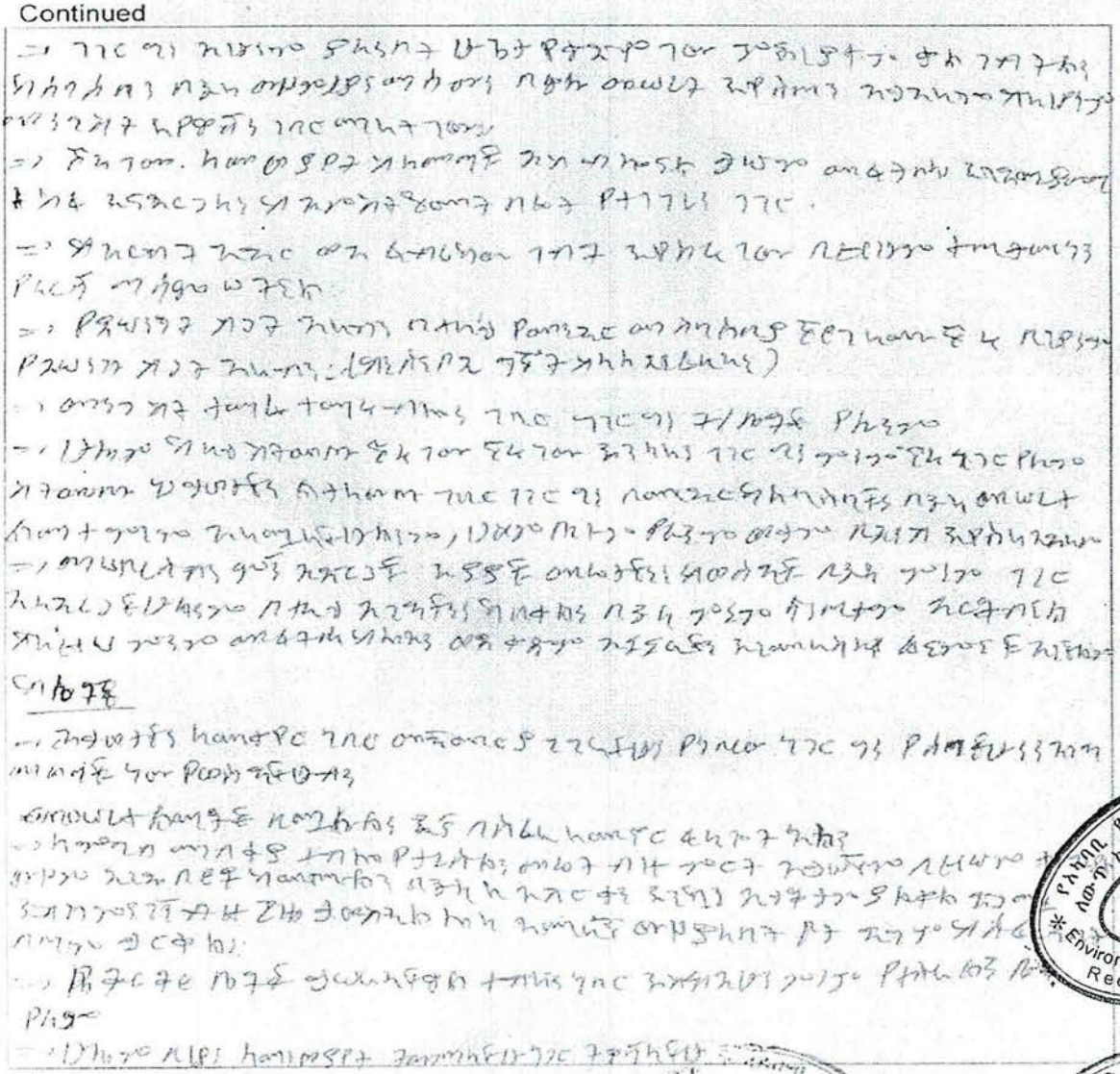
Ethiopian Global Trade & Development Consultancy P.L.C. Addis Ababa

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

Minutes of Public Consultation and /or Focal Group Discussion

Continued









-5-

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

List of Participants in Public Consultation/ Focus Group Discussion

Woreda _____ Kebele _____

No	Name of Participant	Sex	Status	Signature
1	Adisi Chirsela	F		
2	Lujemi Sage	F		
3	Kokila Anffara	M		
4	Gabdi Kolifu	F		
5	Pishila Pompajporo	F		
6	Hamuf Gamaro	F		
7	Gejbiyo Moriidanfi	M		
8	Barforo Pasamafui	M		
9	Ambi Gunamerj	M		
10	Mordifo Sasuna	M		
11	Ojtuia Abasabor	M		
12	Tesema Romi	M		
13	Kunnore Ojchone	M		
14	Arume Shalafuju	M		
15	Pasha Derta	M		
16	Ojkulo Mulaj	M		
17	Ojbulu Kavo	M		
18	Mama Dantorj	M		
19	Halifu Bashimaj	M		
20	Sepiu Gota	M		
21	Bonfajhuka Charka	F		
22	Morsabo Furachoro	F		
23	Andafolaino Gunamu	F		
24	Gosho Kenashima	F		

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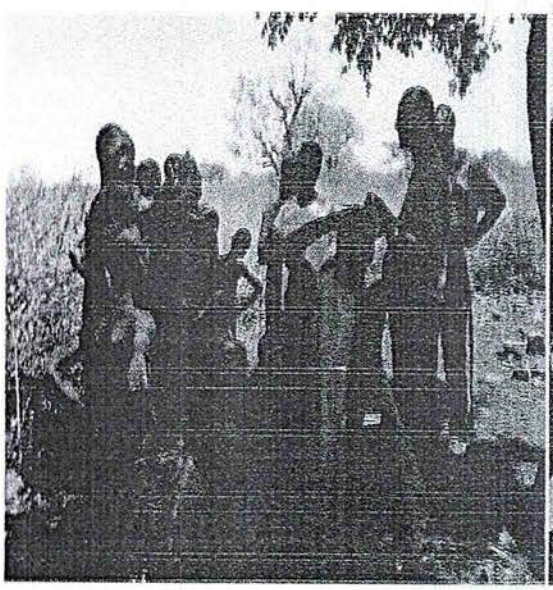
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FDRE SUGAR CORPORATION ,KURAZ SUGAR DEVELOPMENT PROJECT

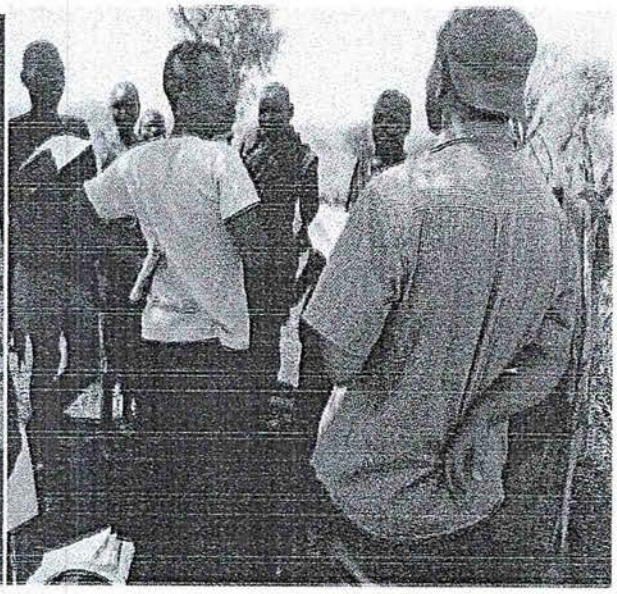
List of Participants in Public Consultation/ Focus Group Discussion

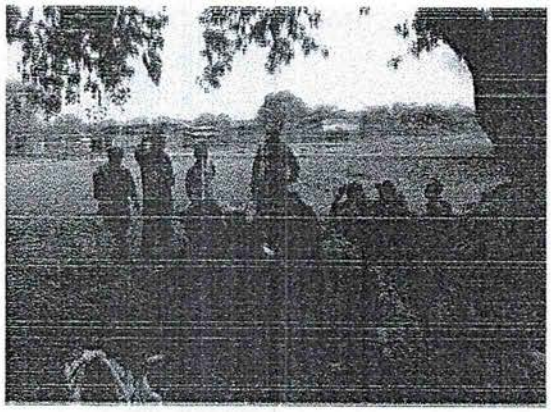
Woreda Hana Kebele Hana

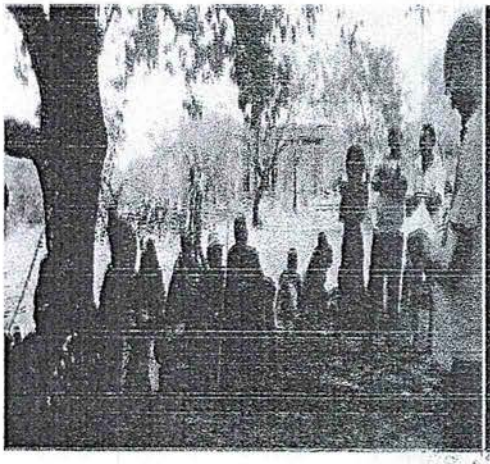
No	Name of Participant	Sex	Status	Signature
1	Chernet Eshete	M		
2	Nigatu Merdekios	M		
3	Meturja Gizachew	M		
4	Asheber Maran	M		
5	Senidu Pantabulo	M		
6	Sakachir Kori	M		
7	Melkamu Kelob	M		
8	Mikret Asrotu	F		
9	Yihun Belay	M		
10	Terfer Bigokumi	M		
11	Mezgu Kizafti	M		

Annex X: Photo Slides at Hana,Omo Hana and Surrounding Villages ,Selemago Wereda, Consultation Discussions with Stakeholders and Surrounding Community Including Women



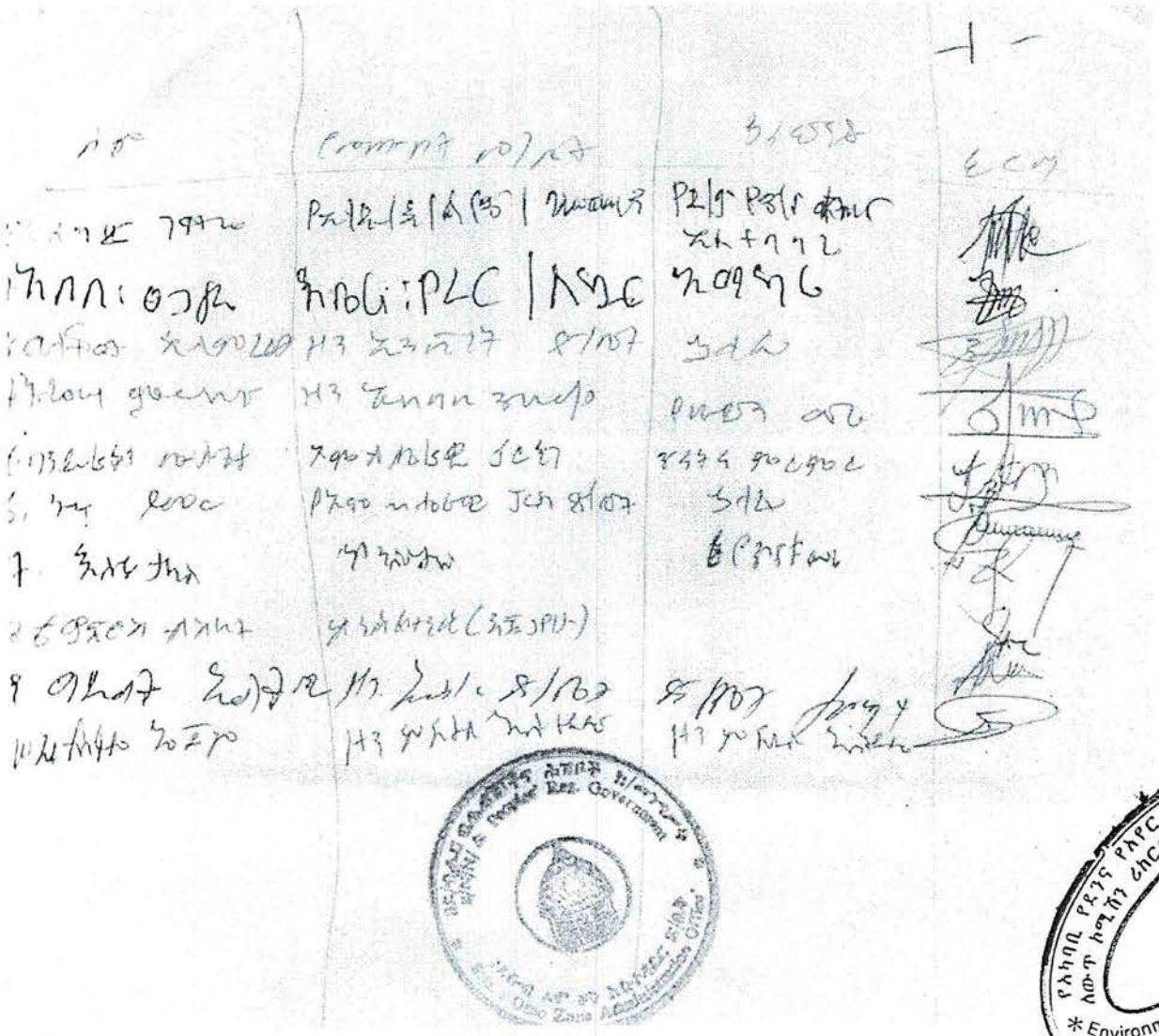


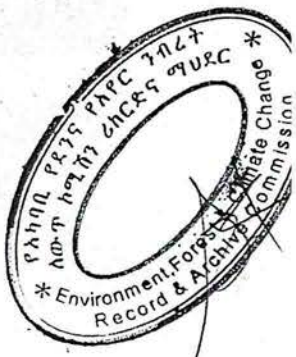






Annex XI: Minutes of South Omo Administration and Sector Offices Consultations









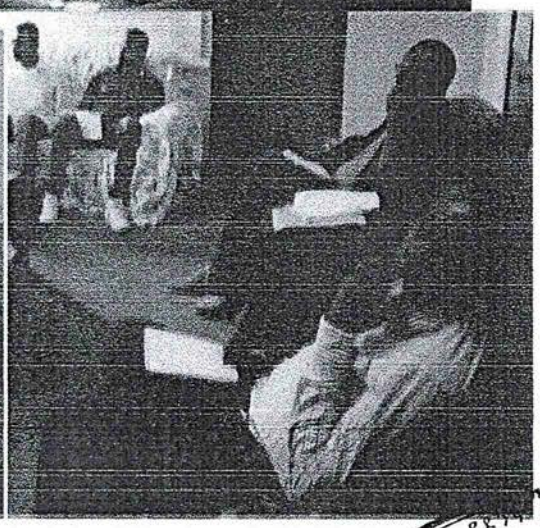

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Development Consultancy
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Annex XII: Photo Slides at Jinka ,South Omo Zone Administration and Sector Offices Consultations





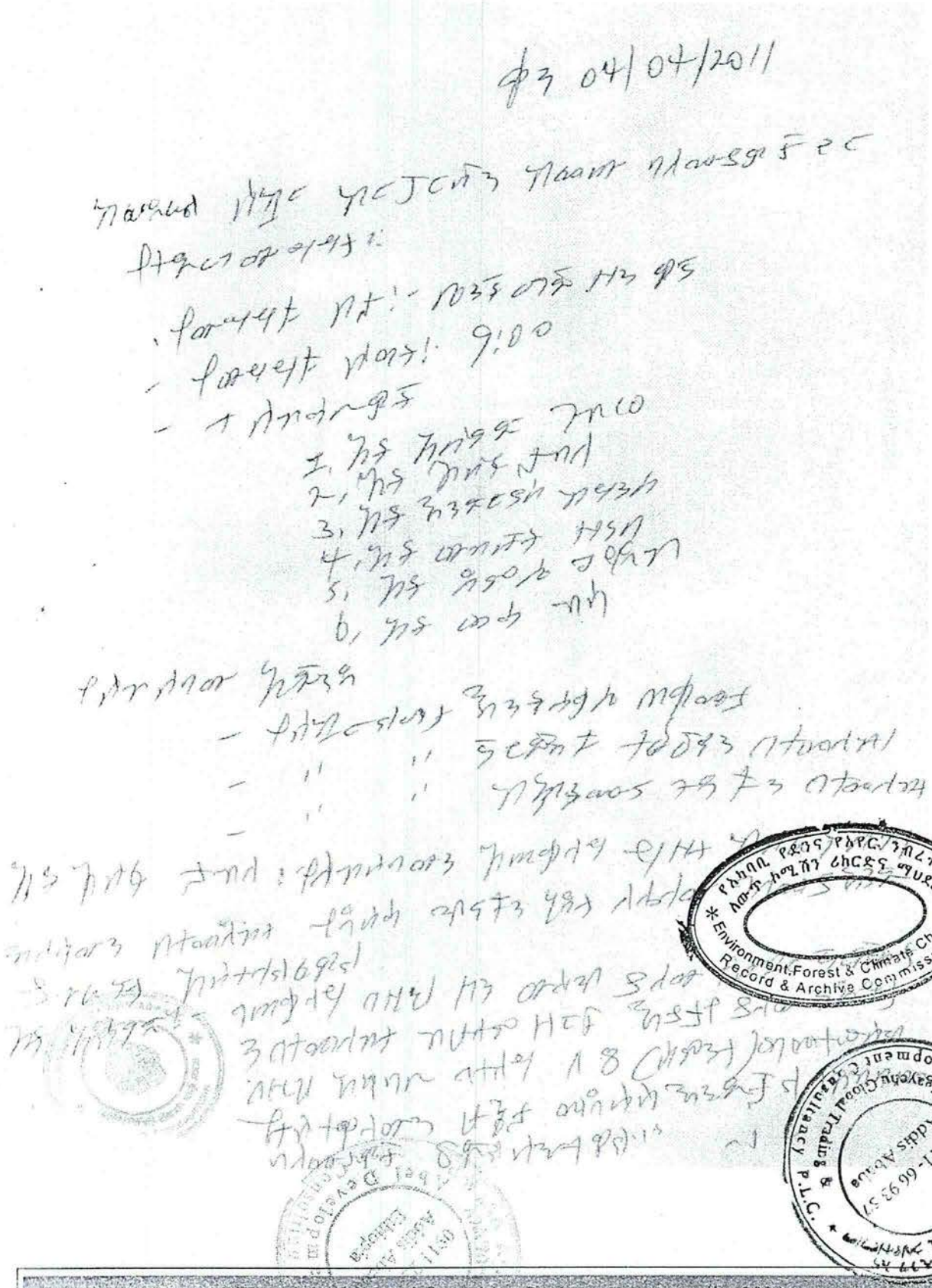


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Annex XIII: Minutes of Bench Maji Zone Administration and Sector Offices Consultations



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- ሰሜንና ደቡብ 0.75 ኪ.ሜ እና ምዕራብና ምስራቅ 0.25 ኪ.ሜ ርቀት ይገኛል።
- ተከታታይ ክትትል ማድረግ ከአካባቢ ጥበቃ ጋር ተገናኝቶ ለሚሰሩ ስራዎች ፈቃድ ከመስጠት በፊት ሁሉም ሰራተኞች ስለ አካባቢ ጥበቃ ግንዛቤ እንዲኖራቸው ማድረግ።

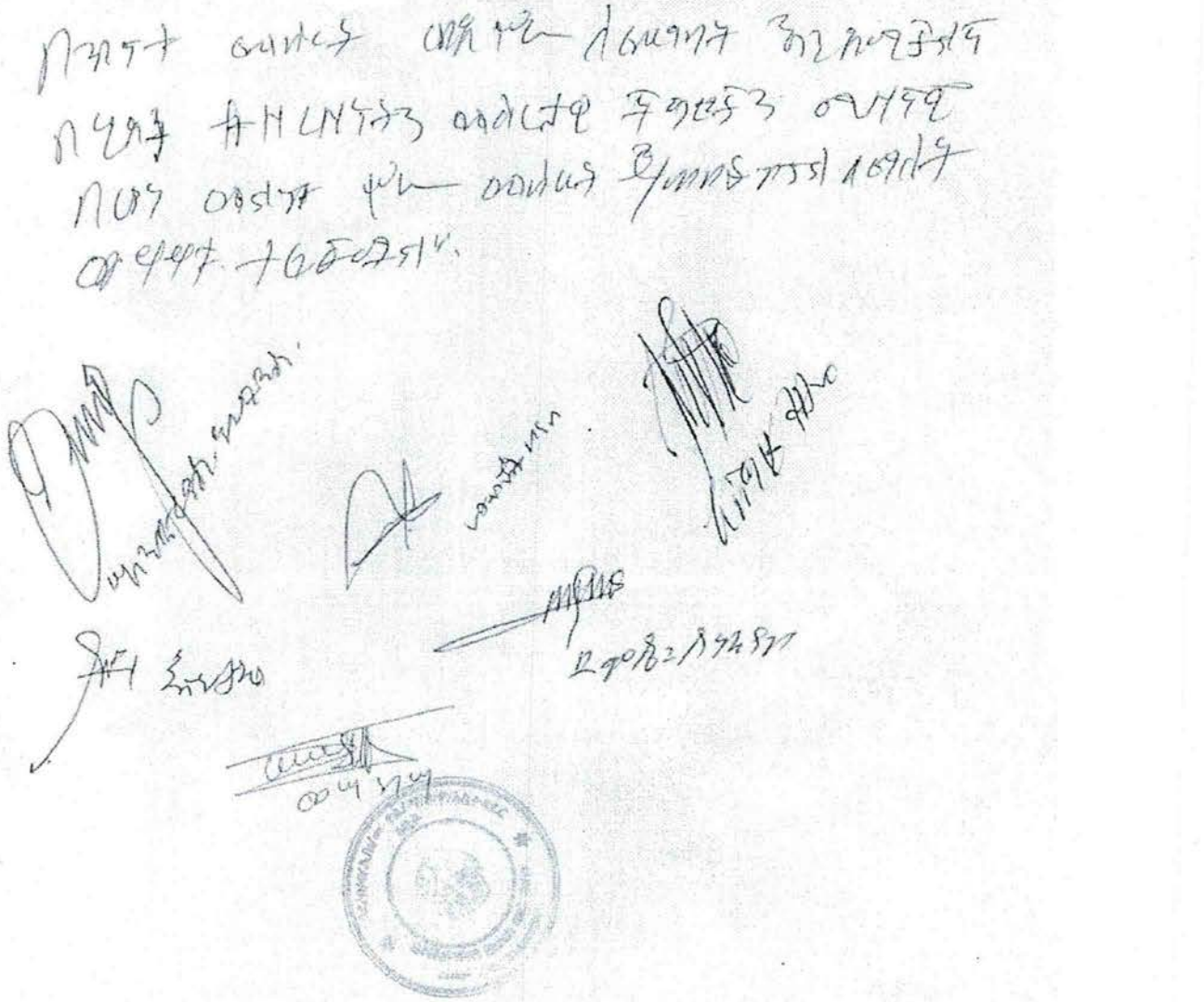
ሀ/ሰ/ኮ/ኢ/ል/ማ

- መቀመጫውን በቂ ቅጥር ግቢ ባለው ቢሮ ውስጥ ማድረግ
- ከሰራተኞች ጋር ስለ አካባቢ ጥበቃ ግንዛቤ ማስጨበጥ
- ከአካባቢ ጥበቃ ጋር ተያይዞ ለሚነሱ ጥያቄዎች ምላሽ መስጠት
- ከአካባቢ ጥበቃ ጋር ተያይዞ ለሚነሱ ጥያቄዎች ምላሽ መስጠት

ኢ/ፕ/ሀ/ል/ማ

- ከአካባቢ ጥበቃ ጋር ተያይዞ የሚነሱ ጉዳዮች ሁሉ ተገቢውን ትኩረት ሰጥቶ መፍታት
- ከአካባቢ ጥበቃ ጋር ተያይዞ ለሚነሱ ጥያቄዎች ምላሽ መስጠት

የአካባቢ የደንና የአየር ንብረት ለውጥ ኮሚሽን ሪከርድና ማህደር
Environment,Forest & Climate Change Record & Archive Commission
Addis Ababa Development Consultancy
Ethiopian Urban Development Consultancy
Addis Ababa Ethiopia



ተሳታፊው ሙያ የመጡበት ፊርማ

1. ኤፍሬም ታከለ ሰብ ኢሰማኮ

2 ደመቀ :: ግብርናቢሮ

3 መሰማ ሃጎ ሰ/ሥራ

4) ኢ ሰ ማ ኮ EPCA

5) ወ/መስቀል ዘነበ ዘነ ኢሰ/ጽ/ቤ/ጽ/ክ/ኃ

6) ፍሬው ቢራቦ-ማዳበሪያ

7. ንጉሰወን ሃጎ

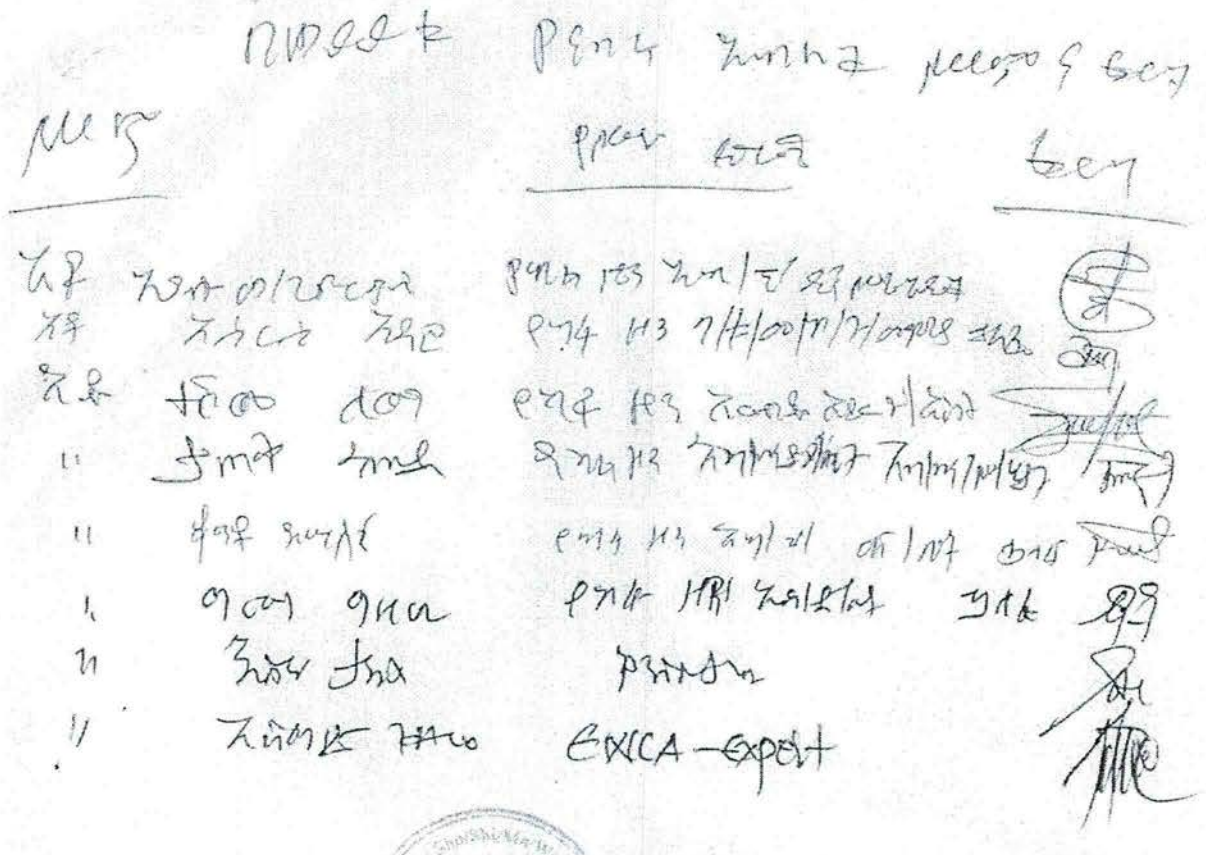
የአካባቢ የደንና የአየር ንብረት ለውጥ ኮሚሽን ሪከርድና ማህደር
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Ethiopian Global Consulting Development P.L.C.
Addis Ababa
011-66 93 57

AnnexXIV: Photo Slides at Mizan Aman ,Bench Maji Zone Administration and Sector Offices Consultations



Annex XV- : Minutes of Keffa Zone Administration and Sector Offices Consultations, Bonga











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ቀን 05/04/2011

ስብሰባ

- የስብሰባ ቦታ: ካሉ ዞን ጊሐር ቅርንጫፍ
- የስብሰባ ሰዓት: 8:10
- ሰብሳቢ: ጌቶ ግርማ ማዘጋጀት

ተሳታፊዎች

1 ጌቶ ግርማ ማዘጋጀት: የካሉ ዞን ጊሐር ቅርንጫፍ ኃላፊ
2 ጌቶ ጊዮርጊስ ጌቴ: የካሉ ዞን በህዝብ ተ/ ሠራተኛ
3 ጌቶ ተስፋዬ ኩማ = የካሉ ዞን ጊሐ ፋ ጊዜያዊ ጥበቃ
4 ጌቷ ታመነች ሃብቶ = የካሉ ዞን ጊሐ/ቅ/ጽ/ቤት የአመራር ባለሙያ
5 ጌቷ ቅድስት ደሚላቸው = የካሉ ዞን ጊሐ/ቅ/ጽ/ቤት ፅህፈት
6 ጌቶ ጊሐፃ ታገሱ —
7 ጌቶ ሄዝገላ ገብረ → ማቴሪያል

የስብሰባው ጊዜያዊ ውይይት

1 የአከባቢ ማህበራዊ ተወካዩ ግምገማ ተወሰኖ የነበረውን ጥያቄ ማህበሰቡን ጊዜያዊ ጥበቃ
2 የፕሮጀክቱ ጥቅም
3 የፕሮጀክቱ ጊዜያዊ ጥበቃ ሰራተኞ ሰፋሪዎች ቅጥርን
4 የአካባቢ ቅሬታ መፍቻ ስልቶች

ማቃለያ ሃሳቦች

- ሃላፊነቱን ለሚወስድ አካል ሰነዱን ከመላኩ በፊት ለሁሉም ባለድርሻ አካላት በማሳወቅ ሰነዱን ማንኛውም ሰው ማግኘት እንዲችል ማድረግ ያስፈልጋል።
- በአጠቃላይ በመስክ ምልከታው ጊዜ ያገኘናቸው ሰዎች ከፕሮጀክቱ ጋር በተያያዘ ያላቸው ግንዛቤ በጣም ከፍተኛ መሆኑን ለመረዳት ችለናል።
- ከዚህ ሀሳብ ጋር በተያያዘ ሰዎች ጥያቄ ሲኖራቸው ወይም ተጨማሪ ማብራሪያ ሲፈልጉ ማነጋገር የሚችሉት አካል ማን እንደሆነ ግልፅ ሆኖ ተቀምጧል።

የአካባቢ ደንና የአየር ንብረት ለውጥ ኮሚሽን Environment, Forest & Climate Change Record & Archive Commission
Ethiopian Global Trading & Development Corporation P.L.C. Addis Ababa 011-66 93 57
Addis Ababa Ethiopia

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- ፍጥረታት ከህወሃትና መሳሪያ : ፍጥረት ማለት ጌቶቻ ወይም ያጠፈሰ የምኮሆነ ስጋቸውና በማያት ያለን አጠቃቀ ሀሳብን ተግባራዊ ማድረግ ችሎ ሁሉ ማለት ነው።

- ሃይ ባርያ ማለት : በዘሀዝ ወይ አጠቃላይ ማንነቱን አጥፍቶ ለጌታው ገዝቷል።

ነፃ አውጪ ኃይል ሰንበቴ : ቅርጽያቸው የሀገራችን አጠቃላይ ወቅታዊ የሚንፀባረቅ :በዘሀዝ ውስጥ የሚሄዱትንም ሂደቶችን ስንመለከት ያተኮራቸውን ተመሳሳይ የሚያተጠቁሙ። ስለዚህ ከአሁን በኋላ አጠቃላይ አለም ሁሉ ፍጥረታችን ይመጣ ቸውንና የአሁኑን አጠቃላይ . ሂደቶች መቃ አጠቃ ስንመለከተው ለሚያስፈልገው ከሆነ ከሆነን መቋቋም ነው ብለን የምን ይሆን ነው ብለን ገልፀዋል።

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79.3


Environment, Forest & Climate Change
Record & Archive Commission


Addis Ababa

* Environment, Forest & Climate Change Record & Archive Commission *

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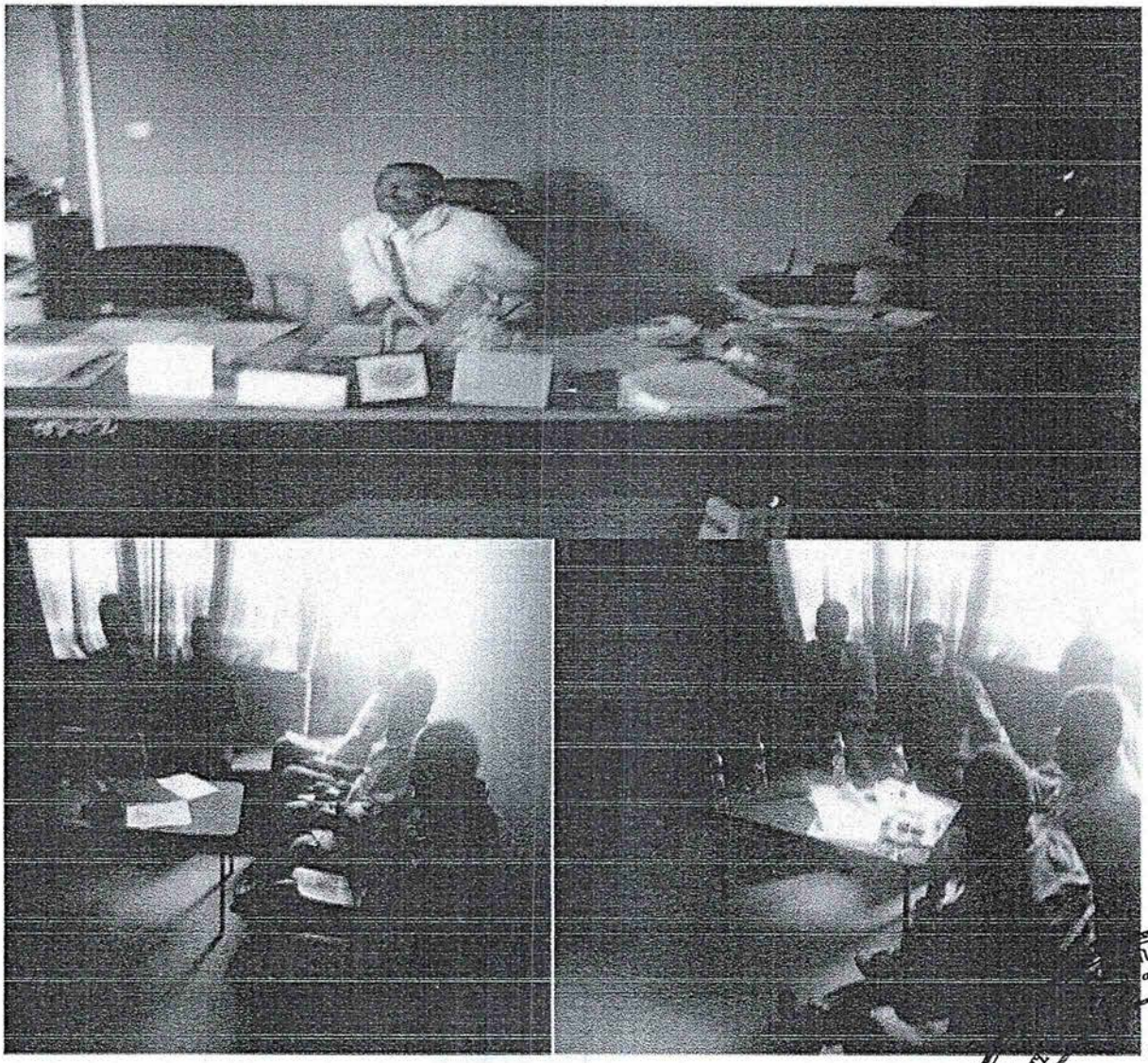
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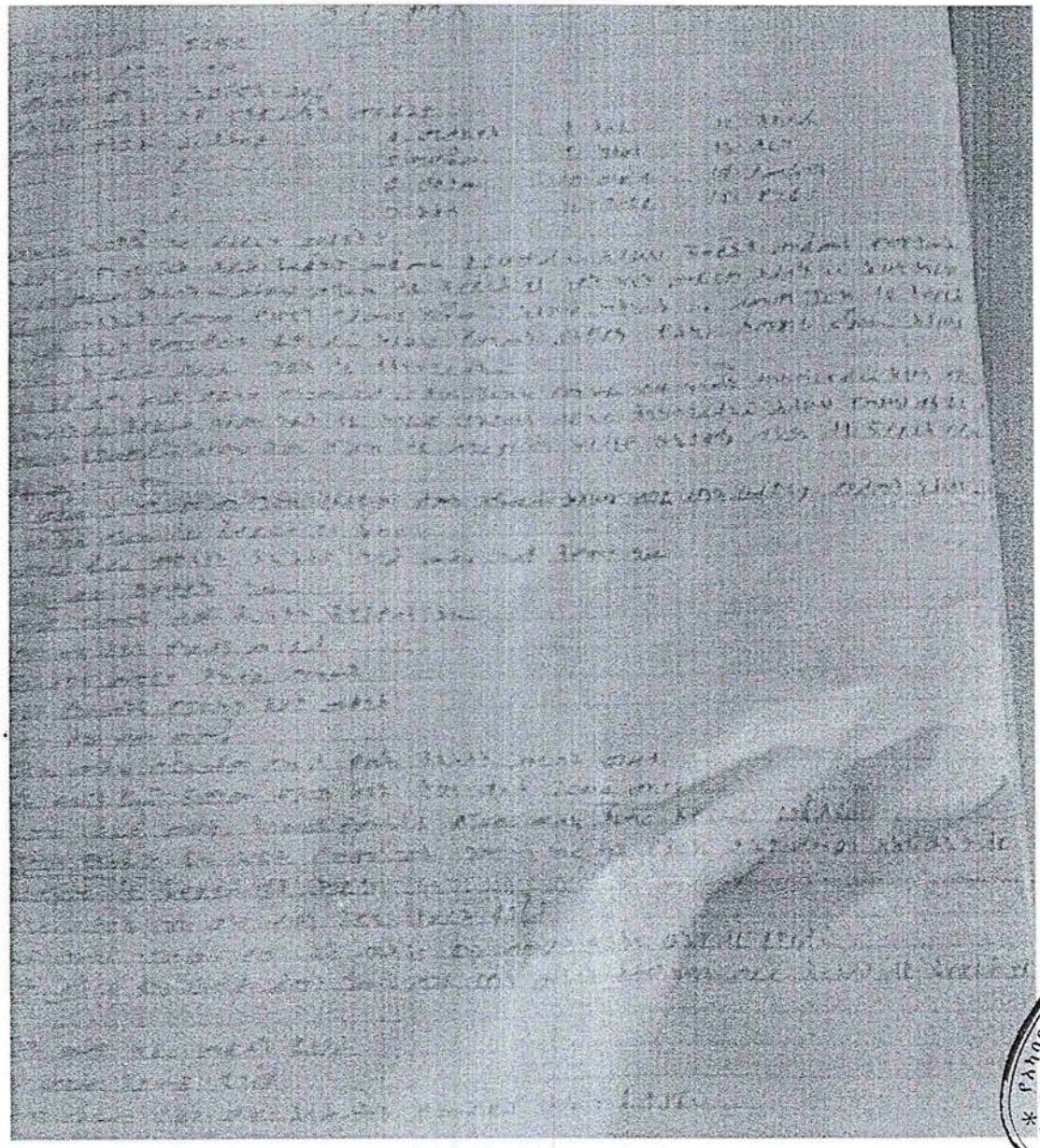
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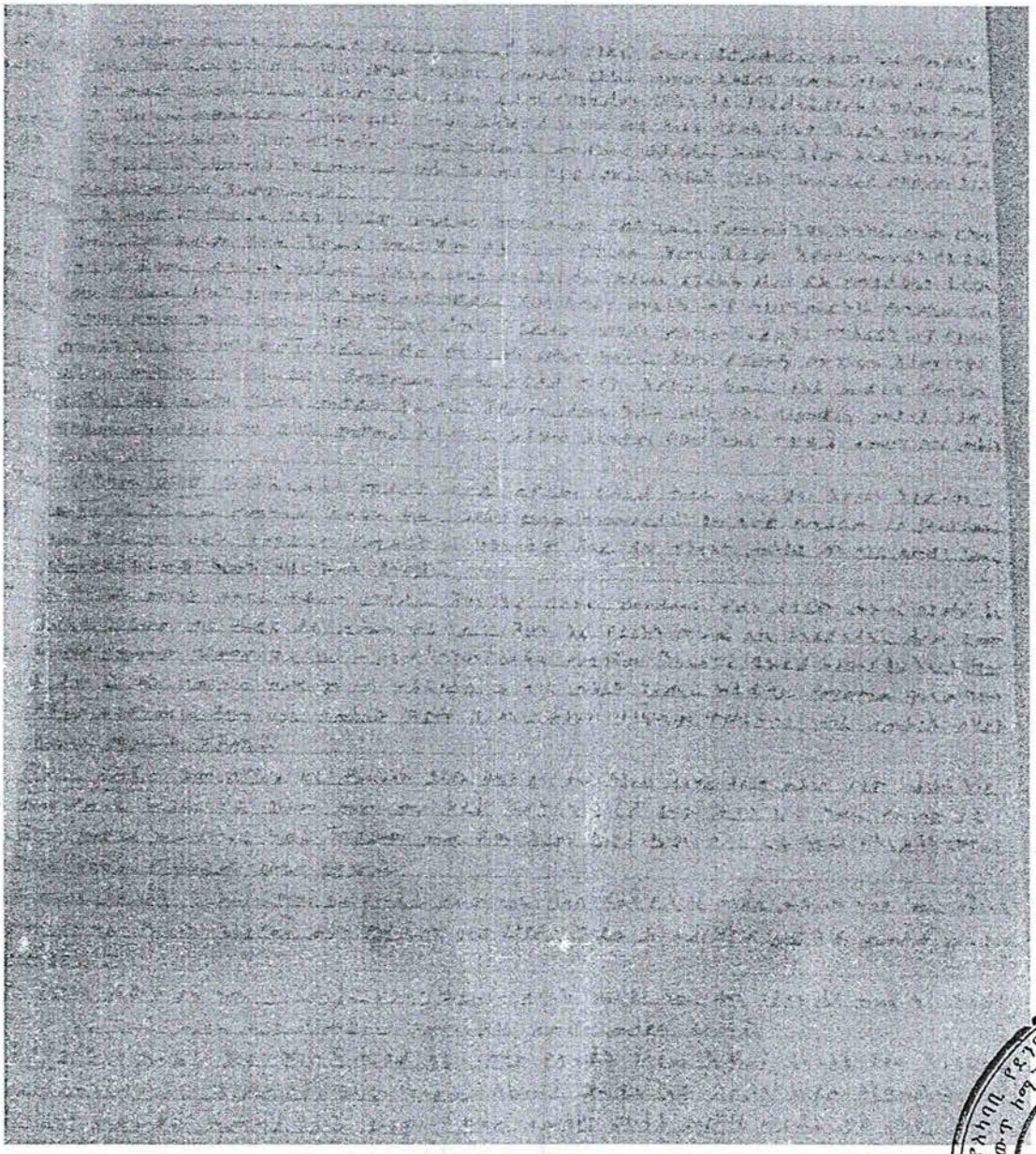
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Annex XVI: Photo Slides at Bonga ,Keffa Zone Administration and Sector Offices Consultations

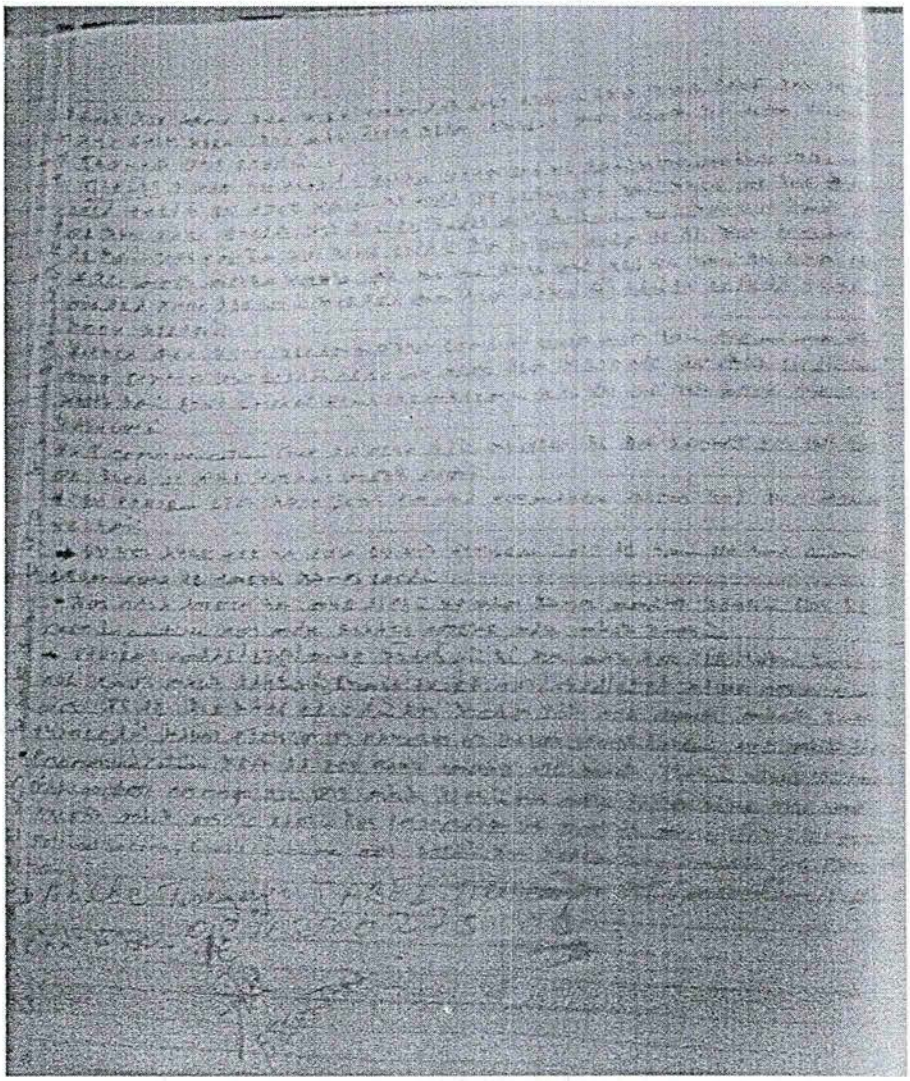


Annex XVII- : Minutes of Omo Park's Workers and Management Bodies , Park Office



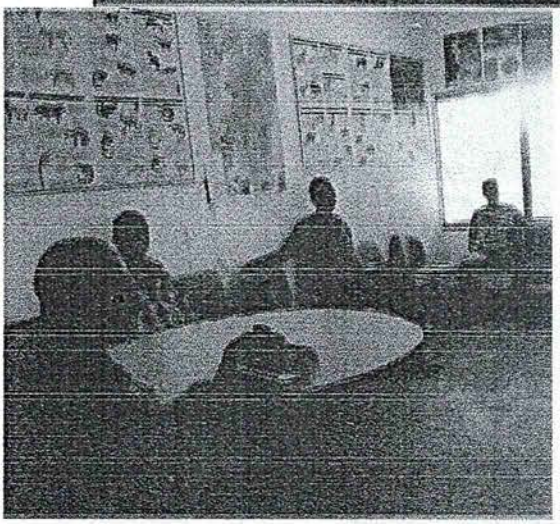


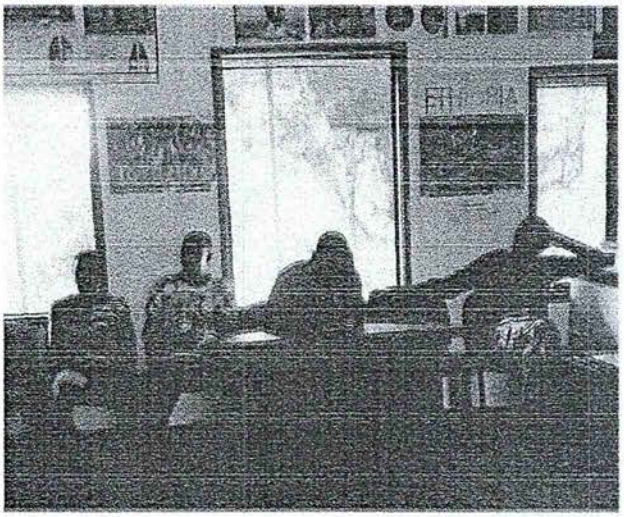
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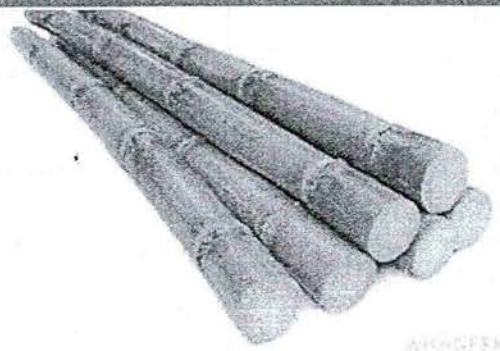
Annex XVIII-: Photo Slides at Omo Park Office ,Management Bodies and Employees Consultations







Annex XIX: Terms of Reference-TOR For Validation & Review of Lower-Omo Sugar Development Project Environmental Impact Assessment Study



Environment,Forest & Climate Change Record & Archive Commission

Addis Ababa

FDRE Sugar Corporation



Environmental Impact Assessment (EIA) for Lower-Omo Sugar Development Project**Error! Bookmark not defined.**

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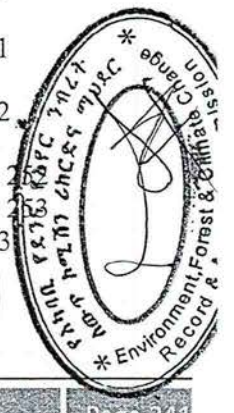
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Terms of Reference-TOR

1. Background Information

FDRE Sugar Corporation with a vision of executing sugar development activities in a large scale and structure came into existence on October 2010 by the Council of Ministers Regulation No.192/2010 replacing the former Ethiopian Sugar Development Agency.

As part of the development plan of the country, sugar development projects such as the Tana Beles, Wolkaite, and Kuraz sugar development projects have come into existence.

Kuraz Sugar Development is a project, which is the focus of this TOR, is found in South Omo Zone (Selamago and Gnanegatom Woredas); Bench - Maji Zone (Surma Maji and Mieinitshasha Woredas) and Keffa Zone (Diecha Woreda) of Southern Nations, Nationalities & People Region.

In addition to irrigation development, the Kuraz project consists of four factories, one of which factory number one, located in Selamago district is on its way to completion.

Two factories have a capacity of 24,000 TCD each and are capable of producing 556,000 tons of sugar and 52,324 meter cube ethanol a year while the remaining three will have a capacity of 12,000 TCD and are capable of producing 278,000 tons of sugar and 26,162 meter cube ethanol a year.

In the medium to long term the project plans to develop a total of 100,000 hectares of sugarcane plantation. The plantation will get its irrigation water from the Omo River through a diversion weir which is under construction with 381 meter width & 22.4 meter height.

Currently 10,000 ha are developed and the balance will be developed in a phased manner, at the rate of 15, 000ha to 20,000 per year.

Upon reaching their maximum crushing capacity these five sugar factories will altogether produce 1,946,000 tons of sugar and 183,134 meter cube ethanol per annum. Furthermore, the factories out of the 415 megawatt electric power which they are expected to produce through cogeneration will contribute 275 megawatts to national power grid.

The Ethiopian Ministry of Environment, Forest and Climate Change (Former Environmental Protection Authority) requires the conduct of a full Environmental Social Impact Assessment (ESIA) for the project that is classified under Schedule 1, Lower Omo Sugar Development project.

2. Objective of the EIA

2.1 General Objective of the EIA

To review and validate the EIA document studied by Federal Water Works Design and Supervision Enterprise in collaboration with South Water Works and Design and Supervision Enterprise and prepare an EIA report that meets international standards and fulfils the requirements of national laws.

2.2 Specific objectives of the EIA

Review the project feasibility study, EIA studies and other relevant documents, and identify gaps ;

Preliminary review of the EIA report indicates that there are gaps and inadequate treatment of the following issues :

Assessment of social impacts of the project on local communities;

Hydrological and river basin modelling studies that assesses the water balance in the Omo Turkana basin;

Environmental and social impacts as a result of hydrological changes;

The project components location and impacts on cultural and archaeological assets;

Impacts on national protected areas and wildlife corridors.

Review, identify and describe the baseline information in a comprehensive manner to the level of international best practice.

2.3 Short Description of Tasks To Be Accomplished

2.3.1 Review of Project Description

Rationalizing the project area proposed comparing with other project option that could be considered based on the right type of scenario analysis

Review of land requirement for the expansion and related operation of the project in line with the land ownership issue

Review of quantified water requirement that shows seasonal variation and year round availability of the water for the project and ecosystem requirement and downstream users

Review of detail water balance which includes but not limited to water intake, water usage, waste water generation, effluent treatment and reuse mechanism, and any other related water conservation mechanism.

2.3.2 Review of the Description of the Environment

Review of comprehensive base line information/data of environment which includes but not limited to air, noise, water, land, fauna and flora, socio-economic condition and related issue as per the international best standards, and country guideline and policies

Review and acquiring of GPS points for basic features such as tourist hot spot, factory site, camp site, conservation site, archaeological sites, and all related vital points of scientific and cultural interest of local people, and international community and development of topo sheet with 1:50000 scale for these vital features

Review and organizing of information regarding sensitive ecosystem such as National Parks, Wild Life Sanctuaries, Biosphere reserves, Elephant reserve, Breeding ground, habitat for migratory birds, wetlands, reserved forest, protected forests and etc. within the study area and its conservation and management plan if any

Description of detail site information within and around project area with clear diagrammatic representation

Review of detail information about surface hydrology and water regime and impact on the same due to the onset of the project and meteorological data of the area

Review of ambient air quality and noise level data and proposal for ambient air quality and noise level monitoring site/sites; and details of traffic density and its impact on ambient air quality and noise level

Review and analysis of the project distance from public water supply areas (surface water bodies and ground water),Scenic (tourist) areas, religious places, protected tribal settlements,

monuments of national significance, World Heritage Sites, Flood prone areas, and any other features such as prime agricultural lands, pasture lands and migratory corridors both for human and wild life etc

2.3.3 Review and Standardization of Anticipated Environmental Impact and Mitigation Measures

Review and presentation of impact and strong analysis using appropriate impact analysis tool in comprehensive manner to respond to national regional and international interest

Review of impact on drainage of the area and surrounding

Review of typical impact analysis and impact specific internationally accepted best mitigation measures as per the standard best practice approach

Review of detail infrastructure and facilities and occupational health and safety consideration of the project for the work force during construction and operation phase and impact of the project on existing infrastructure

Review and proposal of remediation measures for each and every impact anticipated from the onset of the project and proposal for the enhancement of positive impacts that emanate from the project implementation

Review of detail solid and liquid waste management including boiler ash and management measures in place and detail review and analysis of storm water harvesting and usage in the plant

2.3.4 Environmental Monitoring Program

Detail review and preparation of appropriate monitoring program in line with regulatory compliance

Review and preparation of standard and exhaustive monitoring check list with budget required for monitoring in a clear manner

2.4 Additional Studies

Hydrological and river basin modelling study that assesses the water balance in the Omo-Turkana basin including:

Estimation of monthly tributary flows into Omo river including from Kenya sides

Estimate monthly reservoir and flood plain evaporation;

Estimate monthly dependable rainfall in Kuraz irrigation areas and lake Turkana and reservoir areas

Estimate monthly variation of Omo-valley flood plain area and volume of flood lost by evaporation based on at least 10 years 2005-2015 high resolution satellite map (natural condition)

Estimate Gibe III flood reduction (saving of water) on the Omo valley using Hydraulic model (HEC-RAS) and HEC-Resim

Establish river basin model (Omo-Gobe-Turkana- Turkwel) to assess the impacts of development (both in Ethiopia and Kenya) on the Lake Turkana water level using HEC-RESIM USACE software

Review and preparation of detail socio-economic study and plan for the project affected people in the way their livelihood status will be critically considered

Review and description of proposed plan to handle the socio-economic influence of the project on local community

2.5 Environmental Management Plan

Review and brief description of the Environmental Management Plan (EMP) to mitigate the adverse impacts of the project with a clear and reasonable budget plan

Review and detail preparation of post-project monitoring program to ensure compliance to the approved management plan including administrative and technical organizational structure and proposal of appropriate man power and structure of the Environmental Management Unit (EMU)

2.6 General Approach in Brief

The Consultants must assess the time that needs to be allowed for the completion of the EIA study, based on the initial indicative assessment. A description and estimation of the resources required (in terms of budget, person-days) must be provided, including a breakdown of costs.

The Consultants must review and adapt the initial timing and expertise to complete the EIA study, and develop a schedule of resources needed, including

person-days of technical input for each of the experts

operational support costs, including participatory processes and special technical inputs (workshops, group participation training)

any special mapping or data collection costs and

The Consultant's team operating cost (out-of-town transport, accommodation, etc.).

The financial impact of the proposed review shall be limited to a transfer within the fees, or between the fees and reimbursables, involving a variation of less than 15% of the original

amount of each of the budget lines, not increasing the total amount of the contract. In that case, the changes will be accepted by the Contracting Authority in writing (administrative order) and do not require an addendum to the contract.

The resource costs will be presented in a budget format broken down into appropriate line items. The Consultant shall be responsible for all expenses for accommodation, office equipment, hard- and software, printing, binding, communication, secretariat, meeting rooms and any incidentals. These costs are deemed to be included in the fee rates of the experts. Exception will be made for the presentation of reports and opinions to stakeholders, for which a meeting room shall be provided.

2.6.1 EIA Study

The scope of the EIA review will be agreed with the contracting authority on the basis of the results of the scoping study. The EIA review will include an environmental baseline study, an identification of environmental constraints and opportunities, identification and assessment of the potential environmental impacts, an analysis of performance indicators, and an assessment of the institutional capacities to address environmental challenges, and conclusions and recommendations.

Environmental baseline study

A description and appraisal must be made of the current state of the environment, focusing on those key environmental components identified by the scoping study. The trends for, and pressures on, the various environmental components must be identified and a projection must be made of the state of the environment on the short-, medium- and long term under the assumption of no implementation of the sector programme, taking into account the expected effects of climate change (to the extent they can be predicted with some reliability). External factors must be taken into account, including the influence of other sectoral policies. The geographical (or mapping) units to be addressed should be described, if relevant.

Identification and evaluation of environment-related risks, constraints and opportunities

The environmental factors that can affect (positively or negatively) the relevance, effectiveness, efficiency and sustainability of the sector programme, including climate- and natural resource-related aspects, should be identified, described and assessed. These factors may include natural resource availability (e.g. water availability for irrigation), as well as the current and projected effects of climate change. This part of the study should also consider the environmental issues that could potentially be addressed by the assessed programme, and whether the sector programme provides an adequate response to these constraints and opportunities.

An analysis must be made of the degree to which the intended development programme may address these issues, i.e. addressing environmental issues that affect sector performance in the

negative manner, and making optimal use of opportunities offered by the environment to enhance sector performance. A matrix approach is suggested to illustrate the findings, indicating the environmental factors and resources; the positive and negative impacts and degrees of significance; and the programme assessment variables.

Identification and evaluation of impacts

The potential environmental impacts and risks from implementing the sector programmes must be identified and described, taking into account the views and concerns of stakeholders. Their significance should be determined according to their characteristics (e.g. duration, probability, magnitude, mitigability, reversibility) and the sensitivity of the environment. The potential *cumulative* impacts of the envisaged sector activities should be identified, since they may differ from the sum of individual project impacts. Those impacts which are significant should be assessed in detail taking into account:

the views and concerns of stakeholders;

the consistency with international commitments (Multilateral Environmental Agreements);

compliance with environmental regulations and standards;

Consistency with environmental objectives and policies; and its implications for sustainable development.

It is suggested that matrices, flow charts, etc. are used to illustrate the findings, showing which components of the development programme have an effect on which environmental aspects, and the significance of such impacts, as well as to show the consistency with environmental objectives and international commitments.

Identification and evaluation of impacts in terms of vulnerability to climate risks

The direct and indirect impacts of sector programme implementation in terms of increased or reduced vulnerability to climate variability and climate change should be considered as relevant (e.g. the building of new infrastructure in 'climate-sensitive' areas such as wetlands may lead to population migration to these areas, thus exposing more people to climate risks; on the contrary, sector-wide measures aimed at improving water efficiency may increase the population's resilience to climate change-induced droughts).

Analysis of performance indicators

Performance indicators proposed by the sector programme should be assessed from an environmental perspective, i.e. with regard to their usefulness to identify the environmental effects (positive and negative) of sector programme implementation and to monitor the environmental and climate-related constraints bearing on the programme. Based on this analysis,

proposals should be made as appropriate for the improvement of the existing performance assessment framework.

The set of indicators may include:

'pressure' indicators[5];

'state' indicators, for sectors with a direct and major link with key environmental resources[6];

Indicators of other specific issues, such as key institutional weaknesses identified by the EIA review[7].

The set of indicators that are proposed should be practical, usable and SMART (Specific, Measurable, Achievable, Realistic and Time-bound). A baseline will have to be defined for them. If it is not possible to define it, the Consultants should propose clear recommendations on how it could be obtained.

The Consultants should give an indication of how recommended indicators may be applied, including: information/data needed to apply the indicators, the sources where it may be obtained, and an indication of possible costs associated; other resources needed to apply the indicator (e.g. specific equipment or technical capacities).

Assessment of the capacities to address environmental and climate-related challenges

The capacity of implementing institutions in carrying out identified environmental and climate-related interventions, both in terms of adaptation and mitigation, should be assessed.

The Consultants will address the adequacy of institutional structure and capacities of the regulatory framework and human resources of the Sugar sector and national environmental institutions to address the key environmental concerns associated to the aforementioned sectors. As noted earlier, this assessment should focus at the policy/sector level and take adequate cognizance of realistic present and future capacities.

Stakeholder engagement

Stakeholders should be engaged throughout the EIA review study according to the stakeholder engagement strategy agreed at the scoping stage. Stakeholder engagement could include a mix of different mechanisms, such as questionnaires, focused semi-structure interviews and workshops with key stakeholders.

3. Conclusions and recommendations

[5] For example: pesticide use in a given area; hectares of forest cleared for agriculture.
[6] For example: fish stocks for fisheries, soil for agriculture, forest resources for forestry, % of groundwater samples meeting quality standards in the water sector.
[7] For example: number of annual environmental inspections carried out by local authorities in industrial facilities.

This chapter will summarise the key environmental issues for the sector involved, including policy and institutional constraints, challenges and main recommendations. Recommendations should be made on how to optimise positive impacts and make the best out of environment- and natural resource-related opportunities, as well as on how to mitigate negative effects, adapt to environmental constraints and manage risks. It should suggest the selection of an alternative (if more than one alternative is envisaged), potential changes in the sector programme design (e.g. adoption of measures to increase adaptive capacity with regard to climate variability and the expected effects of climate change), implementation and monitoring modalities, or cooperation actions.

The Consultants will pay specific attention to providing realistic, targeted and workable operational recommendations. General statements should be avoided.

The limitations of the EIA review and its assumptions should be presented. The recommendations should take into account the views presented by the stakeholders and explain how these were integrated. In the case of concerns that were not integrated in the final recommendations, the reasons thereof should be given.

4. Language of the specific contract

English

5. Subcontracting

Sub-contracting is optional.

6. Expertise Required

The Consultant's study team will comprise of but not limited to a team of:

Team Leader: Environmental/ EIA Expert

University degree or post-graduate studies in relevant field (e.g. Environmental Sciences, Environmental Economics, Ecology, Environmental Engineering) more than 15 years of relevant experience in the area;

Experience in developing and conducting EIA review s and /or similar environmental assessment assignments; at least one of these assignments as a team leader;

Excellent report writing and communication skills;

Full working knowledge of English.

Senior Water Resources modeller and group leader) more than 15 years experience

Senior Hydraulic modeller - more than 15 years experience

Senior remote sensing and GIS expert - more than 15 years experience

Social Anthropologist /Archaeologist-more than 10 years of experience

Sector-Expert: 1 Natural Resources/Wetland Expert

University degree or post-graduate studies in relevant fields (e.g. Natural Resources, Natural Resources Economics, Forestry, Water Resources) more than 10 years of relevant experience in the area;

Over the last five years, at least one working experience in applying environmental assessment tool,

Full working knowledge of English.

Socioecomist / Sociologist

Second degree level in relevant field (Sociology, Economics) and more than 10 years relevant experience in the area;

Full working knowledge of English;

The Consultants should send their proposal of time schedule and methodology to FRDE Sugar Corporation.

The consulting company must specify the qualifications and experience in environmental assessment of plans, policies and programmes of each specialist to be assigned to the EIA review, as well as their experience in the country and sector concerned. The company should indicate if/how they intend to use local expertise and how they will contribute to the transfer of know-how throughout the study. Furthermore, strong analysis and comment on the TOR for the fulfilment of the study/review by the consultant team is paramount important.

An individual from FDRE Sugar Corporation will be nominated as focal person, to assist an overall process of the EIA review.

For each specialist proposed, curriculum *vitae* must be provided of no more than three pages setting out the relevant qualifications and experience.

The Consultant firm will be based in Addis and work closely with the FDRE Sugar Corporation.

7. Work Plan

The work plan should include but not necessarily be limited to the following activities:

Scoping study

Fact finding / data collection

Review of prior public consultations, identification of key stakeholders

Engagement of stakeholders

Analysis/preparation of recommendations and scoping report.

EIA review

Fact finding / data collection – extensive quantitative data

Field trips for ground truthing of the review work

Engagement of exhaustive stakeholders

Identification and detailed analysis of the potential environmental impacts and constraints

Preparation of recommendations to mitigate negative environmental effects, adapt to constraints, optimise positive effects, exploit opportunities, and generally manage and control environmental and climate-related risks

Preparation of recommendations and draft EIA review report

Preparation of the final EIA review report.

On the basis of this draft proposal and the time schedule outlined in these Terms of Reference-TOR, the Consultants must provide their detailed work plan.

Time Schedule

The Consultant should respond to this time schedule and indicate in their proposal how they intend to organise the work for this purpose.

8. Reporting

The final timetable of report submission will be established on the basis of the methodology presented by the Consultants in their offer.

8.1 Scoping study

The detailed stakeholder engagement plan must be presented approximately 6 calendar days after kick-off; 3 copies in English (double-sided printing) are to be presented to FDRE Sugar Corporation for comments.

The draft scoping report in 3 copies (double-sided printing, English) is to be presented to FDRE Sugar Corporation approximately 8 calendar days after the kick-off meeting of the scoping study.

Comments should be expected within 7 calendar days. The company will take account of those comments in preparing the final scoping report. 3 copies of the final scoping report in English (double-sided printing) are to be submitted three weeks after the kick-off meeting. The consultant team can comment on the indicative time mentioned above with logical and reasonable argument.

8.2 EIA review

The EIA review will start immediately after the kick-off meeting for the scoping study, with a start-up meeting to be organized by the Consultant in close coordination with FDRE Sugar Corporation.

The draft EIA review report in 3 copies (double-sided printing, English) is to be presented to FDRE Sugar Corporation for comments, no later than 7 weeks after the EIA review start-up meeting. Within 2 weeks, comments will be received from the FDRE Sugar Corporation and other related stakeholders.

The company will take into account these comments in preparing the final report. 3 copies of the final report in English (double-sided printing) are to be submitted no later than 9 weeks after the start-up meeting of the EIA review.

A non-technical summary of the final report in 3 copies (English) is to be presented to FDRE Sugar Corporation no later than 9 weeks after the start-up meetings of the EIA review. The consultant team can comment on the indicative time mentioned above with logical and reasonable argument.

9. Monitoring and Evaluation

9.1 Definition of indicators

Stakeholder engagement: Relevant stakeholder are consulted and continuously informed during the scoping and EIA review.

Scoping study: Scoping study is presented to key stakeholders by the proposed deadline, and feedback from stakeholders is incorporated into the final version of the report; the report is distributed timely, in the number of copies and to the addressees indicated in the ToR.

Comprehensive data: Secondary-data collection, field visits and document review are thorough and extensive in order to gather a comprehensive data set.

EIA report: The EIA review report is presented to key stakeholders by the proposed deadline, and feedback from stakeholders is incorporated into the final version of the report; the report is distributed timely, in the number of copies required.

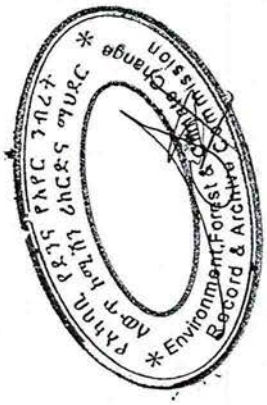
Assignment: Completion of the assignment to the entire satisfaction of the Contracting Authority and the beneficiaries.

9.2 Special Requirements

The FDRE Sugar Corporation will monitor every step of the implementation and after completion of the project a technical review meeting will be held to validate the information and results.

The EIA review should put its focus on the case of sugar industry comprehensive impact analysis and mitigation measure in the context of its impact on downstream users and on archaeological hot spots and UNESCO world heritage site

Annex XX: Business Licences and Competence Certificates







በአዲስ አበባ ከተማ አስተዳደር ንግድ ቢሮ
Addis Ababa City Administration Trade Bureau

ሴሪ ቁ. № 1737798



የግብር ከፋይ መለያ ቁ /TIN 0041910824
የንግድ ምዝገባ ቁ. BL/AA/2/0011059/2008
Principal Registration No
የቀድሞው ንግድ ፈቃድ ቁጥር
Previous License No.
የንግድ ሥራ ፈቃድ ቁጥር BL/AA/14/673/710972/2010
Business License No.
ቀድሞ ተሰጠበት ቀን
Previous Date of issuance
የተሰጠበት ቀን 20/3/2010
Date of issuance
የታደሰበት ቀን : 12/4/2011
Renewal Date

የንግድ ሥራ ፈቃድ

በንግድ ምዝገባና ፈቃድ አዋጅ ቁጥር 980/2008 መሰረት ተሰጠ

1. የግለሰቡ/ድርጅቱ ስም	አቤል ልማትና እንክብካቤ የማማከር አገልግሎት ኃላፊነቱ የተወሰነ የግል ማህበር		
2. ዜግነት	በኢትዮጲያ የተመዘገበ		
3. የንግድ ስም			
4. ሥራ አስኪያጅ ስም	አቶ አበበ ጸጋዬ ሀብተየሱስ		
5. የንግድ ድርጅቱ አድራሻ			
ክልል	አዲስ አበባ	ዞን/ክፍለ ከተማ	ቦሌ
ከተማ	አዲስ አበባ	ወረዳ	05
ቀበሌ	-----	የቤት ቁጥር	አዲስ ከ ቁ 603
ፖ ሳ ቁ	----	ስልክ ቁጥር	0911220275
ፋክስ	----	ኢ-ሜይል	----
6. የንግድ ሥራ ዘረፍ	(882)የማህበራዊ ሳይንስ እና በተፈጥሮ ሳይንስ ዙሪያ ማማከር አገልግሎት		
7. የንግድ ሥራ መስክ	በጀርባ ገፅ ይመለከቱ		
8. ካፒታል በኢት ብር	240,000.00		

ይህ የንግድ ፈቃድ ዛሬ 19/4/2021 ዓ.ም አዲስ አበባ ተሰጠ ።

የሃላፊ ስም/Name of Official
ፊርማ/Signature
ማህተም Seal

Business License

Issued Under Commercial Registration and Business license proc.No 980/2016

1. Owner/Company Name	ABEL DEVELOPMENT AND PROTECTION CONSULTING PLC		
2. Nationality	Registered in Ethiopia		
3. Trade Name			
4. General Manager Name	Mr. ABEBE TSEGAYE HABETEYESUSE		
5. Business Address			
Region	Addis Ababa	Zone/Sub City	Bole
City	Addis Ababa	Woreda	05
Kebele	-----	House No.	አዲስ ከ ቁ 603
P.O.Box	----	Tel.No	0911220275
Fax	----	E-mail	----
6. Sector of Business	(882)Consultancy services on social and natural science		
7. Field of Business	See back page		
8. Capital in ETB	240,000.00		

This Business License is issued in Addis Ababa
this day 12/28/2018 እ.ኤ.አ 2011 ዓ.ም ድሷል

ማሳሰቢያ- 1. ይህ በዓዋጅ ፈቃድ ቁጥር 980/2008 መሠረት በየበጀት ዓመቱ ከሐምሌ 1 ቀን እስከ ታህሳስ 30 ቀን ታድሶ ያለቅጣት የሚታደስ ሲሆን፤ ከጥር 1 ቀን እስከ ሰኔ 30 ቀን ድረስ በአዋጅ በተቀመጠው በ የሚታደስ ይሆናል።

N.B This License Shall be renewed annually in accordance with Regulation no 980/2008 from 1 July to December 30 E.C with out penalty and with penalty from first January to June 30 E.C

2. ይህ የንግድ ፈቃድ የምስክር ወረቀት በማስያዝ ወይም በሌላ ሁኔታ ለዕዳ ዋስትና መሆን አይችልም።
The holder of this License is forbidden for surety ship or debt

This application was created using the trial version of the XtraReports

የአካባቢ ኦዲትና አካባቢ አጠባበቅ የማማከር አገልግሎት (88222)	Consultancy Service for environmental auditing and environmental protection (88222)
ሌሎች በሌላ ቦታ ያልተገለጹ በተፈጥሮ ሳይንስ ዙርያ የማማከር አገልግሎት (88229)	Natural science consultancy n.e.c (88229)

This application was created using the trial version of the XtraReports.

በአዲስ አበባ ከተማ አስተዳደር ንግድ ቢሮ
Addis Ababa City Administration Trade Bureau

ሴሪ ቁ. № 1737799





የግብር ከፋይ መለያ ቁ /TIN 0041910824
የንግድ ምዝገባ ቁ. BL/AA/2/0011059/2008
Principal Registration No.
የቀድሞው ንግድ ፈቃድ ቁጥር
Previous License No.
የንግድ ሥራ ፈቃድ ቁጥር 14/666/862384/2006
Business License No.
ቀድሞ ተሰጠበት ቀን
Previous Date of issuance
የተሰጠበት ቀን 26/9/2006
Date of issuance
የታደሰበት ቀን : 12/4/2011
Renewal Date

የንግድ ሥራ ፈቃድ
በንግድ ምዝገባና ፈቃድ አዋጅ ቁጥር 980/2008 መሰረት ተሰጠ

Business License
Issued Under Commercial Registration and Business license proc.No 980/2016

1. የማለሰቡ/ድርጅቱ ስም: አቤል ልማትና እንክብካቤ የማማከር አገልግሎት ኃላፊነቱ የተወሰነ የግል ማህበር
2. ዜግነት: በኢትዮጲያ የተመዘገበ
3. የንግድ ስም
4. ሥራ አስኪያጅ ስም: አቶ አበበ ጸጋዬ ሀብተየሱስ
5. የንግድ ድርጅቱ አድራሻ

ክልል	አዲስ አበባ	ዞን/ክፍለ ከተማ	ቦሌ
ከተማ	አዲስ አበባ	ወረዳ	05
ቀበሌ	-----	የቤት ቁጥር	አዲስ ከ ቁ 603
ፖ ሳ ቁ	----	ስልክ ቁጥር	0911220275
ፋክስ	----	ኢ-ሜይል	----

6. የንግድ ሥራ ዘረፍ
(887)ሥነአርክቴክቸር፣ኢንጅነሪንግ፣የኮንስትራክሽንና ተያያዥ የቴክኒክ ሥራዎች እና የቴክኖሎጂ የማማከር አገልግሎት
7. የንግድ ሥራ መስክ: በጅርባ ገፅ ይመልከቱ
8. ካፒታል በኢት ብር: 240,000.00

ይህ የንግድ ፈቃድ ዛሬ 19/4/2011 በ አዲስ አበባ ተሰጠ።
የሃላፊ ስም/Name of Official
ፊርማ/Signature
ማህተም Seal

1. Owner/Company Name: ABEL DEVELOPMENT AND PROTECTION CONSULTING PLC
2. Nationality: Registered in Ethiopia
3. Trade Name
4. General Manager Name: Mr. ABEBE TSEGAYE HABETEYESUSE
5. Business Address

Region	Addis Ababa	Zone/Sub City	Bole
City	Addis Ababa	Woreda	05
Kebele	-----	House No.	አዲስ ከ ቁ 603
P.O.Box	----	Tel.No	0911220275
Fax	----	E-mail	----

6. Sector of Business
(887)Architectural, engineering, construction and related technical consultanc
7. Field of Business: See back page
8. Capital in ETB: 240,000.00

This Business License is issued in Addis Ababa this day 12/28/2018 ዓ.ም 2011

ማሳሰቢያ- 1. ይህ ባዓዋጅ ፈቃድ ቁጥር 980/2008 መሠረት በየበጀት ዓመቱ ከሐምሌ ፩ ቀን እስከ ታህሳስ 30 ቀን ድረስ ያለቅጣት የሚታደስ ሲሆን፤ ከጥር 1 ቀን እስከ ሰኔ 30 ድረስ ፈቃዱ በተቀመጠው ሰ የሚታደስ ይሆናል።
N.B This License Shall be renewed annually in accordance with Regulation no 980/2008 from 1 July to December 30 E.C with out penalty and with penalty from first January to June 30 E.C
2. ይህ የንግድ ፈቃድ የመስክር ወረቀት በዋስትና ቁይም በሌላ ሊያገለግል አይችልም።
The holder of this License is forbidden for surety ship or debt

This application was created using the trial version of the XtraReports

በአዲስ አበባ ከተማ አስተዳደር ንግድ ቢሮ
Addis Ababa City Administration Trade Bureau

ሴሪ ቁ. № 2231245



የግብር ከፋይ መለያ ቁጥር/TIN 0041910824
የንግድ ምዝገባ ቁጥር BL/AA/2/0011059/2008
Principal Registration No
የቀድሞው የምዝገባ ቁጥር
Previous Registration No
የቀድሞው የምዝገባ ቀን
First Registration Date 26/9/2006
መጀመሪያ የተመዘገበበት ቀን
የተሻሻለበት ቀን : 19/4/2011
Modification Date

የንግድ ምዝገባ ምስክር ወረቀት
ከንግድ ምዝገባና የፈቃድ አዋጅ ቁጥር 980/2008 መሰረት የተሰጠ

Commercial Registration Certificate
Issued under Commercial Registration and Business license proc No. 980/2016

1.የማለሰቡ/ድርጅቱ ስም
አቤል ልማትና እንክብካቤ የማማከር አገልግሎት ፓላፊነቱ የተወሰነ የግል ማህበር

2. ዜግነት በኢትዮጲያ የተመዘገበ

3. የሥራ አስኪያጅ ስም
አቶ አበበ ጸጋዬ ሀብተየሱስ

4. የንግድ ድርጅቱ አድራሻ

ክልል	አዲስ አበባ	ዞን/ክፍለ ከተማ	ቦሌ
ከተማ	አዲስ አበባ	ወረዳ	05
ቀበሌ	------	የቤት ቁጥር	አዲስ ክ ቁ 603
ፖ.ሳ.ቁ		ስልክ ቁጥር	0911220275
ፋክስ	----	ኢ-ሜይል	----

5. ካፒታል በኢት. ብር 240,000.00

6. የተሰማራባቸው የንግድ ሥራዎች
8. የፋይናንስ እንሹራንስ የሪል እስቴት እና የንግድ ስራዎች

1.Owner/ Company Name
ABEL DEVELOPMENT AND PROTECTION CONSULTING PLC

2. Nationality Registered in Ethiopia

3. General Manager Name
Mr. ABEBE TSEGAYE HABETEYESUSE

4. Business Address

Region	Addis Ababa	Zone/Sub City	Bole
City	Addis Ababa	Woreda	05
Kebele		House No.	አዲስ ክ ቁ 603
P.O.Box	------	Tel. No	0911220275
Fax	----	E-mail	----

5. Capital in ETB 240,000.00

6. Type of activities engaged
8. FINANCIAL INTERMEDIATION, INSURANCE, REAL ESTATE AND BUSINESS SERVICES

የግብር ከፋይ መለያ ቁጥር 0041910824 የተመዘገበ መሆኑን እናረጋግጣለን። has duly been registered under TIN 0041910824
በህ የምዝገባ የምስክር ወረቀት ዘሬ 19/4/2011 ዓ.ም This Registration Certification is issued in 12/28/2018
በ አዲስ አበባ ተሰጠ። on Addis Ababa
የሥራ ስም/Official's Name ፊርማ/Signature
ማህተም/Seal

ማሳሰቢያ፡- 1 ይህ የንግድ ምዝገባ የምስክር ወረቀት በማንኛውም ወቅትም በሌላ አካል አይተላለፍ።
N.B. The holder of this License is forbidden for surety ship or debt

This application was created using the trial version of the XtraReports.

Environment Protection Authority Record & Archive Center

Addis Ababa Development Consultancy P.L.C. Ejigayehu Global Trading & 0911-66 93 57

በኢትዮጵያ ፌደራላዊ ዲሞክራሲያዊ ሪፑብሊክ
የውሃ፣የመስኖና ኢነርጂ ሚኒስቴር

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
Ministry of Water, Irrigation & Energy

CERTIFICATE OF CONSULTING FIRM

This is to Certify
That

ABEL DEVELOPMENT AND PROTECTION CONSULTING P.L.C

Is registered as

WATER RESOURCE CONSULTING FIRM GRADE FIVE

In accordance with the powers and duties vested

In the Ministry of Water Irrigation & Energy
By Article 8(1) (a) of the Ethiopian Water Resources Management Proclamation No. 197/2000

In Winess where of the sedl of the MINISTRY is hereto affixed.

Registrar: Asnake Zemeney Zeamanuel
Licencing & Permit Case Team Leader

Ministry of Water, Irrigation & Energy

Valid for: ONE YEAR

Registration No. WRCE/5/46 Dated 20/11/2015

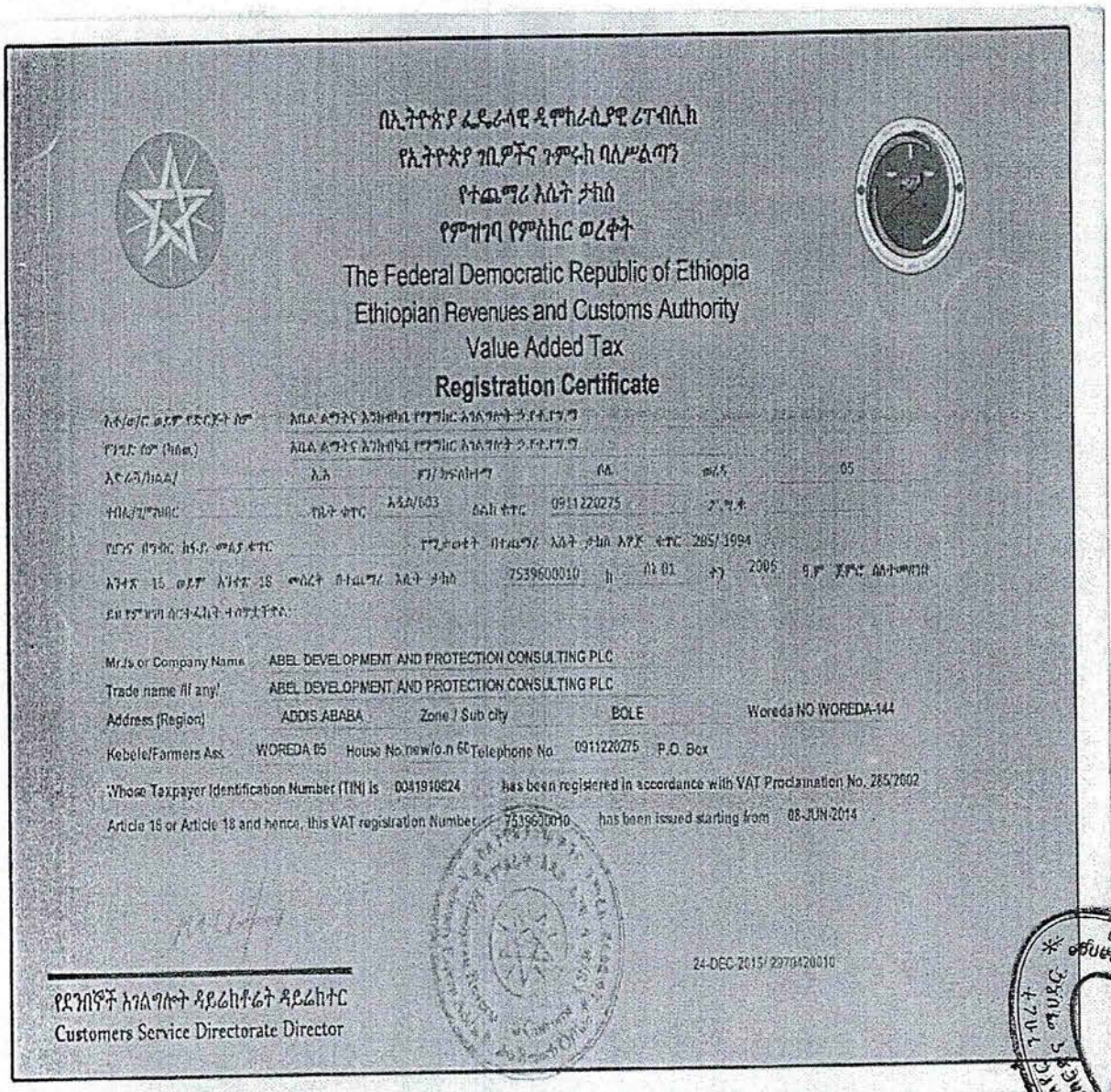
This Certificate is held subject to the Provisions of the guidelines for the registration of Professionals and Consultants.

TAX Registration No. 0041910824

Environmental Impact Assessment Record

0911 220375
Addis Abeba
Ethiopia
Abel Development & Protection Consultancy

Addis Ababa 0911 66 93 57
Ejigayehu Global Trading & Development Consultancy P.L.C



በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
የኢትዮጵያ ገቢዎችና ጉምሩክ ባለሥልጣን
የተጨማሪ እሴት ታክስ
የምዝገባ የምስክር ወረቀት

The Federal Democratic Republic of Ethiopia
Ethiopian Revenues and Customs Authority
Value Added Tax
Registration Certificate

አቶ/ወ/ሮ ወይም የድርጅት ስም: አቤል ልማትና እንክብካቤ የሚማክር አገልግሎት ኃ.የ.ተ.የ.ግ.ማ

የንግድ ስም (ከሆነ): አቤል ልማትና እንክብካቤ የሚማክር አገልግሎት ኃ.የ.ተ.የ.ግ.ማ

እና ራት/ከሆነ/: አዲስ ክ/ከ/ወረዳ/ቀበሌ 05 መሪ ቁ

ተከራካሪ/ሞክክር: የቤት ቁጥር አዲስ/603 ስልክ ቁጥር 0911220275 ፖ.ሣ.ቁ

የሆንና በንግድ ክፍያ መለያ ቁጥር የሚቶመቱት በተጨማሪ እሴት ታክስ አዋጅ ቁጥር 285/ 1994

አንቀጽ 15 ወይም አንቀጽ 18 መሠረት በተጨማሪ እሴት ታክስ 7539600010 ከ ሰኔ 01 ቀን 2006 ዓ.ም ጀምሮ ለልተመዘገቡ

ይህ የምዝገባ ሰርተፊኬት ተሰጥቷቸዋል።

Mr./s or Company Name: ABEL DEVELOPMENT AND PROTECTION CONSULTING PLC

Trade name /if any/: ABEL DEVELOPMENT AND PROTECTION CONSULTING PLC

Address (Region): ADDIS ABABA Zone / Sub city: BOLE Woreda NO WOREDA-144

Kebele/Farmers Ass. WOREDA 05 House No.new/o.n 60 Telephone No. 0911220275 P.O. Box

Whose Taxpayer Identification Number (TIN) is 0041910824 has been registered in accordance with VAT Proclamation No. 285/2002

Article 16 or Article 18 and hence, this VAT registration Number 7539600010 has been issued starting from 08-JUN-2014

24-DEC-2015/ 2970420010

የደንበኞች አገልግሎት ዳይሬክተሬት ዳይሬክተር
Customers Service Directorate Director



ቁጥር: ኢ/ኮ/ኢ/ክ/ፈ/1791/09
ቀን: 18/12/2009

የብቃት ማረጋገጫ የምስክር ወረቀት

የኢትዮጵያ የደንና የአየር ንብረት ለዉጥ ኮሚሽን የአካባቢ እና ማህበረሰብ ተፅዕኖ ግምገማ ጥናት የማማከር አገልግሎት ብቃት ማረጋገጫ ምስክር ወረቀት አሰጣጥ መመሪያ ቁጥር 03/2010 መሠረት ለአቤል ልማትና እንክብካቤ የማማከር አገልግሎት ጋ/የተ/የግ/ማህበር በአካባቢ ተፅዕኖ ግምገማ ዘርፍ ላይ በአካባቢ ማህበረሰብ ተፅዕኖ ግምገማ የድርጅት የማማከር አገልግሎት ላይ ደረጃ 1 የብቃት ማረጋገጫ ምስክር ወረቀት ስጥቷል። የባለሙያዎቹ ዝርዝር ተያይዟል።

ከሠላምታ ጋር

ሽፈራው ነጋሽ
የአካባቢና ማህበረሰብ ተፅእኖ ግምገማ እና
የአካባቢ ፍቃድ መስጠት ዳይሬክተር ጀኔራል

Ref No: ኢ/ኮ/ኢ/ክ/ፈ/1791/09
Date: 29/12/2009

CERTIFICATE OF COMPETENCE

COMMISSION OF ENVIRONMENT, FOREST AND CLIMATE CHANGE, BY VIRTUE OF THE POWER VESTED TO IT BY ENVIRONMENTAL COMPETENCE ISSUING DIRECTIVE NO 03/2017, HAS ISSUED THIS CERTIFICATE OF COMPETENCE TO **ABEL DEVELOPMENT AND PROTECTION PLC** AS CONSULTANCY IN ENVIRONMENTAL IMPACT ASSESSMENT AS ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT CONSULTING FIRM IN CATEGORY OF **LEVEL I.** LIST OF EXPERTS ARE ANNEXED WITH THIS CERTIFICATE.

WITH REGARDS

SHIFERAW NEGASH
Environmental and Social Impact Assessment and Environmental Licensing Director General

የብቃት ማረጋገጫ ምስክር ወረቀት

CERTIFICATE OF COMPETENCE

ዕድሣት (Renewal)

ቀን : 17/02/2015 ዓ.ም
Date: 28/10/2022 G.C

ያዘጋጀው ስምና ፊርማ
Name & Signature

አየለ ምንዳዬ
AYELE MINDAYE

ያረጋገጠው የስራ ኃላፊ
Checked by
ጎንፋ አራርሳ
Gonfa Ararsa
የአካባቢ ፍቃድ እና የብቃት ማረጋገጫ ዳይሬክቶሬት ዳይሬክተር
Environmental Licensing Director

የተሰጠበት (delivered)
ቀን : 18/02/2012 ዓ.ም
Date: 29/10/2019G.C

በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፑብሊክ
የአካባቢ ፣የደን እና የአየር ንብረት ለውጥ ኮሚሽን

ኢ ት ዮ ጵ ያ
E T H I O P I A

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
COMMISSION OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

ቀኖር ቢ/ቤ/1/19/03/19
ቁ/1/29/1ር/2011

ለአቤል ልማትና እንዝዋክቤ የማማክር አገልግሎት ኃ/የተ/የ/ግ/ማህበር በአካባቢ አየር ንብረት ተፅዕኖና ጥናት ዘርፍ የአማካሪ ድርጅት የባለሙያዎች ዝርዝር

ተ/ቁ	የባለሙያዎች ስም	ደረጃ	የሚያማክሩበት ሙያ	ቋሚነት	ስልክ
1	አቶአበበ ወጋዬ ሃብተየሱስ	ከፍተኛ አማካሪ	የብዝሐ ሕይወት እና የስርዓተ-ምህዳር ተንታኝ ባለሙያ	ሥራ አስኪያጅ	0911220275
2	አቶ ፈዩራ አብዲሳ ኪትላ	ከፍተኛ አማካሪ	ኢኮኖሚያዊ ጉዳዮች ተንታኝ ባለሙያ		0911158514
3	አቶ ተሰማ ቶሌራ ፈይሳ	ከፍተኛ አማካሪ	የማህበራዊ ጉዳዮች ተንታኝ ባለሙያ		0911479044
4	አቶ ሻረው አንተነህ መኮንን	ከፍተኛ አማካሪ	የአካባቢ ጤና ባለሙያ		0911971517
5	አቶ መንግስቱ ብርሃኑ ቦጋለ	ከፍተኛ አማካሪ	የመሬት አማቂ ጋዝ ልቀት ተንታኝ ባለሙያ		0930011914
6	አቶ ይልቃል አዲሱ ያየህ	ከፍተኛ አማካሪ	የውሃ ሀብት አጠቃቀም አጥኚ ባለሙያ		0918702084
7	ወ/ሮ አልማዝ ሽቱ ቢያድግልኝ	ከፍተኛ አማካሪ	የአካባቢ ብክለት ተንታኝ ባለሙያ		0911678075

ከሰላምታ ጋር

ሻረራው ነጋሽ
የአካባቢና ማህበረሰብ ተፅእኖ ግምገማ እና
የአካባቢ ፍቃድ መስጠት ዳይሬክተር ጀነራል

በአዲስ አበባ ከተማ አስተዳደር ንግድ ቢሮ
Addis Ababa City Administration Trade Bureau

ሰሪ ቁ. № 1494893

የግብር ከፋይ መለያ ቁ. /TIN	0002431080
የንግድ ምዝገባ ቁ.	BL/AA/2/0002774/2005
Principal Registration No.	
የቀድሞው ንግድ ፈቃድ ቁጥር	06/2/24375/02
Previous License No.	
የንግድ ሥራ ፈቃድ ቁጥር	14/673/584364/2006
Business License No.	
ቀድሞ ተሰጠበት ቀን	27/12/1997
Previous Date of issuance	
የተሰጠበት ቀን	5/4/2006
Date of issuance	
የታደሰበት ቀን :	29/2/2011
Renewal Date	



የንግድ ሥራ ፈቃድ
Business License

በንግድ ምዝገባና ፈቃድ አዋጅ ቁጥር 980/2008 መሰረት ተሰጠ

Issued Under Commercial Registration and Business license proc.No 980/2016

1. የግለሰቡ/ድርጅቱ ስም	እጅጋየሁ ግሎባል ትሬዲንግ ደቨሎፕ ኮንሰልታንቲ	1. Owner/Company Name	EJEGAYEHU TRADING DEVELOP CONSELTANTI PLC
2. ዜግነት	በኢትዮጵያ የተመዘገበ	2. Nationality	Registered in Ethiopia
3. የንግድ ስም		3. Trade Name	
4. ሥራ አስኪያጅ ስም	አቶ እሰይ ታከለ ወልደመስቀል	4. General Manager Name	Mr. ESEY TAKELE WELDMESKEL
5. የንግድ ድርጅቱ አድራሻ		5. Business Address	
ክልል: አዲስ አበባ	ዞን/ክፍለ ከተማ: ቦሌ	Region: Addis Ababa	Zone/Sub City: Bole
ከተማ: አዲስ አበባ	ወረዳ: 03	City: Addis Ababa	Woreda: 03
ቀበሌ: -----	የቤት ቁጥር: 375/201	Kebele: -----	House No. 375/201
ፖ.ሳ.ቁ: ----	ስልክ ቁጥር: 0911669357	P.O.Box: ----	Tel.No 0911669357
ፋክስ: ----	ኢ-ሜይል: ----	Fax: ----	E-mail: ----
6. የንግድ ሥራ ዘረፍ	(882)የማህበራዊ ሳይንስ እና በተፈጥሮ ሳይንስ ዙሪያ ማማከር አገልግሎት	6. Sector of Business	(882)Consultancy services on social and natural science
7. የንግድ ሥራ መስክ	በጀርባ ገፅ ይመልከቱ	7. Field of Business	See back page
8. ካፒታል በኢት ብር	20,000.00	8. Capital in ETB	20,000.00
ይህ የንግድ ፈቃድ ዛሬ	29/2/2011 በ አዲስ አበባ ተሰጠ።	This Business License is issued in	Addis Ababa
የሥላፊ ስም/Name of Official		this day	11/8/2018
ፊርማ/Signature		Seal	

ማህተም

ለ2011 ታድሷ

ማሳሰቢያ 1. ይህ ፅቀድ ፈቃድ ቁጥር 980/2008 መሠረት በየጊዜው ዓመቱ ከጥር ቀን እስከ ታህሳስ ቀን ድረስ ታድሶ መያዝ ያለበት ሲሆን ከጥር 1 ቀን እስከ ሰኔ 30 ቀን ድረስ ታድሶ መያዝ የሚገባው በተቀመጠው በ የሚታደስ ይሆናል።

NB The License Shall be renewed annually in accordance with Regulation no 980/2008 from 1 July to December 30 E.C with [illegible] from first January to June 30 E.C

2. ይህ የንግድ ፈቃድ የያዘበትና ወረቀት በዋስትና ወይም በእዳ ሊያዝ አይችልም።

The holder of this License is forbidden for surety ship or debt.



የኢትዮጵያ ሥራ አመራር ኢንስቲትዩት
ETHIOPIAN MANAGEMENT INSTITUTE

የሙያ ብቃት ማረጋገጫ

Professional Competence

የምስክር ወረቀት

CERTIFICATE

እሰይ ታከለ ወልደመስቀል

This is to certify that

ESSEY TAKELE WELDEMESKEL

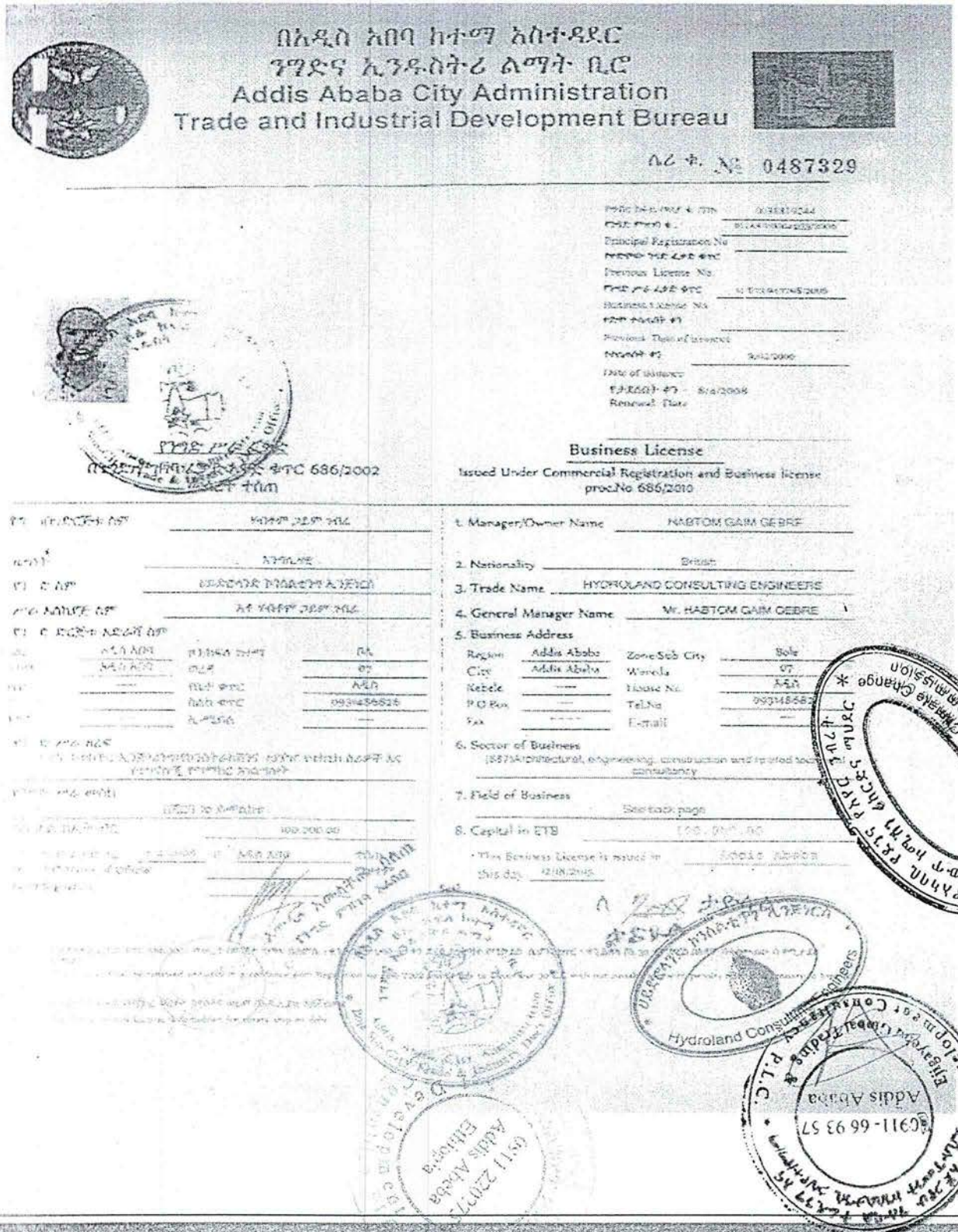
የኢንስቲትዩቱን የሥራ አመራር አማካሪነት የሙያ ብቃት መመዘኛ በሚገባ ስላሟሉ ይህ የምስክር ወረቀት ተሰጥቷቸዋል ::

has satisfactorily fulfilled the requirements set by the Institute for the Certification of Management Consultants.

ABERA BEDRU
Evaluation Committee Chairperson

AUGUST 15/2005
Date

ZEKARIAS ASSEFA
ዋና ዳሬክተር
Director General



በአዲስ አበባ ከተማ አስተዳደር
ንግድና ኢንዱስትሪ ልማት ቢሮ
Addis Ababa City Administration
Trade and Industrial Development Bureau

ሰሪ ቁ. № 0487329

Principal Registration No
Previous License No
Business License No
Previous Date of Issuance
Date of Issuance
Renewal Date

Business License

Issued Under Commercial Registration and Business license proc.No 686/2010

1. Manager/Owner Name HABTOM GAIM GEBRE
2. Nationality British
3. Trade Name HYDROLAND CONSULTING ENGINEERS
4. General Manager Name Mr. HABTOM GAIM GEBRE
5. Business Address

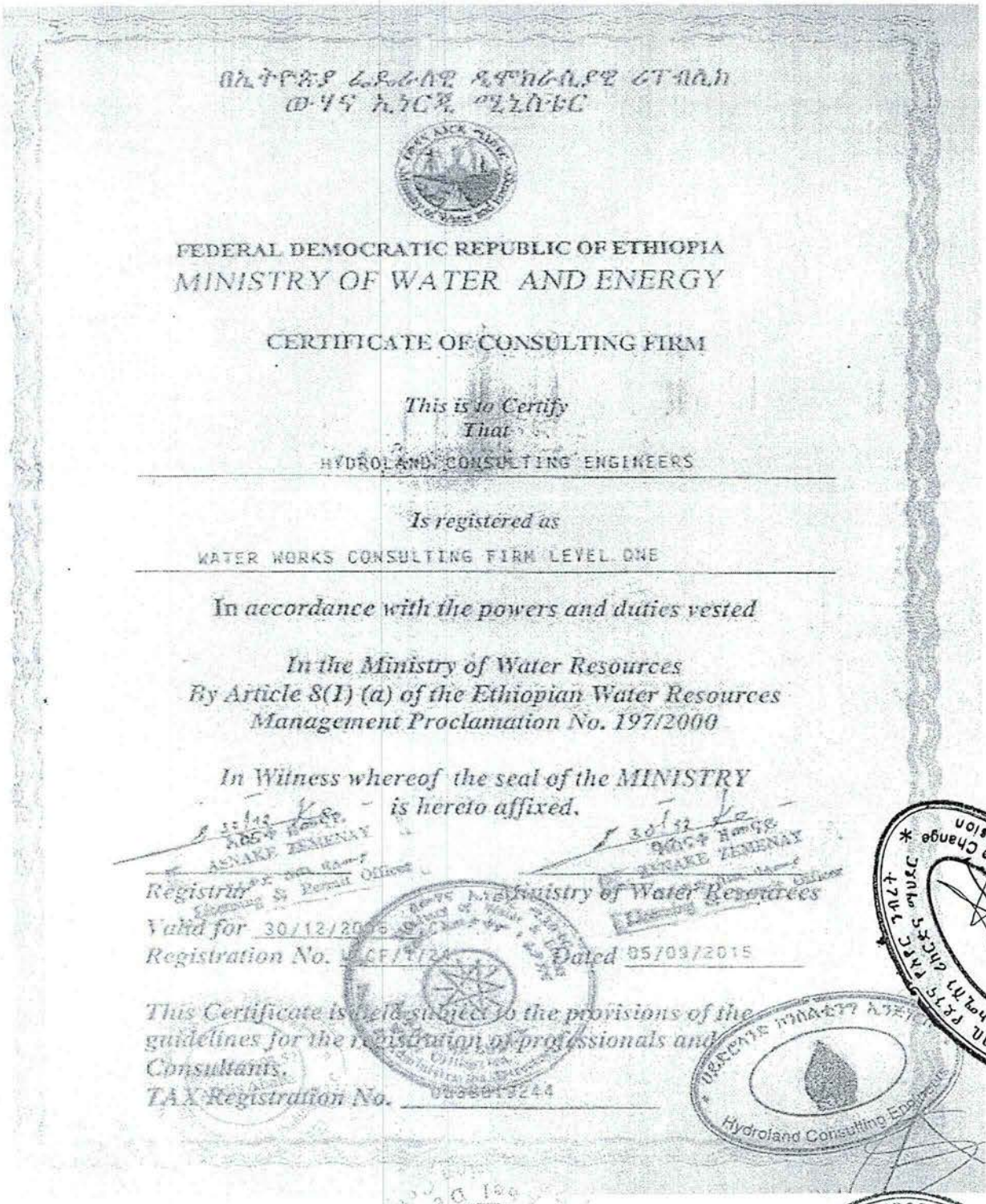
Region	Addis Ababa	Zone/Sub City	Bole
City	Addis Ababa	Woreda	07
Kebele	---	House No.	ኦዲስ
P.O.Box	---	Tel.No	0933485828
Fax	---	E-mail	---

6. Sector of Business
[Architectural, engineering, construction and related technical consultancy
7. Field of Business
See back page
8. Capital in ETB

This Business License is issued in ... this day ...

Hydroland Consulting Engineers

Addis Ababa
Tel 011-66 93 57



በኢትዮጵያ ፌዴራላዊ ዲሞክራሲያዊ ሪፐብሊክ
ውሃና ኢነርጂ ሚኒስቴር

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF WATER AND ENERGY

CERTIFICATE OF CONSULTING FIRM

This is to Certify
That

HYDROLAND CONSULTING ENGINEERS

Is registered as

WATER WORKS CONSULTING FIRM LEVEL ONE

In accordance with the powers and duties vested

In the Ministry of Water Resources
By Article 8(1) (a) of the Ethiopian Water Resources Management Proclamation No. 197/2000

In Witness whereof the seal of the MINISTRY is hereto affixed.

ASNAKE ZENENAY
Registrar & Permit Officer

ASNAKE ZENENAY
Planning Director
Ministry of Water Resources

Valid for 30/12/2015
Registration No. CF/1/24 Dated 05/03/2015

This Certificate is held subject to the provisions of the guidelines for the registration of professionals and Consultants.

TAX Registration No. 0006813244

Hydroland Consulting Engineers

Environmental Protection, Forest & Climate Change Commission
Record & Archive

Addis Ababa

Federal Democratic Republic of Ethiopia

Sugar Corporation

Addis Ababa

Ethiopia

Kuraz Sugar Development Project

Feasibility Study Report

Volume IX: Environmental Impact Assessment Study

Part II: Annexure

December 2012

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Kuraz Sugar Development Project

Feasibility Study Report

Volume IX:

Environmental Impact Assessment Study: Part II: Annexure

December 2012

Issue and Revision Record

Rev	Date	Originator	Checker	Approver	Description
A	30/12/12	Various	Benti Shemina	ZLB	Draft Final

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Annex 1.1 List of Contacted Officials and Professionals

S/N	Name of Contacted Person	Institution	Position	Contacted Date	Remark on Data Collection
1	**Federal Level**				
1	Kahisay G/Tensay	Ethiopian Wildlife Conservation Agency; National Parks and Wildlife Sanctuaries Coordination Directorate	Director	13/05/2011	Through discussion and questionnaire
2	**Regional Level**				
1	Mitiku Bediru	Regional Sugar Enterprise	General Manager	27/06/2011	Addressed critical issues observed during the field survey
2	Misrak Kumalo	Natural Resources and Environmental Protection	Expert Ecosystem	27/06/2011	Discussion
3	Girma Timer	Culture and Tourism Bureau	Parks Core Process	27/06/2011	Discussion and questionnaire
4	Atrag G/Mikael	Culture and Tourism Bureau	Parks Core Process	27/06/2011	
5	Bekele Yisma	Health Bureau	P.M.E. Officer	28/06/2011	Top ten diseases
6	Ato Mengesha Meshane	Finance and Economy Bureau	Demography Data Officer	27/06/2011	Provided Digital Copy
3	**South Omo Zone**				
1	Tadele Getachew	Zonal Council	Counselor, for the Chief Zonal Administrator	15,16/05/2011	Discussion
2	Tekle Waldegenriel	Zonal Council; Policy Affaires Core Process	Head	15,16/05/2011	Discussion
3	Minlargew Addisu	Agriculture and pastoralist development Department	Head	15,16/05/2012	Discussion
4	Desalegn Tekle	Water, Mines & Energy Dept.	Head	15,16/05/2013	Discussion and questionnaire
5	Abdela Alete	Health Department	Head	15/05/2011	Discussion
6	Mamo Mala	Culture and Tourism Department	Head Tourism Resources and service process owner		Discussion
7	Anteneh Tesfaye	Finance and Economy Dept.	Population Affairs Officer	15,16/05/2011	Hard copy
8	Hailu Seyoum	Agriculture and Pastoral Development Department	Zonal EIA Study Facilitator		Discussion
3.1	**Selamago District**				
1	Berhanu Arega	District Council	Chief Administrator	17,20/05/2011	Discussion
2	Mitiku Kuti	District Council	EIA Study Facilitator	18-20/05/2011	Discussion
3	Shimelis Tesfaye	Health Office	Health Officer	20/05/2011	Discussion, consultation and questionnaire

S/N	Name of Contacted Person	Institution	Position	Contacted Date	Remark on Data Collection
4	Wondimu Waldeyes	Water, Mines & Energy Office	Acting Head		
5	Indalu Tamene	Pastoralist development Office	Acting Head,		
3.2	**Nyangatom District**				
1	Hekal Netir	District Council	Chief Administrator	6/6/2011	Discussion
2	Tefera Naske	District Council	Vice Chief Administrator	25/05/2011	Discussion
3	Kebede Abune	District Council	EIA Study Facilitator		Discussion
4	Ermiyas Nagoliyo	Pastoral Development Office	Head	25/05/2011-09/06/2011	Discussion, consultation and questionnaire
5	Gashaw Jorge	Health Office	Head		Discussion
6	Belete Lobun	Culture and Tourism Office	Head		Discussion
7	Afework Abate	Water, Mines & Energy Office	Head		Discussion
4	**Bench-Maji Zone**				
1	Kasahun Kebede	Zonal Council	Counselor for the Chief	20, 22/06/2011	Discussion
2	Gezahing Abate	Zonal Council	President		Discussion
3	Dejene Komtikele	Zonal Council	Speaker of the House		Conducted consultation with officials
4	Melaku Gitabe	Water, Mines & Energy Department	Head		Discussion
5	Biniam Desta	Female, Children and Youth Affairs	Vice Head		Discussion
6	Tsegaye Gelta	Culture and Tourism Department	Head	22/06/2011	Discussion
7	Fikadu kora	Finance & Economy Department	Development Plan Officer		Discussion
8	Solomon Tefera	Finance & Economy Department	Data Core Process		Discussion
4.1	**Maji District**				
1	Metu Aku	District Council	Vice Administrator	10/6/2011	Conducted consultation with officials
2	Eshetu Ayele	Civil Service Office	Head		Discussion
3	Yesef Assefa	Agriculture Development Office	Representative		Discussion
4	Ali Ahimed	Water, Mines & Energy Office	Head		Discussion
4.2	**Meinitshasha District**				
1	Fajiyo Sappi	District Council	Chief Administrator	15/06/2011	Discussion
2	Shimaj Gurchima	Health Office	Vice Administrator		Discussion
3	Kasa Kebede	House of Peoples' Representative	Speaker of the House		Conducted consultation with officials
4	Gezahing Regassa	Agriculture Development Office	Head		Discussion
5	Berhanu Haile	Agriculture Development Office	Vice head		Discussion

S/N	Name of Contacted Person	Institution	Position	Contacted Date	Remark on Data Collection
6	Getiney Seid	Agriculture Development Office	Expert		Discussion
7	Girma Shange	Culture and Tourism Office	Head		Discussion
8	Agenyehu Gebre	Water, Mines and Energy Office	Head		Discussion
9	Berhanu Zewude	Trade and Industry Office	Head		
5	**Kefa Zone**				
1	Mesele Kebede	Zonal Council	Vice Chief Administrator	22/06/2011	Discussion
2	Woldegebriel Irago	Trade and Industry Department	Investment Core Process	22,23/06/2011	Discussion
5.1	**Decha District**				
1	Admasu Wolde	District Council	Chief Administrator	23/06/2011	Conducted consultation with officials
2	Alemayehu Haile	District Council	District Party Office	23/06/2011	Discussion
3	Lisanu Teshome	Agriculture Development Office	Head,	23/06/2011	Discussion
4	Gezahign Abuya	Water, Mines and Energy Office	Head,	23/06/2011	Discussion

Annex 1.2: Selamago Woreda Stakeholders and Public Consultations

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ስንተርኛና ኋለተኛዉር ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡብ ኦሞ ወረዳ Woreda ሠላማጎ ቀበሌ Kebele – ቀን Date 13/09/03

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	አቶ ገርዛችኝ ሄሬጋ	ወ	ኤክስቴንሽን	የመሬት አስተዳደር	
2	>> ሽመልስ ተስፋዬ	ወ	ጤና ይ/ቤት	የይ/ቤቱ ተወካይ	
3	>> ወንዱሙ ወልዴ	ወ	ውሀ ይ/ቤት	>> >>	
4	>> ሄንዲክ ተሾመ	ወ	ሽ/አ/ል/ይ/ቤት	>> >>	
5	>> ዓመቱ ካ-ቱ	ወ	ወረዳ ፓ/ቤት	>> >>	

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የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

የኩራዝ ስኳር ልማት ፕሮጀክትን በተመለከተ የሙያዊ ተሳትፎ ባደረጉ ባለሙያዎች ላይ ውይይት ተካሂዷል።

አጀንዳ አንድ፡ ተሳትፎ የተደረገው ስለ ፕሮጀክቱ ያለው መንግስታዊ በፕሮጀክቱ ሁሉም በአመራሩ እና በባለሙያው ዘንድ መንግስታዊ ቢሮዎች በአካባቢው ላይ ስለሚኖሩ ጠቀሜታዎች እና የተለያዩ ጥናቶች በጥልቀት ያላቸው ቅድመ ዝግጅት እና የተሳትፎ ገለፃ የተደረገ መሆኑን ተሳታፊዎች ገልፀዋል።

አጀንዳ ሁለት፡ የፕሮጀክቱ ፋይዳ እና ጥቅም

ተሳትፎው በቀጣይ ፕሮጀክቱ ሊኖረው ስለሚችላቸው ፋይዳና ጥቅም ተሳታፊዎች እንዲገልፁ በማድረግ መሰረት፡

1ኛ. ፕሮጀክቱ ለአካባቢው ህብረተሰብ የተለያዩ የስራ ዕድሎችን ለፈጠር የሚችል መሆኑ፣

2ኛ. ልማቱን ተከትሎ በአካባቢው የተለያዩ መሰረተ ልማቶች ለገነቡ ሊንቀሳቀሱ እና

3ኛ በአጠቃላይ ፕሮጀክቱ ለአካባቢው ምሁራኑ ገቢ እንዲያገኙ እና ጥቅም የሚሰጥ መሆኑን ተሳታፊዎቹ ገልፀዋል።

አጀንዳ ሦስት፡ የሚታሰቡ ስጋቶች

ፕሮጀክቱ ተግባራዊ መሆን ሲጀምር ሊያስከትል የሚችላቸውን ስጋቶች በተመለከተ ተሳታፊዎቹ፡

1ኛ የፕሮጀክቱ ድንበር አርብቶ አደሩ ለግጦሽ ከሚጠቀመው መሬት በመቀነሱ አለመከፋቱ፣

2ኛ፡ የሰው ሀይል በአካባቢው እየበዛ ከመጣ ቁጥር የተለያዩ በሽታዎች ስርጭትና የወሲብ ተዳዳኝ ቁጥር ሊጨምር የሚችል መሆኑ፣

3ኛ ከተማዋ እዙን ባለችበት ደረጃ ከቀጣይ መጸ

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አካባቢያችን የሚመጣውን ከፍተኛ የሕዝብ ሀይል ለያስተናግድ
የሚችል የጤና አገልግሎት፣ የመኖሪያ ቤትና የንግድ ሽቅርቦት
ጋር በተገናኘ ያለመመጣጠን ሁኔታ የሚፈጥራቸው መሆኑን፤
ፋብሪካውን አጸፋ አስተያየት በሚሰጥበት ጊዜ የሚሰጠው መረጃ ላይ ከአስተያየቱ
በዛት አንፃር መጠኑና ነቅ ለፈጣር የሚችል መሆኑ ሌላና
5ኛ. በቂ የመጠጥ ውሀ አቅርቦት ችግር ሊፈጥር የሚችል መሆኑንገልፀዋል።

አጀንዳ አራት፡ ለተጠቀሱት ስጋቶች የተሰጠ የመፍትሄ ሀሳብ
ከላይ ለተጠቀሱት ስጋቶች የመፍትሄ ሀሳቡን በተሰጠሳቢው
አንጻር በቀረበው ሀሳብ መሰረት፦
1ኛ. ለሰው ጉልበት ለአንስሳት የጤና አገልግሎት የሚሰጥ ባለሙያም
ቦታ የመድሀኒት ችቅርቦት ሬጉላቶሪ ትኩረት ተሰጥቶ በሰራ፤
2ኛ.ፋብሪካው አጸፋም ሆነ በየጸረጂው ላሉ የህጠረተሰብ ክፍሎች
ፕሮጀክቱን አስመልክቶ የማንሳቤ መስጨበጫ ስራ ተጠናክሮ ቢቀጥል፤
3ኛ. ለፕሮጀክቱ አገልግሎት የሚውለውን መሬት ድንገር
ከፕሮጀክቱ ስመራር ጋር በመመካከር መለየትና አርብቶ
አጸፋ አንጻያውቀው ማጽደግ እና
4ኛ. በአካባቢው መሟላት የሚገባቸው መሠረተ ልማቶች
ከሚመለከተው አካላት ጋር በመነጋገር በየጸረጂው እንጸመልኮ
ማጽደግ የሚሉት የመፍትሄ ሀሳብ ተጠቅሰዋል።

አጀንዳ አምስት፡ ማጠቃለያ
ልማቱ ከአካባቢው ህጠረተሰብ ሀገር ከፍተኛ
አስተዋጽኦ ያለው በመሆኑ በየጸረጂው ያሉ
አካላት ለፕሮጀክቱ ስራ ስኬታማነት አስፈላጊውን
ትብብርና ተሳትፎ ማድረግ አስፈላጊ ጉዳይ መሆኑ
በተሰጠሳቢዎቹ ተገልፃል።

Water Works Design and Supervision Enterprise (WWDSE)
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Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአካባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ጉራ ቀበሌ ማኅበረሰብ ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡብ ኦሞ ወረዳ Woreda ሣላማጎ ቀበሌ Kebele ጉራ ቀን Date 11/09/03

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ወይነሪኝ ዋቆይ	ወ	አርብቶ አደር	የጎዋስ ሰብሳቢ	
2	ማሪሎ ሙኩጉሎ	ወ	አርብቶ አደር	የወረዳ ኮሚሽ	
3	የጠጉት በላቸው	ወ	አርብቶ አደር	የሠገር ሽማግሌ	
4	ውርጎ በላቸው	ወ	>> >>	>> >>	
5	ሴሩዋ በለቸው	ወ	>> >>	>> >>	
6	ገኤ ጊዮጠርጎ	ወ	>> >>	ወጣት	
7	ቡሙጌ በርነለኝ	ወ	>> >>	የጎሣ መሪ	
8	ቢጵ ቤዮጉና	ሴ	>> >>	የሴቶች ተወካይ	
9	ካንበርጉሊይጵ	ሴ	>> >>	ተሳታፊ/አገፅ	
10	ጋንጌ አይጀሬኝ	ሴ	>> >>	የቀበሌ ነዋሪ	
11	ዘጣይ የርነለኝ	ሴ	>> >>	የቀበሌ ነዋሪ	
12	ጀጵቴ ይንጋይነለንጀ	ሴ	>> >>	>> >>	
13	ወይካለጣ የሙጉ	ወ	>> >>	ወጣት	
14	ፈሻ ጂርታንዓ	ወ	>> >>	ወጣት	
15	አጎርቢ ቢቸላ	ወ	>> >>	የሠገር ሽማግሌ	
16	ጋንጂጌ በዮሽወዓ	ወ	>> >>	የቀበሌ ነዋሪ	
17	ሄንጥሩ ይንጋይቻሮቴ	ወ	>> >>	ወጣት	
18	ሙለሴ ገሬንጂንወ	ወ	>> >>	ወጣት	
19	ቻሬያገለኝ ውርጎ	ወ	>> >>	ወጣት	
20	አጀ ካርቢጀ	ወ	>> >>	የሃዋሳ አመራር	
21	አይካሮ የላጌ	ወ	>> >>	ወጣት	
22	ወይካሮ ሣፃይ	ወ	>> >>	ወጣት	

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ጉሬ ቀበሌ ማኅበረሰብ ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡብ ኦሞ ወረዳ Woreda ሊላጠጣ ቀበሌ Kebele ጉሬ ቀን Date 11/09/03

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	ሩሌ ሀጡ ቻሪ	ወ	ኣርብኛ ኣዳር	የወጣት መሪ	
24	በላይ ደቦ	ወ	>> >>	መምህ	
25	ዓርበዮ ሰላመሁንዳ	ወ	>> >>	መምህ	
26	ሃገርቦ ሲርዋ	ወ	>> >>	መማህ	
27	ከተማ ኣገሌሁን	ወ	የቀበሌ ገ/ልዑላን	አመራር	KFK
28	በቃቦርልል መንዮጠ	ወ	የቀበሌ አራስአስላፊ	አመራር	
29	የኽይኽ ኧንግሊልየ	ወ	ሂሪጠቆ ሂዩር	የዘገሬ ኣጫጭሌ	

Water Works Design and Supervision Enterprise (WWDSE)
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የጥናቱ ባለሙያ ስለ ኢጠቃላይ የሃራዝ ስኳር ልማት ፕሮጀክቱ ማንነትና አስፈላጊነት ኢጠር የለ መግራሪያ ካሰጡ በኋላ የውይይት አጀንዳዎቹን በመግለጽ በአያንዳንዱ ላይ ተሳታፊዎቹ የሰጣቱ ልውውጭና ሃሳብ እንደያይ ርታግቸው ኢቅርጠዋል።

አጀንዳ 1: መሠህበረሰቡ ስለፕሮጀክቱ ያለው ማንዛቤ

አጀንዳውን በተመለከተ በኢጠሳታፍው ተሳታፊዎቹ ዘንድ ከዚህ በፊት በተለያዩ መድረኮች ስለተጠየቁት አሁን በቀ ማንዛቤ ያላቸው መሆኑንገልፀዋል።

አጀንዳ-2: ስለ ፕሮጀክቱ ያላቸው ስጋት

ተሳታፊዎቹ በፕሮጀክቱ ዙሪያ ያላቸውን ስጋት አንደገለፁ ተጠይቀው፡

1ኛ. መንዙን ተከትሎ የለው መሬት ለሸንከራ አገዳ ልማት የሚውል ከሆነ ከብቶቻችንን የሚመንጪበግቢው ማጠሸና የሃዋሳ ሊገባር ውሀ እንጠጣለን ይቸላል፡

2ኛ. ልማቱን ተከትሎ በአካባቢው ሱሰኛ ገዢ ሰቦች የሚሰፍሩ ከሆነ የአርሶ በርሶ አለመግባባት ለከሰት ይችላል የሚሉ ስጋቶችን አስቀሃመጠዋል።

አጀንዳ 3: ፕሮጀክቱ የሚሰጠው ፊየዳ መዘሃዎ ጥቅሃዎ

አጀንዳውን በተመለከተ ተሳታፊዎቹ በጋራ ከተወያዩበት በኋላ የሚከተሉትን ሀሳቦች ሰንተዋል።

1ኛ. የተለያዩ ልማት አውታሮችን አገልግሎት ሚሳኝ የሚያስችላቸው መሆኑን፤

2ኛ. ለአካባቢው ሕዝተሰብ የስራ ዕድል የሚፈጭር መሆኑን፤

3ኛ. በሃመሳኝ ስንገል ራሳቸውን የሚያስችል ሁኔታ የሚፈጭር መሆኑን፤

4ኛ የስውም ሆነ የኤንስሳት ጤናን ከመጠበቅ አንፃር ሃህይ ሁኔታዎችን የሚፈጽር መሆኑና

5ኛ በአርቅ ወቅት በቀ ውሀ በቅርቦት ሚሳኝ የሚያስችላቸው መሆኑን ገልፀዋል።

አጀንዳ-4: ስጋቶችን ለመቅረፍ የተሰጡ የመፍትሄ ሃሳቦች

ከቀረቡት ዋና ዋና ስጋቶች ላይ ከተወያዩ በኋላ የሚከሉትን የመፍትሄ ሃሳቦች ሰንተዋል።

1ኛ ከሰውም ሆነ ለኤንስሳት በቀ ውሀ በአቅራቢያቸው ሚሳኝ ኬንዲችሉ፤

2ኛ የሳስ መሬት ሁኔታና የኤንስሳት ጤና ኦገልግሎት ከመጀሙ ቢመቻች እና

3ኛ ፕሮጀክቱ መጸ ስራ ገበቱ ውጤት መኖሩት ቢጀሃር በሚከት ሀሳብ ሰንተዋል።

አጀንዳ 5: ሚጠቃለያ

ተወያዩቹ ለሚቱን ያመኑበትና ይቱቀበሉት ባመሆኑ መንሚስት በሸፈግ መጸ ስራ ገበቱ በልማቱ ሂጸት ተሳታፊ ዋችና ዘጠቃሚዋች መሆን የሚቻሉበት ሁኔታ እንደፈጠር ፍላጎታቸው መሆኑ ተረጋግጧል ፡፡

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ተሳታፊዎች ዝርዝር
List of participants

የ ሀይለሙሀቀስሌ መሸሻጋ ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡ ኦሞ ወረዳ Woreda ሳላመጎ ቀበሌ Kebele ሀይለሙሀ ቀን Date 12/09/03

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	አለፀሲሌ ወኩሉ	ወ	አርብቶ አደር	ስራአስኪያጅ	
2	ገብኙ ደርባ	ወ	>> >>	የቀበሌ ኘሙሀር.	
3	ገርዳንአለ ኘለሙገዳገ	ወ	>> >>	የቀበሌ ነዋሪ	
4	ኩሙሉኩ ደርባ	ወ	>> >>	ወጣት	
5	ኃይሉ ጅንቄ	ወ	>> >>	የሀገር አማማሌ	
6	ለንለኜሌና ቢዮሉሜ	ወ	>> >>	>> >>	
7	ናሙንቼቦኒ ቢዮቻ	ወ	>> >>	>> >>	
8	ሉንለኜ በና በዮጲሲና	ወ	>> >>	ወጣት	
9	ለሙለስሙሄያ ደርባ	ወ	>> >>	የሀገር ሽማማሌ	
10	ሩጋሙጵሩ ደንገል	ወ	>> >>	>> >>	
11	ሲጎንጇነ ኘለቶይ	ወ	>> >>	የንዛ ወሪ	
12	ቻርደልንጎ ሚዩሊሀለ	ወ	>> >>	የሀገር ሽማማሌ	
13	ሼገሮ ካበጌ ኘሌቸጲ	ወ	>> >>	ወጣት	
14	ካሬሞ ሲጎንጇነ	ወ	>> >>	>>	
15	ጉግኬኮካሙሎ ኘሌሲጲ	ወ	>> >>	የሀገር ሽማማሌ	
16	ጣሀርቻሀሬ ገልጇንሀ	ወ	>> >>	ወጣት	
17	ኘለሀዖለ ለንለኜበና	ወ	>> >>	>>	
18	ኘሌጌ ሳባጎሮ	ወ	>> >>	ወጣት	
19	ጉለኜጱዋ ቢዮሉሜ	ወ	>> >>	>>	
20	ናሾጋይ ጱሊ	ወ	>> >>	>>	
21	ናጇራሀኢ ቻካጲሴነ	ሴት	>> >>	የሴቶች ተወካይ	
22	ቻንሴካ ጉግኮካሙሎ	ሴት	>> >>	ነዋሪ	

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የጥናቱ ባለሙያ በኩራዝ ሸንኮራ አገዳ ልማት ሜካንካና አስፈላጊነት ዙሪያ አጭር ማብራሪያ ሰጥተው ተሳታፊዎቹ ካነሷቸው ጉዳዮች አንፃር የጋራ ውይይት አንዲያደርጉና ሀሳባቸውን ሊያንጸባርቁ ጋብዘዋል።

አስተያየት-1፡ ማህበረሰቡ ስለፕሮጀክቱ ያለው ግንዛቤ
ይህንን አስተያየት አስመልክቶ ጥቂቶቹ ተሳታፊዎች ስለፕሮጀክቱ የሚያውቁ ቢሆንም አጠቃላዩ ግንዛቤ ግልጽ አንደሌላቸው በማለጽ ተናግረዋል።

አስተያየት-2፡ ስለፕሮጀክቱ ያሉት ስጋቶች
ተሳታፊው ለተሳታፊዎቹ በፕሮጀክቱ ዙሪያ ስጋት ካላቸው አንዲገልፁ ሲጠይቁ ከሰጡ በኋላ፡
1ኛ. አጠቃላይ መሬቱ ለሸንኮራ አገዳ ልማት የሚውል አገሪያ የማጠጫ መሬት ሌላና ለገጠጠ የቻላል፣
2ኛ. ይኑ ከተመነጠረና ለኤርሻ ከወለ የጸር አንስሳት ከአካባቢያቸው የሰደዳለ፣ ይጠፋሉ ወይም ወዴ መኖሪያቸውን በመቀጠት አደጋ ሊያስከትሉ ንን ይችላሉ፣
3ኛ. ልጣቱን ተከትሎ ብዙ ሰው ወደ አካባቢያቸው የሚመጣ ከሆነ የህዝብ ቁጥር ይጨምራል፣ አለ መግባባትም ይከሰታል፣
4ኛ. አጠቃላይ መሬቱ ለኤርሻ የሚውል ከሆነ የሁለንተና ከብቶች አንጽላይ ሊሙሉ፣ ለያጽሩ ስለሆነ ደህ ሁኔታ አከመግባባት ችን ሊያስከትል ይችላል፣
5ኛ. በድርቅ ወቅት ላጠቶቻችንን ይዘን የምንሰደደው በአሜ መንገ ዳር ነው። አሜ የሚለማ ከሆነ በድርቅ ወቅት መሸሻ አናጣለን የሚሉ ስጋቶችን ገልፀዋል።

አስተያየት-3፡ ፕሮጀክቱ የሚሰጠው ፋይዳ
ፕሮጀክቱ ለህብረተሰቡ የሚያስገኘውን ፋይዳ አስመልክቶ ፕሮጀክቱ ተግባራዊ ሲደረግ የተለየየ

o/o

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Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

መሠረተ ልማቶች በቅርበት ለሚኖሩ ለሚቸሩ ተጠቃሚዎች
እንሆናለን በማለት ገልፀዋል::

ከጀንዳ-4: ስጋቶችን ለመቅረፍና ሬየዳውን ከቸ ለማጽዳት
መወሰድ ያለባቸው መፍትሄዎች::

ከሰዓት ከተጠቀሱ ስጋቶች አንፃር ተሳታፊዎቹ
የመፍትሄ ሀሳብ እንዲሰጡ ተጠይቀው የሚከተለ
ሉችን ሀሳቦች ሰጥተዋል::

1ኛ. ባለጠጉያዎች መዳ አካባቢያችን መጥተው
ከልማት የሚውለውንና ለማጣስና ለመኖሪያ
የሚውለውን መሬት በመለየት እንዲያካፍሉቸው፣

2ኛ. ከጠንቅ ውጭ አካባቢውን በሚመለከቱ ውሳኔዎች
መዳ እርማዊ ወይም መዳ ተማባር ከመገባቱ በፊት
ማህበረሰቡን ባሳተፉ መልኩ የጋራ ምክክር
ለይደረግልን እንዲሚገባ ገልፀዋል::

ከጀንዳ-5: ልዛጠ ቃለ ያ
የቀበሌው ማህበረሰብ ስለ ፕሮጀክቱ ያለው
ማንዛቤ አነስተኛ ሆኖ በመገኘቱ በዚህ ዙሪያ
ቀጣይነት ያለው የማንዛቤ መስጨባጫ ስራ
ሊሰራ እንዲሚገባ ከተሳታፊዎቹ አስተያየት
ለማወቅ ተችሏል::

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ተሳታፊዎች ዝርዝር
List of participants

የ አቁሠና ቀበሌ ማ/ሰብ ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡብ አሚ ወረዳ Woreda ሣላማኝ ቀበሌ Kebele አቁሠና ቀን Date 13/09/03

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ገብረቂ ባሻ	ወ	አርሶ አደር	የቀበሌ አመራር	
2	ተንቁ ማርሻሽ	ወ	>> >>	የጎሳ መሪ	
3	ኡይቡላ አየንሌ	ወ	>> >>	የሀገር ሽማግሌ	
4	አዩቡሉ ካሮ	ወ	>> >>	>> >>	
5	ደሸ አርጡና	ወ	>> >>	>> >>	
6	ቻማየሰ ዶርባ	ወ	>> >>	መጣች	
7	አየሁየሊችን ለማጠመኝ	ወ	>> >>	>>	
8	ኡየሱላ ደዩኔ	ወ	>> >>	የሀገር ሽማግሌ	
9	ኤጡጋ ጠገሉኝ	ወ	>> >>	ኣመራር	
10	ጋሞጪለች ቸርኔ	ሠ	>> >>	የሀገር ሽማግሌ	
11	ኡቱርቡ ቡሉሜሬ	ወ	>> >>	>> >>	
12	ሞይቶል ጉናዚሬ	ወ	>> >>	>> >>	
13	ዶቢዶኝ ኡሙሉ	ወ	>> >>	መጣች	
14	አዩይኝጋ ሚፊቦ	ወ	>> >>	>>	
15	ሉዶሬ ገልባል	ወ	>> >>	>>	
16	ጉናሲና ባቲሩ	ወ	>> >>	>>	
17	አዩለንማ አይሲላ	ሠ	>> >>	>>	
18	ጋሪዶ ሃሉጎ	ሴ	>> >>	የሴቶች ተወካይ	
19	ቸቸሃለይ ባሃሮ	ሴ	>> >>	የቀበሌ ነዋሪ	

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የሙያይቱ ሰጠሳቢ ስለኩራዝ ስኳር ልማት ፕሮጀክት ማጠራሪያ ከሰጡ በኋላ አያንዳዋይን ለሙያይት አቅርበዋል። በመቀጠልም ተሰብሳቢዎቹ በቀረቡት አጀንዳዎች ላይ ሀሳባቸውን ሰጥተዋል።

አጀንዳ አንድ: ስለ ፕሮጀክቱ ያለቸው ግንዛቤ
ከዚህ በፊት በተለያዩ አጣቃት ስለፕሮጀክቱ ልማጠራሪያ ሲሰጥ በነበረበት መቅት ተሳታፊዎቹም ተገኝለጡ የነበሩ በልሆኑቸው ግንዛቤው ያለቸው ልክሆኑን ገልፀዋል።

አጀንዳ ሁለት: የፕሮጀክቱ ሬይዲ ፕላይ ሰቅም የፕሮጀክቱን ጠቀልሎታ አስመልክቶ የተረዱትን ያህል አንደገለፀ- ተጠይቀው አንዳ ፊዚክተለው ሀሳባቸውንአጥተዋል።
1ኛ: የተለያዩ መሰረተ ልማቶች ተጠቃሚዎች አንሆናለን፣
2ኛ: የስራ ዕድል አናገኛለን፣
3ኛ: ለገቲን ገንዛብ አናገኝለን፣
4ኛ. የተሻለ የትምህርት ዕድል ለልጀቻችን ይፈጠራል፣
5ኛ. ከፕሮጀክቱ የአርሻ ሠራ ልምድ አናግኝታለን።

አጀንዳ-ሦስት: የልሚታሰቡ ስጋቶች
በፕሮጀክቱ ዙሪያ የሚታሰቡትን ስጋቶች በተመለከተ:-
1ኛ. የግጦሽ መሬት አጥሪት ለከብት ይቸላል፣
2ኛ. የአሳ ሽሽ አርሻ ተጠቃሚነታችንን ልናጣ አንችላለን፣
3ኛ. የመባ ቦሽታ ስርጭት ለጨ ምር ይፍላል፣
4ኛ. የዱር አንስሳት ሊሰዳዱ ይፍላሉ በጣለት ሀሳባቸውን ገልፀዋል።

አጀንዳ አራት: ስጋቶቹን ለጣስወገድ የተሰጡ መፍትሄዎች
1ኛ. የግጦሽ ቦታዎች አንዲለዩ ቢጸደጣ፣
2ኛ. የአንስሳት ፊዴሮ ልማት ኑሩት ቢሰጠው፣
3ኛ. ለስጡም ነዩነ ለአንስሳት የሀጠጣ ውሀ አቅርቦት አንዲኖር በጸደጣ፣

4ኛ. አርብቶ አደሩ የመኸሩ ተጠቃሚ እንዲሆን ቢደረግ እና
5ኛ. የመሰረተልማት አውታሮች ግንባታ ከወዲሁ ቢታሰብበት::

አጀንዳ አመጣጥ: ሜጋጠቃለያ

ፕሮጀክቱ ለአካባቢው የሚሰጠው ፊይዳ ከፍተኛ በመሆኑ ወዴ ተግባር ገብቶ እንቅስቃሴ ሲጀመር የሚነሱበረሱኝ አደጋር ይለውጣል የሚል እምነት አለን ስለሆነ የሜጋጠቃለያ ሀሳባቸውን ሰጥተው የሰለቱ አጠቃላተጠናቋል::

Annex1.3: Nyangatom Wereda Stakeholders and Public Consultations

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ካንጋንጎ ቀጠሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/ኦ1 ወረዳ Woreda ጌንጌቶ ቀበሌ Kebele ካንጋንጎ ቀን Date 24/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ሎኛደንጎ ሎኣቀ	ወ	አርጓኔ አደር	ሊቀመንበር	
2	ናሎአትሊኔ ጐሊአልኦ	ወ	"	የቀጠሌ ነዋሪ	
3	ኒውጉን ጎደ	ወ	"	"	
4	ኒጠንጠን ደለንጋ	ወ	የጉሣ መሪ	"	
5	ለሎት ዩ-ኖጅ	ወ	አርጓኔ አደር	"	
6	ወ/ሮ ሎአሪ ሎአዲ	ሴ	"	የአ/ተ/ቃመሣይ	
7	ናአለ°ፍ ኧ/ሮት	ሴ	"	የቀጠሌ ነዋሪ	
8	ናቻዋይንግ ጐኑሀ	ወ	"	የአገር ሽማግሌ	
9	ኢሎና ኢትሊለንግ	ወ	"	"	
10	ኧጎደ ኧሎ	ወ	"	"	
11	ለኔ ጋሎኝ	ወ	"	"	
12	ኢሎና ሎጅአ	ወ	"	የጉሣ መሪ	
13	አለፐር ኢኞዎ	ወ	"	"	
14	ጉንጋ ሎኖሪየ	ወ	"	መጣት	
15	ወ/ሮ አጉሉ ቻፓ	ሴ	"	የቀጠሌ ነዋሪ	
16	ዐ-ቼ ኧቸአ	ወ	"	የአገር ሽማግሌ	
17	ገሎኒ ጎጋ	ወ	"	ረመጣ	
18	ኢላፕ ሊኡንኧ	ወ	"	የቀጠሌ አመራር	
19	ኢ ሊሮ ናጎሊ	ወ	"	መጣ	
20	አመጅን ሎጅአ	ሴ	"	መጣ	
21	የራኔንግ ሎፓ	ወ	"	የአገር ሽማግሌ	
22	ሎኛ አወሌ	ወ	"	የአገር ሽማግሌ	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ካፍጠናን ቀለሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/ኦሞ ወረዳ Woreda ኔንጋዎም ቀበሌ Kebele ካፍጠናን ቀን Date 24/09/2005

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
	መዩን ኦንሞን	ወ	አርሶ አደር	የአገር ሽማግሌ	
	ደብንጋ ኢላፕ	ወ	〃	〃	
	ሎኣን ኦላ-	ወ	〃	〃	
	ንብታ ኤኣዮ-ሊያን	ወ	〃	〃	
	ሎዋያ ኦላ	ወ	〃	〃	
	ኦኣቃር ኦላ	ወ	〃	〃	
	ኢሌንሰ መንሳ	ወ	〃	ወጣት	
	ሎኣና ሎየኩን	ወ	〃	〃	
	ሎዋና ሎየኩን	ወ	〃	〃	
	ሎተን ሎየኩን	ወ	〃	〃	
	ሮዋ ኦንጀን	ወ	〃	〃	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ሩትላርቀለሉ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/አ ዎ ወረዳ Woreda ኔንቻሞ ቀበሌ Kebele ሩትላር ቀን Date 24/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ኦንጉኮ ኦዲሞ	ወ	ኢርሙና ኪሊኒክ	ዋሪቀመንበር	
2	ኦሚፓ ኦሮሞያ	ወ	11	የቀለሉ ነዋሪ	
3	ኦዶሉ ኦሮሚ	ወ	11	11	
4	ጌፕ ፍሬዘግ	ወ	11	11	
5	ኦቴሌ መሮጌ	ወ	11	11	
6	ፖርፍ3 ኦሞኳንኑ	ወ	11	11	
7	ናሙዋ ቴክኮስ	ወ	11	መምህ	
8	ኦኒጄ ኦሚለ	ወ	11	11	
9	ኦትኔንስ ንንንኑ	ወ	11	11	
10	ኦጄሮያ ኢያ	ወ	11	11	
11	ኦመና ፓል	ወ	11	11	
12	ኦቄሮቼ ኦሚለ	ወ	11	11	
13	ኦቄሮ ናግለ	ወ	11	11	
14	ኦኦመ ኦሚያ	ወ	11	የቀለሉ ነዋሪ	
15	ኦጀግ ኦተሞሮ	ወ	11	11	
16	ኢባሌጉ ኦሮግ	ወ	11	11	
17	ኦግትኦ ኦኦኒ	ወ	11	የገጠሩ መሪ	
18	ኦሙሊር ኔሙ	ወ	11	የቀለሉ ነዋሪ	
19	ኦመኦ ኦመሩግ	ወ	11	11	
20	ናፓር ኦሙ	ወ	11	11	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ሩሮጎይ ቀበሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ይሰኣ ወረዳ Woreda ጅንጀቱ ቀበሌ Kebele ሩሮጎይ ቀን Date 24/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ሎጎይ ሎፓይ	ወ	አ/አ ይር	ቀ/ሊ ቀበ/ንክሪ	
2	ሎይናጎ ሎፓሩጎና	ወ	"	ም/ "	
3	ጎርቴ ጊሉሃ	ወ	"	የአካ/ተወካይ	
4	ናማር ሎጎሄይ	ኦ	"	የአ/እሣ ተወካይ	
5	ኡሙታ ቀድሩጎ5	ኦ	"	"	
6	ጎጀቶ ጎጊላ	ወ	"	"	
7	ጎ-ታን ሎጎሉ3	ወ	"	የቀበሌ ነዋሪ	
8	አጎይ ሎዋሃ	ኦ	"	"	
9	ሎትያጋ ጎቴጎ	ኦ	"	"	
10	ሎቶሩጎና ሎጮጎ	ኦ	"	"	
11	ሎቻፒዮ ኤሞኒንጎ	ኦ	"	"	
12	ሎፑቁ ጎቴጎ	ወ	"	መጠት	
13	ሎዬመ ኤቦይ	ወ	"	"	
14	አኤወኒንጎ ጎሩሶደ	ወ	"	የጉሀ መ/	
15	ሎጎ ሎጮ አኤወኒንጎ	ወ	"	መጠ	
16	ናሞንጎ ናማሪይ	ኦ	"	የቄሳሊ ነዋሪ	
17	ሎጎቁ ሎሙሩን	ወ	"	መጠ	
18	ናፑኤ መቻር	ኦ	"	የቀበሌ ነዋሪ	
19	ጎሪፓቻ ኦዶታኤሮጎ	ኦ	"	"	
20	ጎሮ ሎሃሎ	ኦ	"	"	
21	ናጎንጎ ሎፓይ	ኦ	"	"	
22	ናቻርቶ ሎጎጎቪይ	ኦ	"	"	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ናሮዓዳ ቀበሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/ኦሞ ወረዳ Woreda ዳንጉር ቀበሌ Kebele ናሮዓዳ ቀን Date 24/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	ሎክለ ኡጋ	ወ	አርጉታ አዶር	ወጣት	
24	ኤርሞ ሎዋክ	ወ	〃	〃	ኤርሞ
25	ናሃቼ ሎክለ	ኦ	〃	የኢ/ተወካይ	
26	ናዋክ ሎኦረ	ኦ	〃	〃	
27	ኤፔዮ ሎኮቼይ	ኦ	〃	የቀበሌነዋሪ	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ _____ ውይይት/ስብሰባ
Consultations

ዞን Zone _____ ወረዳ Woreda _____ ቀበሌ Kebele _____ ቀን Date _____

ተ.ቁ. Ser.	የተሳተፈው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1					
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21					
22					

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ሩፓቃአኖ ቀጠሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/አ ወረዳ Woreda ኧንቃም ቀበሌ Kebele ሩፓቃአኮት ቀን Date

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ኤፓሮን አስፊ	ወ	ሰ/አለቃ	የአካሄ መሪ	
2	ኮንታ ካሌ ኮክፍት	ወ	"	"	
3	አረማን ኮንሶ	ወ	"	"	
4	ናሙን አጠየ	ወ	"	የአገር ሽማግሌ	
5	ኧታስ አስፊ	ሴ	"	"	
6	ኮሮሌ ኧሱ	ወ	"	"	
7	ኻቮቃ አሀገሌዋ	ሴ	"	ቀጣኝ	
8	ኧክሽለ ዋኽ	ወ	"	"	
9	ኧቻቸ ኮቀሌን	ወ	"	"	
10	ናያታ ሊያኮሌ	ወ	"	"	
11	ሮጋ ኮቃሊያ	ወ	"	"	
12	ኧኘ ኮኤክና	ቀ	"	የአካሄ መሪ	
13	ኮኣሀን ኧንስ	ወ	"	"	
14	ናቀቃ ኧርሱ	ወ	"	ፀሐፊ	
15	ኮግፓ ኮሮጌ	ቀ	"	የአገር ሽማግሌ	
16	ኧቮር ኮሌቀቻኒ	ወ	"	መምህት	
17	ኧኔሮ ኮቀቻ	ኦ	"	የኦ/ተወካይ	
18	ኧታኑ ሱኻተሮ	ኦ	"	"	
19	ኻሌንን ኮቀኽሮ	ኦ	"	"	
20	ጣሮሮ ኮቀኽሩ	ኦ	"	"	
21	ወረሌ ኮታንን	ኦ	"	"	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ኮሬንችኻ መ ቀለሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/ኦ ወረዳ Woreda ፍንጃ ቆጮ ቀበሌ Kebele ኮሬንችኻ መ ቀን Date 25/07/2005

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ታሪኩ ቶኔ	ወ	አርብቶ አደር	ቀለቀመንበር	
2	ፍሬማና ኮኔ	ወ	〃	የቀለሌካዉ	
3	ኮንቻነነ ሌኮ	ወ	〃	የጉሊ ዐቢ	
4	ኮተሙሄዶ ኮሽለ	ወ	〃	〃	
5	ኬላፕ ዐቢ	ወ	〃	〃	
6	ኮለርማ ኮኒቃ	ወ	〃	የቀለሌካዉ	
7	ኮቻርሮ ኮኔ	ወ	〃	〃	
8	ኤፖሌ ኮንቻዶ	ወ	〃	〃	
9	ኦንኮሉ ኤቁሉ	ሴ	〃	የኤኔኔ አመሃሪ	
10	ኮቻሉ ዶኑሌ	ሴ	〃	〃	
11	ዶቻቁዶ ኮኑኒን	ሴ	〃	〃	
12	ናንሊና ኮቻቁ	ሴ	〃	የቀለሊካዉ	
13	ናፑቴዶ ዐቢ	ሴ	〃	〃	
14	ኦኒዶ ኦሙሮ	ሴ	〃	〃	
15	ናቻር ኮቼሙ	ሴ	〃	〃	
16	ናኔቼንጊ ኮሩኽ	ሴ	〃	〃	
17	ኦኦኔ ኮንሌዉዶ	ሴ	〃	〃	
18	ናሙኦንች ሌኮ	ሴ	〃	〃	
19	ኦኦሉሉ ኦቁሪ	ሴ	〃	〃	
20	ፍንጃ ሶኦታ	ሴ	〃	〃	
21	ኦሮንዶ ኮኒቁዶ	ወ	〃	መዛት	
22	ኦሮሙ ዐቢ	ሴ	〃	የቀለሌ ካቁ	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ኮሬንጎቻ ቀለሉ ውይይት/ስብሰባ
Consultations

ዞን Zone ዱ/አ ጥ ወረዳ Woreda ኝንቻጥ ቀበሌ Kebele ኮሬንጎቻ ቀን Date 25/09/2007

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	ናትን ባትት	ወ	አርሶ አደር	የቀለሉ ነዋሪ	
24	ኦሚዋ ዓ ናጊሬ	ወ	〃	〃	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ____ ውይይት/ስብሰባ
Consultations

ዞን Zone ____ ወረዳ Woreda ____ ቀበሌ Kebele ____ ቀን Date ____

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1					
2					
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20					
21					
22					

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ኧንጋራ ቀቦሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ዲላ ዙሪያ ወረዳ Woreda ጫንቆሬ ቀበሌ Kebele ኧንጋራ ቀን Date 27/9/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	ተሾመ ታደ	ወ	አርሶ/ኧሶሳ	አመራር	
24	ኧንጋጎ ሚሊዮን	ወ	ሪ	ሪ	
25	ዳንኤል ፍቅሬ	ወ	11	11	
26	ሄለን	ሴ	11		
27	ሂሩት ለገሰ	ሴ	11	የገጠሳ ልማት	
28	ለማ ሀሰሬ	ወ	11	ሃዋሳ ኢንቨስተር	
29	ለቁምቃሜ ጌታነህ	ወ	11	አመራር	
30	ኧሉ ሚሊዮን	ወ	11	የገጠሳ ልማት	
31	ለማ ሶሪሳ	ወ	11	አመራር	
32	ሚሊንቨርዳ ለማ	ሴ	11	11	
33	ለሉሉሙ ፍቅሬ	ወ	11	11	
34	ለቂን ፍቅሬ	ወ	11	11	
35	ኪዳነ ለማ	ወ	11	11	
36	ጌቱ ጌጡ	ወ	11	የገጠሳ ልማት	
37	ፍሬ ሚሊ	ሴ	11	አመራር	
38	ፍሬው ለማ	ወ	11	11	
39	ጌሾ ጌታቸው	ወ	11	11	
40	ሙሉ ቤንቲ	ወ	11	11	
41	ለማ ለማ	ወ	11	ት/ጊ/ጽ/ቤት	
42	ናሁ ጎሳ	ሴ	11	አመራር	
43	ፓሊ ጌታነህ	ወ	11	11	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ አደጋ ቀስቀሳ ውይይት/ስብሰባ
Consultations

ዞን Zone ሊሂቃ ወረዳ Woreda ደንጋጭ ቀበሌ Kebele አደጋ ቀን Date 27/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ዶክተር ካሳዬ	ወ	አ/አዳራሽ	ዋ/ሊቀመንበር	
2	ናትናኤል ሰመረ	ሴ	"	የሕ/ተወካይ	
3	ሶፍር ኤዋሩ	ወ	"	መምህ	
4	የሀዲያ ቡቢ	ወ	"	"	
5	ዶክተርቢያ ጌጌሶ	ወ	"	"	
6	ሃጎ ሉሆቲት	ወ	"	"	
7	ዶቃመንን ችሪዶ	ወ	"	ሊ	
8	ዶሮ ዶታዩን	ወ	"	"	
9	አወሉአሉ ዶፍቻ	ወ	"	"	
10	ዶንሮት ኤሶሮ	ወ	"	"	
11	ሃያ ቦአሉሳ	ወ	"	"	
12	አችሞ ዶሮት	ወ	"	"	
13	ዶተሮሮ መቡ	ወ	"	የአገር ሽማግሌ	
14	ኤሳለ ቷቦ	ወ	"	"	
15	ሉሆቲት አዳየ	ወ	"	የጎሳ ሰብ	
16	ሉሀ ሄንጌ	ወ	"	"	
17	ኤሉዋሞ አቸይየ	ወ	"	ሊ	
18	ችሆሮ ሶዎመ	ወ	"	ሊ	
19	ጥዬ ሶንሪ	ወ	"	የሕ/ንቅሄ	
20	ናቴሎ ዶሊሉዋ	ሴ	"	"	
21	ናይሪያ አችአ	ሴ	"	የቀበሌ ነዋሪ	
22	አርንጋ ሶዉሬ	ሴ	"	"	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ አደጋ ቀስቀሳ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/አብ ወረዳ Woreda ኛጃንጮ ቀበሌ Kebele አዳጋ ቀን Date 27/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	ናትናኤል ታምሩ	ወ	አ/አደር	የቀበሌ ነዋሪ	
24	ናትዮን ኤሳሪ	ሴ	〃	〃	
25	ናሊሰን ኦዲሾን	ወ	〃	〃	
26	ታሉሩዋ ኤያሙ	ወ	〃	〃	
27	ታማር ታሽት	ወ	〃	መጠታ	
28	ኦሞፓ ታየለቦሩ	ወ	〃	〃	
29	አሉሳር ኤሉዋሞ	ወ	〃	〃	
30	ካሳ ኤፓሞ	ወ	〃	〃	
31	ታሪዝም ባታና	ወ	〃	〃	

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ፖፒላሪያ ቀጠሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/አም ወረዳ Woreda ናንፋሞ ቀበሌ Kebele ፖፒላሪያ ቀን Date 28/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ዋታሎ ኦጣፔሶ	ወ	አ/አፈር	የግብሣ ዐቢ	
2	ሎሔሳን ሃሣ	ወ	"	"	
3	ሎወጣት ሎተሳ	ወ	"	"	
4	ዮንታኖ ክወሬ3	ወ	"	ወጣት	
5	አጣጣሮ ካፔሎ	ወ	"	"	
6	አፊሣ ማቻርሎፖ	ወ	"	ሊ	
7	ሎኪዴ ሎኪሌ	ወ	"	"	
8	ሎፅዋያዴ ኤሎሳን	ወ	"	የአገር ሽማግሌ	
9	ወቼ ሎሣር	ወ	"	"	
10	ሎሳናኝ ናኪዋ	ወ	"	"	
11	ሎዴ ዋር ተሳኪሳ	ሴ	"	የሴ/ተወካይ	
12	ሎንሌ ኤቻኝ	ሴ	"	"	
13	ሎቾኝ ገ5	ሴ	"	"	
14	ናዋሳነ ናሣሊ	ሴ	"	የቀሌሌ ነዋፅ	
15	ናጋርኝ ኤሳ	ሴ	"	"	
16	ማና ናዋሳንፐ	ሴ	"	"	
17	አቁንሳ ሎኤዋሃ	ሴ	"	"	
18	ናቾኝ ግፔሎ	ሴ	"	"	
19	ጉሮጋ ሎፅያንሳ	ሴ	"	የሴ/ተወካይ	
20	ናታገር ሎሌን	ሴ	"	"	
21	ሎተሳዴ ሎኤፔሎ	ወ	"	ወጣት	
22	ሎዋዴ ሎሳርሊንሳ	ወ	"	"	

የሴሪማኖ ዐቢ

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ሃንቻሩ ቀለሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደ/ኦም ወረዳ Woreda ኔገሌ ቦረና ቀበሌ Kebele ሃንቻሩ ቀን Date 28/09/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	አደም ኻሬ	ወ	አ/አደር	ቀ/ሌቀመንበር	
2	ሀመዴል ጅማ	ወ	"	ም/አስተዳዳሪ	
3	ጣሰን ቀጸ	ወ	"	ወጣት	
4	ሻጊ ሉሮ	ወ	"	"	
5	ደቻሳ ለርይሳ	ወ	"	"	
6	ኻንጋ ለሚርችሞ	ወ	"	ፈ/ቀመንበር	
7	ነርሚ ኻቦ	ወ	"	የቀ/ሌ ነዋሪ	
8	ቦሮ ቻንቆ	ወ	"	"	
9	ይሙ ጎርቻ	ወ	"	"	
10	ቡሩ ጫሮ	ወ	"	"	
11	ሌሌሳ ኦዶሳ	ወ	"	ቦ	
12	ሶርሐ ሉቦ	ወ	"	ኩ	
13	ታዲሴ ቻንቆ	ወ	"	"	
14	ዋቆታ ቀሮታ	ወ	"	"	
15	አደታ ይሙ	ወ	ጤ	ቦ	
16	ጉመዳ ቶሉሳ	ወ	"	"	
17	ቻቦ ቶሌሳ	ወ	"	"	
18	ኦሊ ቻንቆ	ወ	"	የሴ/ቤ/ቶምጣሪ	
19	ቶሉሳ አዶሳ	ሕ	"	"	
20	ቶጌ ፓርቻ	ሕ	"	የቀ/ሌ ነዋሪ	
21	ኩኩራ ይሌሳ	ሕ	"	"	
22	ሰፌ ለቾሳ	ሕ	"	"	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ሃንችሩ ቀበሌ ውይይት/ስብሰባ
Consultations

ዞን Zone ደቡብ ወረዳ Woreda ኛንጌሎ ቀበሌ Kebele ሃንችሩ ቀን Date 28/04/2005

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
23	አረ ሙይ ኛ	ወ	አ/ አደር	የኤ/ ኮሚቴ ሊቀ	
24	ደጉ ዓለ	ኦ	,,	,,	
25	ገረመው አሊጋ	ወ	,,	ወጣት	
26	አናንጌ አሊጋ	ወ	,,	,,	
27	ጌዴሣ ወንጌ	ወ	,,	,,	
28	ርሳ ጭሎ	ወ	,,	,,	
29	አርጋ ቴዲቶ	ወ	,,	የሚሊሻ ኃላፊ	
30	ሻሌ ሙጋ	ወ	,,	,,	

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የአሁን ለኢንደስትሪ ፕሮጀክት የአከባቢ ተጽዕኖ ግምገማ ጥናት ባለሙያ እና የየቅሉ ቡድን አደር ጠንቀሳ አወያይ ፕሮጀክት ከአከባቢ የልማት ዕቅዶ አንፃር መገምገሚያ: አስጠ ስጋለ አተገባበሩም ቃል ስፕሮጀክቱ የልማት ሂደትና ስተያዘት አጀንዳዎች ላይ ሂሳስ አንዲሰጡ ጋብዟል::

ቀኝ አዳም ስፕሮጀክቱ አቅቋቋሚ ጉዳ ለው ለቋቸውንኛው ከመንጉንቸው ቀስቴዎች መሰረት ም አንአንራ, ናፓያአዲት, ናሮጉዲ, ኦፓአር, ለሰሰንኛው, ናትጉር, ሃዬመአን, አፒፕያዲ, አዲፓአናአት በየቀስቴዎቻችን ስተደርጉት ውይይት ላይ የተሣተፉን የየቀስቴዎች የገጠሙ መሪዎች: የአለተአዲር አማሳት: የሴት ተወካዮች: የመጣኝ: እና የጠቀሳቸው የየቀስቴያችን አርብቶ አደሮች ተወካዮች ፊስኮት ሠርተን ስጥመጥ ለጠል ሂሣቻችን ለመቻል እና መንግሥት ባቀደው መሰረት ስመሄዱ ሩት ተመቀጫዎች ለመሆን ነው::

አመንም ጋር ግጭት አለፊለማም ስመከሰት ስለሩት ሂሳስ አለጠ ስኃለ ለኩፕሮጀክቱ ያለቸውን መንዘቡ የኩፕሮጀክቱ ሴይአዎች፣ አጋጅችና የመሩትሌ ሂሣስን አንደማስተለው ገለፀዋል:: ስዚህም መሠረት ፤

አጀንዳ አንድ:- አስኩፕሮጀክቱ:መንሃቡ

ኩፕሮጀክቱን ስተመለከተ አዚህ ስሩት ስተሰየዩ ጉዳያት ስመሪያ አመሪጮች የሚንዘቡ ማሳመስማ ሥነ ሕዳርግ አስኳስ መንዘቡው አንአስቻቸው ገለፀዋል::

አጀንዳ ሁለት: ኩፕሮጀክቱ አስአጠቃቀሙ ሊሰጉ አስፈጊለው ሴይአዎች

ደህንነት አጀንዳ ስተመለከተ ሰፋ ያለ ሂሣስና አንሷል::
አአኳዘሂሣው:

1ኛ. አንአጠቃቀሙ የሚሆኑ ስጠለጮችን ሄሳመርተን ስሞጣጠ አመለ ሂሣቻችንሊሰአንሷል::

2ኛ. የሰመሞ ሠነ የአንአሂሣት የመጣ አቅርብን አጠር የሚተሰጠ ስመሆኑ ስዱርቻ ጊዜ ስመጣ አንሷት ስአመለ ሂሮሌው የመጫለመን አጋጋ ያሰመጣዩመናል::

3ኛ. የልማት ስአተገባበት መንግስት የመስአአያ ኃደለ ስአአጠቃቀሙ ሊመ ደንመው አሳመጫለ ለዘመናት አንጂሊት ሠጋር አአአዩሮች

በየረዛው አመናኒው መቋረጥ መፈተሽ ሲገኝ ይችላል::

4ኛ. ለመተን ተስማሚውአስማተማንተ መሠራተ ለመዳኝ መሰረት ስካለባቸው ዕንስሳትን ሕዝቦች ተመቃመቻች ሊሆኑ ይችላሉ በመከተ ሰፊ ያሉ ሃሣቦችን ማኝተል::

አይንቄ ሂስት: ፍሮጄክቱ ሲተገበሩ ሊኖሩ ስለመኖች ተስማሚ በየቀስለቻቸ ስተይዞንት መደጃኝ ለይ ተመሥ ሣይ ዕሆኑ ቀናዊ ቀናቻች: ሃሣቦች:

1ኛ: አግሮስት ሀገር አርማች አይሮች ጋር በየረዛው የመሬትና መቋረኝን ለአሁን ጊዜም አዮተባባስ የመሬዴ አዛመመጄቻች አዮተስተዋተ ለለሆኑ ይሂ ኝመር ለተስጠው ለመተኝን አንቅፋት ሲሆን የሞለ ማንች:

2ኛ. ፕሮጄክቱ ስተስጠንቸው መሬትቻኝ መስን ለመሬኖትና ክለ ሊስች መሳስለ ለየረዛው የሚተየው መቋረም የመሬት ገፅይ አስመሆን:

3ኛ. አግሮስት ሀገር አርማች አይር ጋር አካለርው መቋች የተሣሣ ለፍርው የአስራስትን ኢኒሽ አሳስጊ ለቅቀው መይ አንጋቱን አቅራኒያ የተስይዩ ለፈቤቻኝ አገሪዛ መይ ጊዜ አየስዛ ለመሞመተችው ይሂ ለዚገር አሳቀመለ ለአርማች አይር አስፈፅርና አናኗር ለይ አዮተየ ያለውን ችግር አዮለስለመ አዮተባንስ አንይዜይ ያይርጋለ የሚለ ሲገኙኝ መኖሩ: አነ

4ኛ. ስተስጠው ፕሮጄክቱ የሚመሽ መሠረት አንኒች ሊሣስች ይችላል የሚለ ፋርሣኝ ለሣፈተ ተስንቷል::

አይንቄ አሪት: አንይዜሣች ለተንስት ሃሣቦች የተስመጡ ሥውፋቻዜ ሃሣቦች:

1ኛ. በፕሮጄክቱ መስን ለስመሞ ሀገ ለአንአሣት የመሬ አቅርበት ሲተሳስመን

2ኛ. ለፕሮጄክቱ ለመተ ጉን ለጉን አርማች አይሮች ስሞግስ ለጠለ ሆስን የሚኝ ለለተ ሀገተ መሬመር ሲተሳስለት::

3ኛ. መሠራተ ለመኝች መከትሎ ሠራኝተለ ትምህት ሲኝች መንገድ: Hመናዊ የመገናኛ አመተሮች ለለአንን መሞሮ አመዩሙ ሲተሳስለት::

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

4ኛ. አንዲሁም በዚህ ሀገር አረጋገጭ ጋር በቋንቋ መግባባት የሚቻል ስለመሆኑ ስለዚህ አካባቢ ስለሆነ ስለዚህ ጉዳይ ስለመሆኑ ያለው የመንግስት አካላት ከመጀመሪያ ዘለቄታዊ መሬትና የመኖሪያ ቤታቸው ሁኔታ ሲቀየር

5ኛ. ስለተ በታሰበባቸው መሬቶቻቸው ውስጥ ስለሚኖሩትና በአከባቢው ባሉት ከአሪሶች መንግስ ለዘመናት የቆዩበት የቤተሰብ ንብረት መተዳደሪያ ስለሆነ ማሞት ለታሰበው ልማት እንቅፋ ቋት ሊሆኑ ስለሚችሉ ከመጀመሪያ የመሬቶቻቸው ፣ የዘመናት የክልሉ መንግስት ዘለቄታዊ መሬትና የመኖሪያ ቤታቸው ሁኔታቸው ሲቀየሩ በማሰት ስፋ ያለ ሂሳብ ሊኖር ይገባል።

ከዚህ ጋር ተያይዞ መጠቀስ ያለበት

መንግስት ገለልተኛቸው ባለቀለሞቻቸው ድርጅ ስለ ስለማናገሩ ለልማት ሀገራቸው እንዲመቻቸው መደርጉ ፣ የዘመናት ሂደታቸውና ግብዓታቸውና ከሀገሩ ባለይ ለዘመናት የዘሩት እንስሳዊ እንስሳዊ ስለሆኑ ለልማት ሂደት ያለውን ጥቅም ለልማት ሂደት የተገላለጸውና መጥ ጥሬታ ያለው መሆኑ ገለፀዋል። ከዚህም በተጨማሪ ፣ ልማቱ ለዓለም ሀገ ለልጆቻቸው እንደ እንስራ ስለሆነ የመንግስታቸውን ልማት ወደ ፡ የሚገኘውን ገቢ ለተማረቁበት ጥቅት ጥሬታ አለን የሚለ ተመሳሳይ ሂሳብ ተሰጥቷል።

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Annex1.4: Bench Maji Zone Key Stakeholders Consultative Meeting

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ ዞን ኤክስፐርቶች እና ተወካዮች ውይይት/ስብሰባ
Consultations

ዞን Zone ቤንች ማጂ ወረዳ Woreda — ቀበሌ Kebele — ቀን Date 15·10·2003 ዓ.ም.

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1.	አቶ ገዛኸኝ ኢካቶ	ወ	ሴክሬታሪ ዘ/ቃ/አስ/መ	የጽህፈት ቻርጁ	
2-	አቶ ዳንኤል ሽሬ	"	" "	ዳ/ዕ/ጠ/ክ/ባ	
3-	" ዮሮሬ ፖሎካውስ	"	ቤንች ማጂ ዞን ፖሊስ	ፖሊ-ጉጉ	
4	" መለሰ ገ-ተንሳ	"	ዞ/ቦ/ዘ/ወ/ጥ/ጽ/ኦ	የመሬትና ሀብ	
5	" ዳጋሎ ጋፅተ	"	ባ/ት/ሰ/ፕሮጀክት	ዋና ሥራ አስኪያጅ	
6	ሪ ለሚሬሳ ጀሌቶ	"	ዕ/ዝ/ወ/ጉ/ጽ	ዋ/ሰ ጥሪ ሥራ	
7	ታከለ ጉርሶ	"	ማ/ሥ/ሽ/ዘ/መ	ሥራኪ	
8	ወ/ሮ ሰብሪና ጀሌሮ	ሴ	ፈ/ጉ/ሥ ትራንስፖርትና ማ/ኮ	ተሸ/ኪ	
9	ዳኛቸው ጎሌ	ወ	ሂሂ/ኢ/ል/ መ/ሪ	ዳ/ዕ/ሥ ሂሌሳር	
10	ካሣሁን ካጣቦ	ወ	ሰ/ት-ጥ/ሥ/ሥ/ሰ	ጽ/ቤ-ሥ/	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Annex 1.5: Maji Wereda Stakeholders Consultative Meeting

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የ[illegible] ከንዛተር አ/ሰቦች ባለዕዳዎች ውይይት/ስብሰባ
Consultations

ዞን Zone ሰሜን/ጠ/ክ ወረዳ Woreda ማጂ ቀበሌ Kebele _____ ቀን Date 3/10/2003

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	አቶ መሰቱ ካሳው	ወ	ትክክለኛ ቃ/አፈጉባኤ	ሰብሳቢ አስተባባሪ	
2	" ካሳሁ ፍቅሬ	ወ	ም/ሰብ ቁ/ር አፈጉባኤ	ሥራ ሂደት አስተባባሪ	
3	" ደሸቱ አየለ	ወ	ኢሼሽ ወረዳ ዳኛ ጽ/ቤት	ጸሐፊ	
4	" ሮቤ አዳ	ወ	ግብርና ጽ/ቤት ዳይሬክተር	አስፈፃሚ	
5	" ቴዎድሮስ ገ/ሚካኤል	ወ	እርሻ ጽ/ቤት ኃላፊ	ለተጋበዙ ሃሳብ ገለፃ	
6	" በጋሻ ገበየ	ወ	ገቢዎች ቅርንጫፍ	የሀገብ ግንኙነት ገለፃ	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

የማሺ ወረዳ ኢንተርፕራይዞና ሰንጎተር ዕፅ/ቤቶች ባለሙያዎችና ወኖች ውይይት ማስታወሻ

ስብሰባው : በንጉሴ ሽዋዬና (ዶ/ር) - የአካባቢ ተፅዕኖ ግምገማ ጽ/ት ባለሙያ
ፀሐፊ : ኢዜ ሽፈራው (ዶ/ር) - ከማሺ ወረዳ ኢንተርፕራይዝ ጽ/ቤት
የስብሰባው ቦታ : ማሺ ወረዳ ዋና ኢንተርፕራይዝ ቢሮ
ስብሰባው የተካሄደበት ቀን: 03/10/2003 ዓ.ም.

ባለሙያው ለመንግሥት ተለዳዳሪ ሰንጎተሮች ሊያደረገ አለለው ዘርፈ-ብዙ የፅሁፍና ሠራዊች ጠቅለል ገለ መልጉ አገለፀ በሁሉ ፡ የአካባቢ ብክለት ፕሮጀክቱን ተለመለከተ በጊገር ውስጥ ሊየተመሠረተ ያለው የአካባቢ ጥበቃ ጊቋርቦችና ፍቺታ ባለሀብቶች የዘገጅት የአካባቢ ፍቺታ ጥናቱን ለማወጂነት ፡ ስንጎተተና ዋጋ ለመንግሥት ካጠጪ ጊገር ሊያስገባ መሠሩን ጠቅሊል :: ስመጥቀጠልም ፡ በጊገር ውስጥ ባለው ስሪ የሰው ኬቲልና ለፓንኮር ሽንዳ ብዙት ሊውሉ የሚችሉ መሠረቶች መሆናቸውን ጠቅሰው ፡ በጊዜው ወቅት መንግሥት ካጥቱ ትኩረት ስዕዩአስን ወደ ብዙት ለመሠማት ስፋርጠኝነት የተሳሳተ መሠሩን ገለፀዋል :: ካነሩም የተሳሳ ፡ በቶኝቶው ሽግ ማለትም ለዘቡ-ጠ ሽግ ሊና ስመንጉ ማሺ ዞኖች ውስጥ የተቋቋመውን የአነራሽ አንጊ ብዙት ፕሮጀክት አጠቃሊይ ገፅታ ዘንርተ የተዳገሌ ማብራሪያ ካሰጠ በኋሊ በቀረበት ኢይንዲዎችና መሠሩት የመፍቶ ተሳትፌዎች ሂሳብቶውን ግንዜቤ ሰጠ ጋንዛሊ ::

ኢይንዲ አንዴ : ወሬዱ ኢንተርፕራሩና አንተርፕቶ አሰናሮይንቱ አሰራቸው ግንዛቤ
የአካባቢ ብክለት ፕሮጀክቱ በዘቡ-ጠ ሽግ ዞን ውስጥ ብቻ የሚካሄዴ ኢንይየን መጠሩና ግንዛቤ ሲኖራቸውም በጊዜንቱ ማሺ ዞን ውስጥ ሁሉም ወንዝ ተጎትሎ ባሉት መሠቶች ሳቱ ብዙት ኢሠሩ በተሰማው መሠሩት ለማካሄዴ አሰሠተቶ ዴ-ግ ሁሉን ግንዛቤ ሳንዛቤ ግንዜኬሌቶሠ ተሳታፊዎቹ ገለፀው በባለሀብቶቹና አተዳዳሪዎቻቸው ማብራሪያ መሠረዚተቸውን ገለፀዋል ::

ኢይንዲ ሁለት : ፕሮጀክቱ አለሚለጠው ፍቱዲ መጥቀም ጉዳዮች
ፕሮጀክቱ ፡ ኢንደማንቸውም ፍጠማኔ ሠራዊች የተለያዩ ጉዳቱዎች ኢንደ መጪያስገኝ በባለሀብቶው ኢጠቆሳዩ የዘቡንጨርቢሪዩ ሂሳብች ካተኩጠ በሁሉ ፡ ተንተሌዎቹ ፕሮጀክቱ ፡

1ኛ. የአካባቢውን ማሠሠሌጠል ጉዮ ለመሳሳል ካቡተኛ ጠቃሚነት ኢንዴረዱ ፡

c/o

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

2ኛ. ለጠዙ ዜጎች የሥራ ዕድል የሚፈጥር አለመሆኑ ፤
3ኛ. የፕሮጀክቱ ሕዝብ ለሚሰጥ ስጦታ ሆነ ጉዳት ሲደርስ ለማይተመን ከፍተኛ ኪሳራ የማይጋለጥ አለመሆኑ ፤
4ኛ. የሠራ ተሳትፎን ያስገባው ማኅበረሰብ መሰረት የሰለጠ ለመፍጠር የሚችል አለመሆኑ ፤
5ኛ. የተለያዩ የመሠረተ-ልማቶች ለፕሮጀክቱ ጉልህ የሚያደርግ አለመሆኑ ፤
6ኛ. ፕሮጀክቱ ተቀጥረው አካባቢዎች ባሉት ማህበረሰቦች መስተጋብ ለዘመናት የቆዩትን የጉርብ ጎርብ ግንኙነት ለመቀርፍ የሚችል አለመሆኑ ፤
7ኛ. የሰለጠ የባሳል ትስስር ጉልህ ሚና ለፕሮጀክቱ የሰለጠ ለማለተዋወቅ የሚፈጥ ሌሆን ጉልህ ሚና ይጫወታል ና
8ኛ. የፕሮጀክቱን ማህበራዊና ኢኮኖሚያዊ ገጽታዎች ለመሳለፍ ከፍተኛ ኪሳተዋጽኦ ሌኖረው ጉልህ ሚና ይጫወታል ብለን ገልፀዋል ።

ሰንጠረዥ ሦስት ፡ ፕሮጀክቱ ሌያስከትሉ የሚችሉ አወንታዊ ተፅዕኖዎች

ፕሮጀክቱ ሌያስከትሉ የሚችሉ አወንታዊ ተፅዕኖ ለማጥናት ፕሮጀክቱን ለመቀመጥ ማለት ጉልህ ሚና ይጫወታል ብለን ስለገመትን ሲሠራ በአሳታፍ ሰነዶች ተከታትሎ ለመገምገም ማለት ጉልህ ሚና ይጫወታል ብለን ስለገመትን ትግሪት ሳጥን

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የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

፭ኛ. በጠለፋራዊ ፓርኩ ንብብ መሰንጋ ብዙ ቁጥራት ማለዩናት ስለሆንዎሩ፣ ከወዲሁ ጥንቃቄ ግበተዚረገ ለሰተቀር ጉዳገር ሊያስከትብ ቀችሳብ ስለሆነ ብስራት ሃሳብቸውን እቅርቧል።

አቧንዴ አረት፡ ስጋቶቸን ለመቅረፍ የወሰዱት የመፍትሔ ሃሳቦች

፩ኛ. በአገርቷ ውስጥ ካሉት ፓርኮች፣ የአገሞ ጠለፋራዊ ፓርክ ካሱተቻ የዱር እንስሳት ዝርዮና ቁጠቻት የለመ በመሆኑ ሌና ከሳዚህም የዱር እንስሳት የአገር ቅርስና ሀብት በመሆናቸው፣ የታቀደው ልማትና የዱር እንስሳቱ ጥበቃና ልማት አንዱ በሌለኮው ሌላ ጉዳገር ስለማይፈጠር ሌኒኳን እንዲሆን ሲደረግ፣

፪ኛ. ለልማቱ የወጣታስት ቦታዎች የአገሞ ውንዝን ተከትለው ስለሆኑ፣ ቁሳ ልማም የዱር እንስሳቶቸ ካአገሞ ወንዝ ውሃን የመጣጣኝ ፅደተቸውን ሊያመጣ ጠባቸው ስለሆኔችል ለእንስሳት የውሃ እቅርቦት ሲታሰብበት፣

፫ኛ. እስራሬጌ የሆኑ የመዋሠሪ-ልማት ሌመታናኛ ካወዲሁ ሌንዲማቆሙ ስሩሪግ፣

፬ኛ. የእንስሳት የግጦሽ መሬትና የጠፋ ሌጠገብው ሁኔታ ሳጣቀቢው ልማት ጉዳ ሊገዳ ሲታሰብበት፣

፭ኛ. ልማቱንና ልማቱ ስለተቀደገቸው ቦታዎች የመኒመሰክቱ ጉዳዮች፣ በየደረጀው ያሉትን የሕጠሪተሰብና የሕወራር ኣገሳት ጌሳተሌ በሆነ ሀወስኑ ጠለቅ ያለ የጋራ ቃመክክርና መተዳት ሲደረግስት ስለማሪኝ ሰሩ ያሉ የመፍትሔ ሃሳቦች ተሰጥተዋል።

አቧንዴ አሳሰበ፡ ማጠቃለያ

የወጪው የኣስተዳደር ኣካሳት፣ ስንተርቻኝ ፕሮጀክቱ ሊኖሳቸው የሚገቸቸው ቀስሴዎች ያሉትን ማሳለሰስ ሙሳውር በዘናቹን ውስጥ ስለደረጀው ያለን ኣካሳት ሊካሄዱ ስለተቀደው የአካባር ልማት ፕሮጀክት ያለቸው ግንዛቤ ኣነስተኞ ስለሆነ፣ የማጀሻ ማለስለስሚ ሥራ ስቀጣጠኖ ጀመሰ ቀስሴ ሳዋሌዎች ድሌስ ስለሆነ ኣንዲሚገባ ተሰጠቢዎቸ ገለፀው ስብሰባው ተጠናቋል።



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Annex 1.6: Meinitshasha Wereda Stakeholders Consultative Meeting

Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

ተሳታፊዎች ዝርዝር
List of participants

የመኢሻ ሽሻ ወረዳ _____ ውይይት/ስብሰባ
Consultations
የወረዳው አስፈፃሚና ባለሙያዎች

ዞን Zone ቤንች ማጂ _____ ወረዳ Woreda መኢሻ ሽሻ ቀበሌ Kebele — ቀን Date 08/10/2003 ዓ.ም

ተ.ቁ. Ser.	የተሳታፊው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	[illegible]	ወ	[illegible]	[illegible]	[illegible]
2	[illegible]	ወ	[illegible]	[illegible]	[illegible]
3	[illegible]	ወ	[illegible]	[illegible]	[illegible]
4	[illegible]	ወ	[illegible]	[illegible]	[illegible]
5	[illegible]	ወ	[illegible]	[illegible]	[illegible]
6	[illegible]	ወ	[illegible]	[illegible]	[illegible]
7	[illegible]	ወ	[illegible]	[illegible]	[illegible]
8	[illegible]	ወ	[illegible]	[illegible]	[illegible]
9	[illegible]	ወ	[illegible]	[illegible]	[illegible]
10	[illegible]	ወ	[illegible]	[illegible]	[illegible]
11	[illegible]	ወ	[illegible]	[illegible]	[illegible]
12	[illegible]	ወ	[illegible]	[illegible]	[illegible]
13	[illegible]	ወ	[illegible]	[illegible]	[illegible]
14	[illegible]	ወ	[illegible]	[illegible]	[illegible]
15	[illegible]	ወ	[illegible]	[illegible]	[illegible]
16	[illegible]	ወ	[illegible]	[illegible]	[illegible]
17	[illegible]	ወ	[illegible]	[illegible]	[illegible]
18	[illegible]	ወ	[illegible]	[illegible]	[illegible]
19	[illegible]	ወ	[illegible]	[illegible]	[illegible]
20	[illegible]	ወ	[illegible]	[illegible]	[illegible]
21	[illegible]	ወ	[illegible]	[illegible]	[illegible]
22	[illegible]	ወ	[illegible]	[illegible]	[illegible]

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23 ማሞ ገዛኸኝ ወ መንገስቱ ግሽኖ ሀላፊ [illegible]
24 ሙሉጌታ ዘለቀ ወ [illegible] [illegible]

የመኸረት ሽሻ ወረዳ ኤክስቴንሽንና ሰንተርና መሰል ባለመደቃቸው ተወዳዳሪ ቃለ-ጉባኤ

ሰብሳቢ : ከንቲ ሺሜና (ዶ/ር) - የኬሳባቢ ተፅዕኖ ግምገማ ጉዳዮ ባለመደ
ፀሐፊ : መንክተር ሰፋድ (አቶ) - የወረዳው ገፃዊነት ተርገሚና የመንግሥት
ከሚሄኒክ ጽ/ቤት ባለመደ

የኬሳባቢ ተፅዕኖ ግምገማ ጉዳ ባለመደው መንግሥት ስአሬሳ-ወቅቱ
በተለያዩ ሰንተሮች ኤያዩረገ የለውጫ ሀብረ-ሰብ የልማት ሥራዎች ካተቀፀው
የስኳር ልማት ፕሮጀክቱ ኤገፃር ማሕራቢያ ካለው በኃላ ፤ አለተቀፀው ፕሮ
ጀክት ስንርተ ዐቢያሌ ገለፃ ኤዩርጋል ። በመቀመልም ፕሮጀክቱ ኬሬሳባቢው
ጋር በተጣጣመ መልኩ ኤንዲሄዱ ለማዳበር አለሚሠሩ ጽዮች ኬና
ወደ ኬሳባቢው አለማመጡ የጀንዮ ባለመደቃቸው ዩሳንሱና የሠራትመር
ስለማመጣጠኑና ሊፋ ያለ የወንዛቡ ማሳሰቢያ ሰጫ ማሕራቢያዎች ሰጥተል ።
ተሳትፏቸው የተቀፀው ልማት የኬሳባቢው ማሕበሬሰብ ለዘመናት
ሲኖሩቀው የንስሬውን ዕዩገት ስር የሚጎዳት መሆኑን ገልፀዋል ፤
ቀንስሎም ባለመደው ስተያዘት ኤይንዩዎች መሠረት ተሳትፏቸው ሂሳባቸውን
ኤንዲሰጡ ስወጋገዝ ሙዋዲቱ ቀንሷል ።

ኤይንዩ ኤንዩ : ኤስተዳዩሩና ሰንተሮቹ ስኦናመልኩቱ ያሳቸው ግንዛቤ
ሚዛንን ኤይንዩ ስተመሰረተ ፤ መቅሰቱ ሚሄስትሩ ስዩስትር ኤዋመ ዘን ፤ ይኽንኑ
ካተማ ስተመሰረተው የኦርመይ ኤዩሮች ቀን ሳይ ካደረጉት ንግግር ሰፋ
ያሉ የልማት ሥራዎች ኤንደሚሠሩ የተረዱ ሲሆንም የስኳር ልማት
ፕሮጀክቱን ስተመሰረተ ወን ስባለመደው ካተጠቃው ማሕራቢያና
ገለፃ ኤንፃር ኤና ፕሮጀክቱ ወረዳውንም የሚያሳቱ ስለመሆኑ
ቀመንም ግንዛቤ ኤንይሰንስቦቹ ገልፀዋል ።

ኤይንዩ ሁለት ፡ ፕሮጀክቱ ሊሰሩ ስለሚችሉቸው ፋይዳዎች
ኤይንዩውን ኤስመልክቶ ባለመደው የመንዩርዩሪያ ሂሳብ ካሰጡ በኃላ
ተሳትፏቸው ፕሮጀክቱ ሊሰሩ ስለሚችሉ ፋይዳ ሲገልፁ ፡-

Kuraz Sugar Development Project Environmental Impact Assessment
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1ኛ. አዚህን ሄዎተዎ ያለጠን የመሠረተ-ልማት ችግሮችን ሊቀርፉ የሚችል መሆኑ፣
2ኛ. አገሬቱ ሄዎገጠመዎት ያለውን የሰንጋር ሞሮት ሄንዚን አስወግዱ በዎቦቱ ሁሳችንን ኘለን ለአሰራሙ አገር ለማልማት የሚዎዱ ችሎ አለመሆኑ፣
3ኛ. በልማት ወዱ ሄሊ የቀረውን ህዚቄችንን ሰንጥቶ ይገዎ ሊሄሰለማ የሚችል አለመሆኑ፣
4ኛ. አቫንስር አገዉ ልማት ሄስ ካፋጠርነዎቹ ማንነት ጋር ለጋን የወጊዱን ማሄጠሊለጠ ወዱ ሊቄ የሰመዎት ሠራ ሄንዚጋገ ዎቹ ሌሄተዎችን የሚፈጉር አለመሆኑ፣
5ኛ. አዚህን ካለው ከተሻለ ህዝተ አዝመ ሊኄንዚው ሄንዚቄሪሊጉ ለማዱሊግ ካፍተኛ ኢንተዎጄንዎ ሊኄዚው ሄንጄዎችን ሄና
6ኛ. ልማት ለጠዙ ዘንቮ ካፍተኛ የሠራ ፅዱል የሚፈጉር መሆኑን ጠሰሩት ገልፀዎል።

ሄቪንጄ ሃሄት፡ ፕሮጀክቱ ሊሄሊት ታለማችሁት ችግሮ
ፕሮጀክቱ ሄንዱሊጠቮ የልማት ሠሠዎቻ መመሄኮ ችግሮቹ ሊሮሊት የሚችሉና ቄሠዎ ዜማዎ ካልማት ሄንቄር ልዩ ትኩረት የሚሾ ሄንጄ ልዎሄ ከገለፀ ሰጠሊ፣ ካችግሮቹዎ ሄንጄንዱቹ፣
1ኛ. ካተቀዱት ሉጠጥዎች የሚመጡ ተረፈ ሞሮቶቹ የአካባቢ ብክለትን ሊያስከትሉ ሄንጄመጄችሉ፣
2ኛ. በመመሄኮ ሲዎዎን፣ የአካባቢ መረጃዎችን ሊያዳርጎ የሚችል አለመሆኑ፣
3ኛ. ለፓንስር አገዉ ልማትና አፋጠርነዎቹ ገዙ የለጠ ዜዎል ወዱ ሄካሳሊመ ሊመጣ አለማችል፣ ተሳትፎ ለጌተዎች ሊጠዙ ሄንጄመጄችሉ፣
4ኛ. የሄዎዉ ህዝብ ተጠቅሚ ልማት ከተቀዳሚው ከተዎች መሆኑን የሚያሳይን ሄሪዎች በመመሄኮ ሲዎዎን ለመፈጸሙ ሊያስከትል የሚችል አለመሆኑ፣ ሄና
5ኛ. የማሻሻያ ለጠሪያ ሄንቮችን በመመሄኮ ሲዎዎን ሊያስከትል የሚችል ለማ በጄጠቄሳት ለሊሄው ችግሮ ወዱ ለመገጠሙት ካልልማት ጋር ለጋን ሄንጄ ለጠሪያ ሄንጄ ለሊሄኖው ሊቄ ሄስካሊ የሰዎ ተቀዳሚና ዘዎጄሪ ሄንዚሄዎ አለመሆኑንና ዎ/ሮ

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ተሳታፊዎች ዝርዝር
List of participants

የ ዲቻ-ወራዳ ኢንተግሬትና ስኳርተ ልማት ውይይት/ስብሰባ
Consultations

ዞን Zone ከፋ ወረዳ Woreda ዲቻ ቀበሌ Kebele - ቀን Date 17·10·2003 ዓ.ም.

ተ.ቁ. Ser.	የተሰብሳቢው ስም Participant's name	ጾታ Sex	ሥራ/መ/ቤት Job/Office	ኃላፊነት Responsibility	ፊርማ Signature
1	ደ[illegible]	ወ	[illegible]	[illegible]	
2	[illegible]	ወ	[illegible]	[illegible]	
3.	[illegible]	ወ	[illegible]	[illegible]	
4	[illegible]	ወ	[illegible]	[illegible]	

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

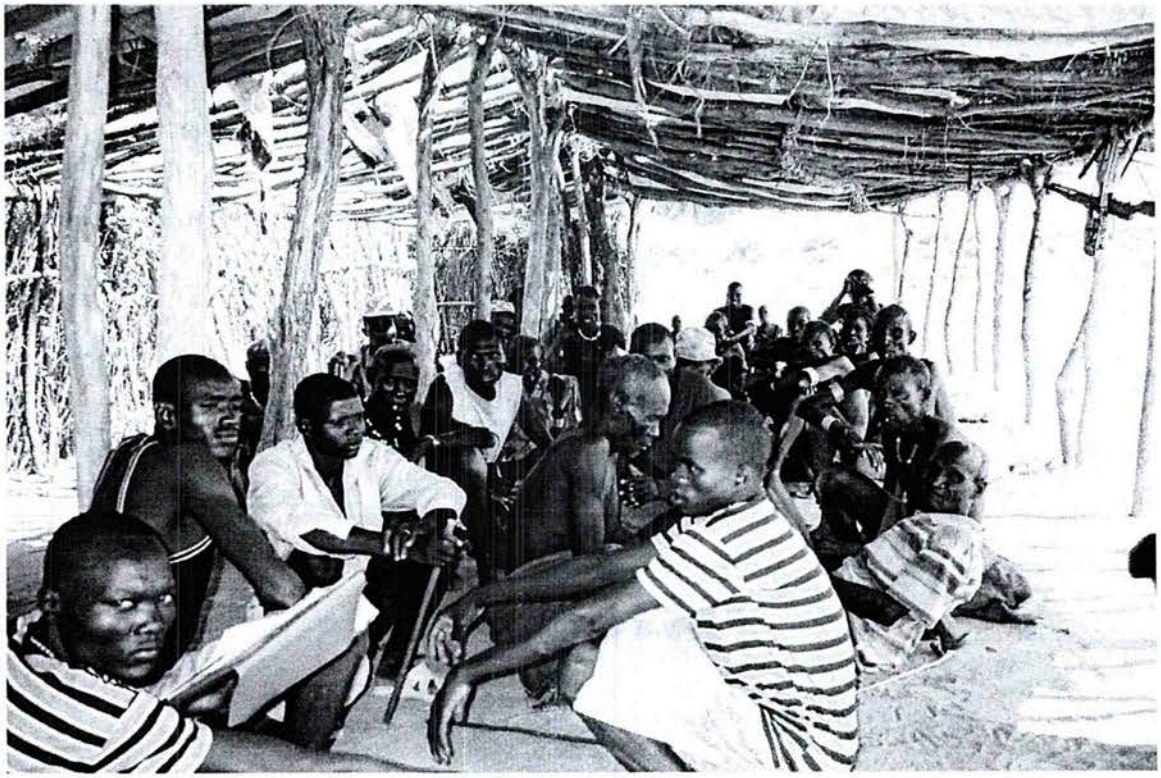
Kuraz Sugar Development Project Environmental Impact Assessment
የኩራዝ ስኳር ልማት ፕሮጀክት የአከባቢ ተፅዕኖ ግምገማ ጥናት

Water Works Design and Supervision Enterprise (WWDSE)
የውኃ ሥራዎች ዲዛይንና ቁጥጥር ድርጅት

Annex 1.7: Decha Wereda of Kefa Zone Stakeholders Consultative Meeting

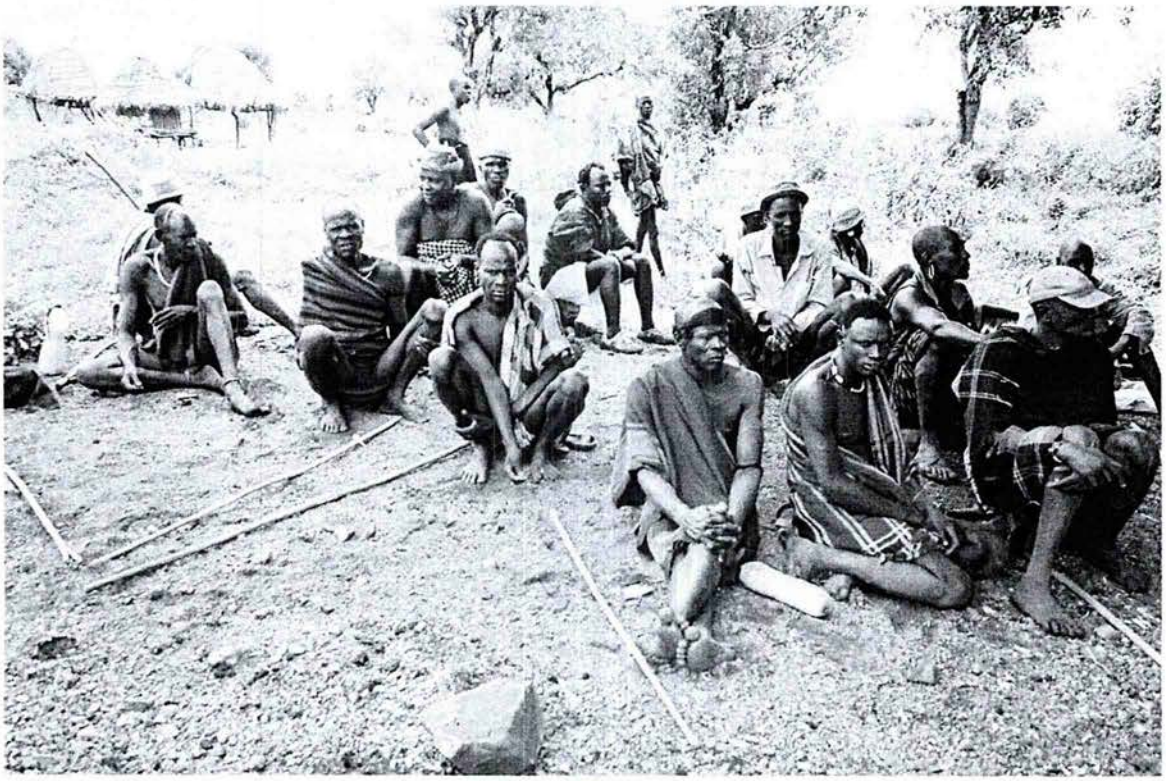
Annex 1.8: Photo Slides by Study Team

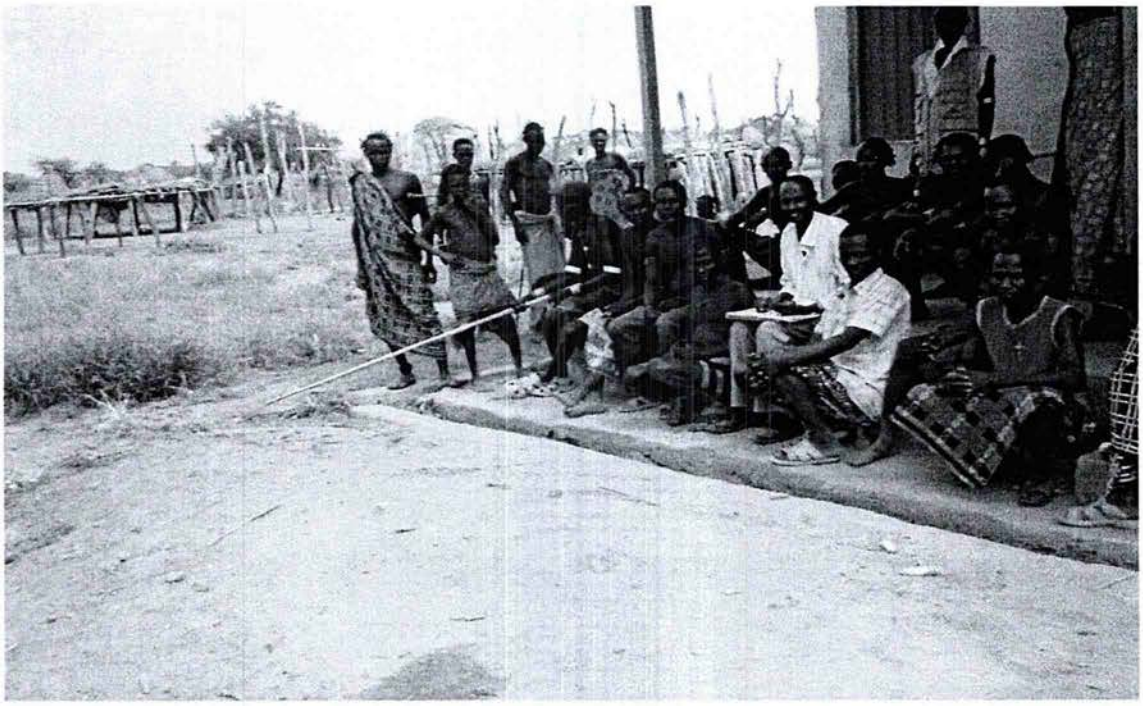


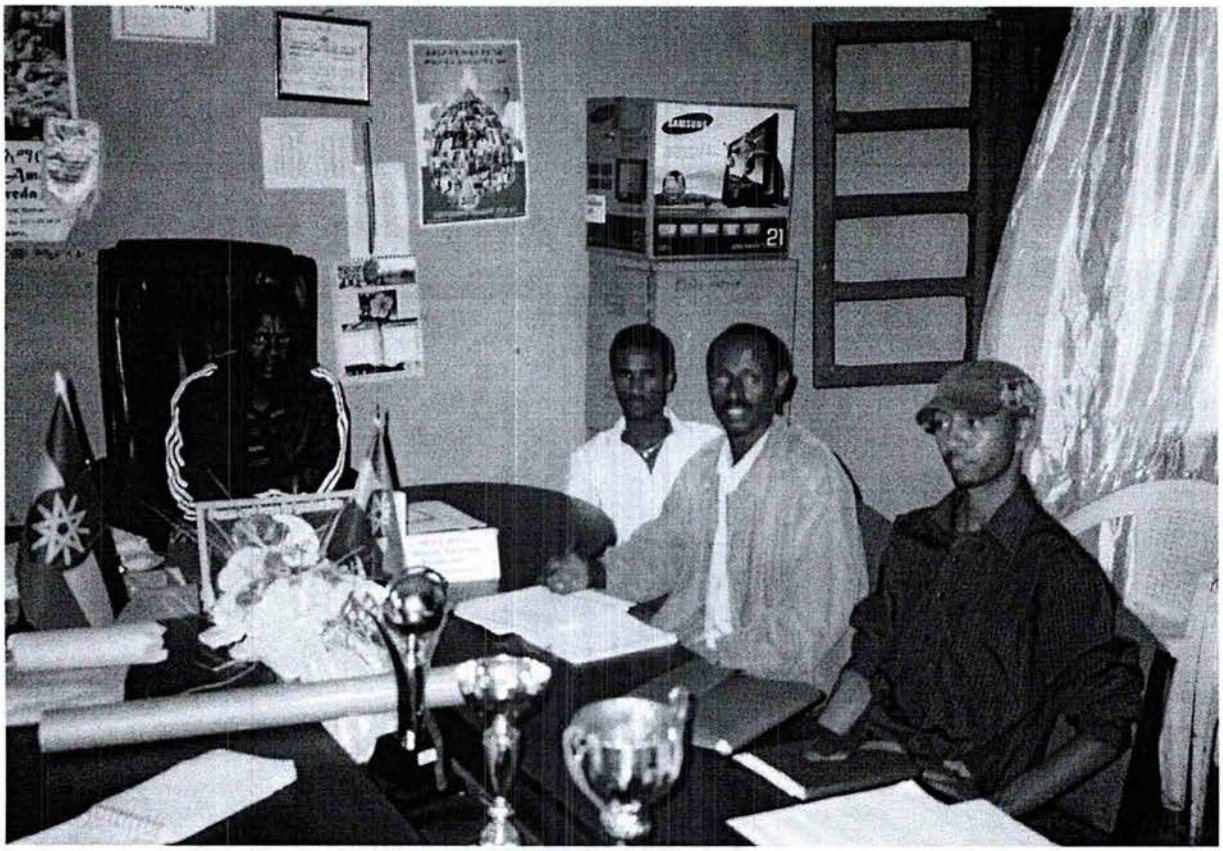


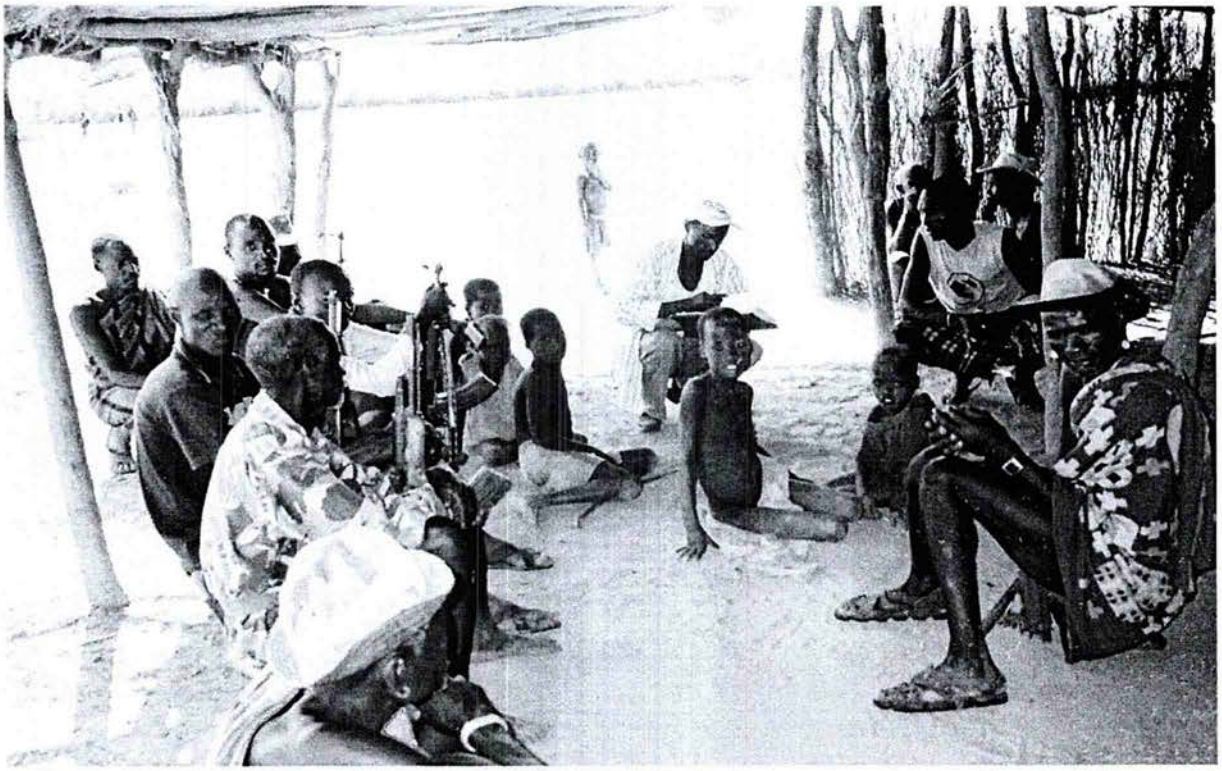


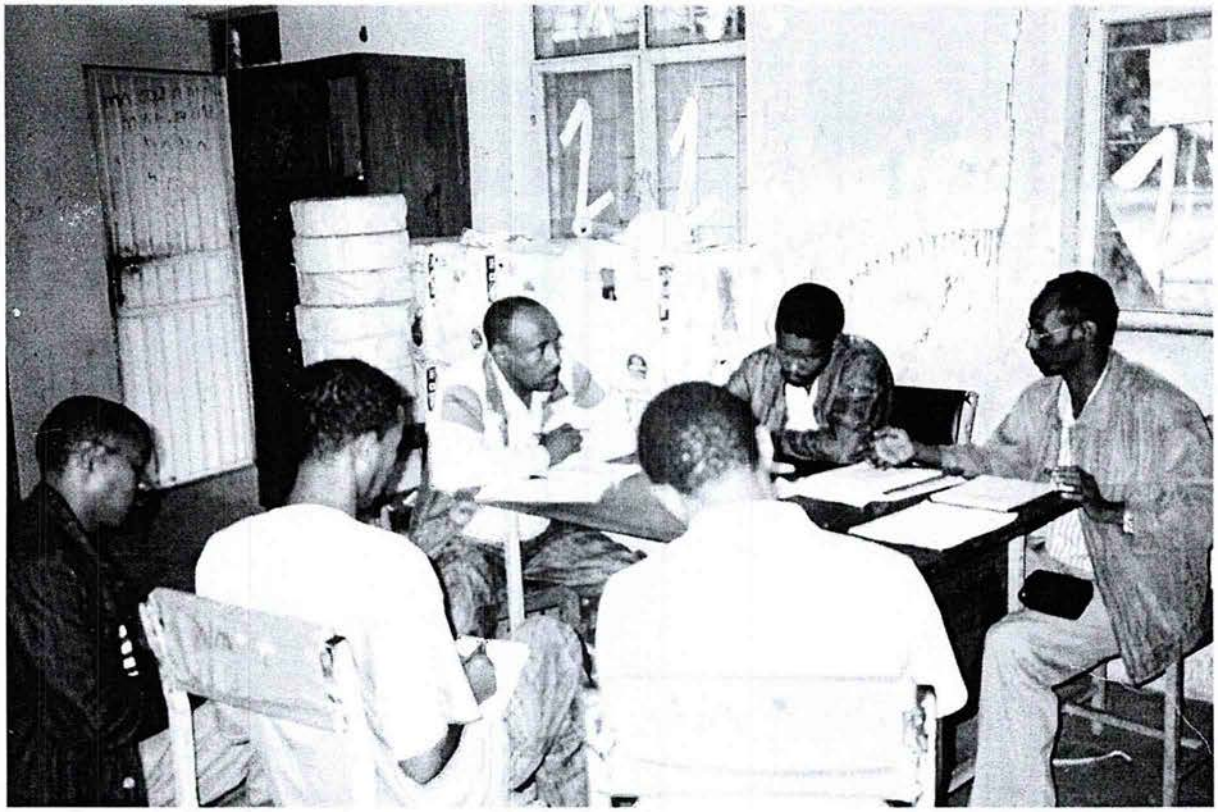


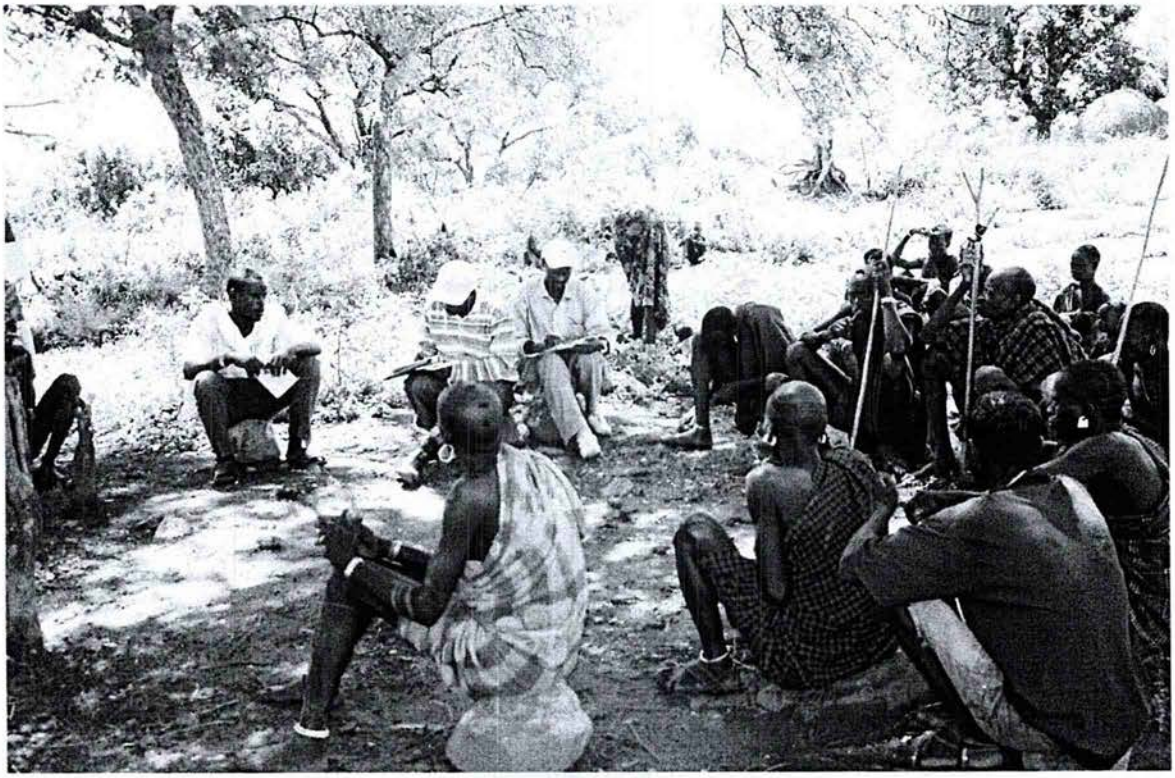




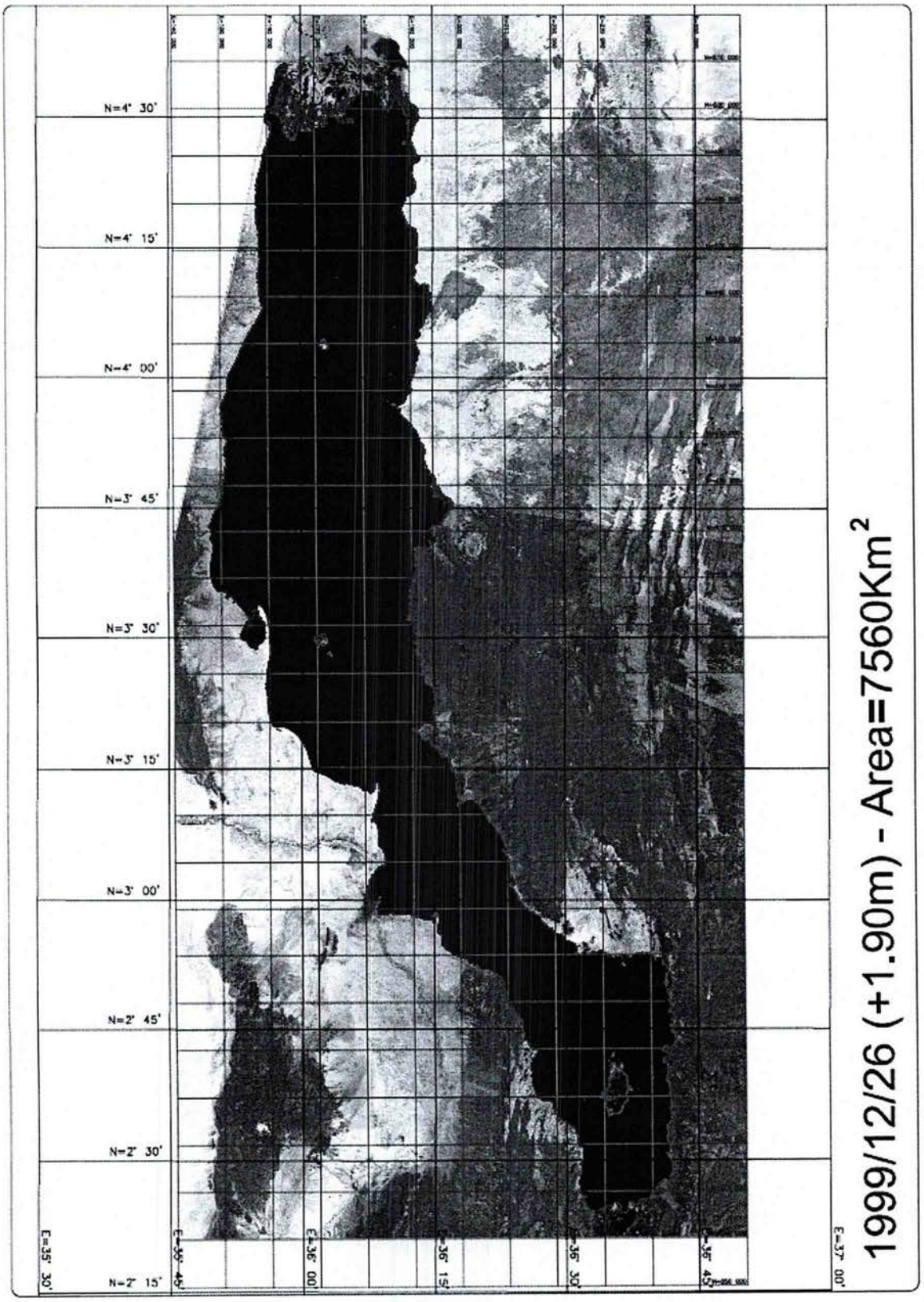


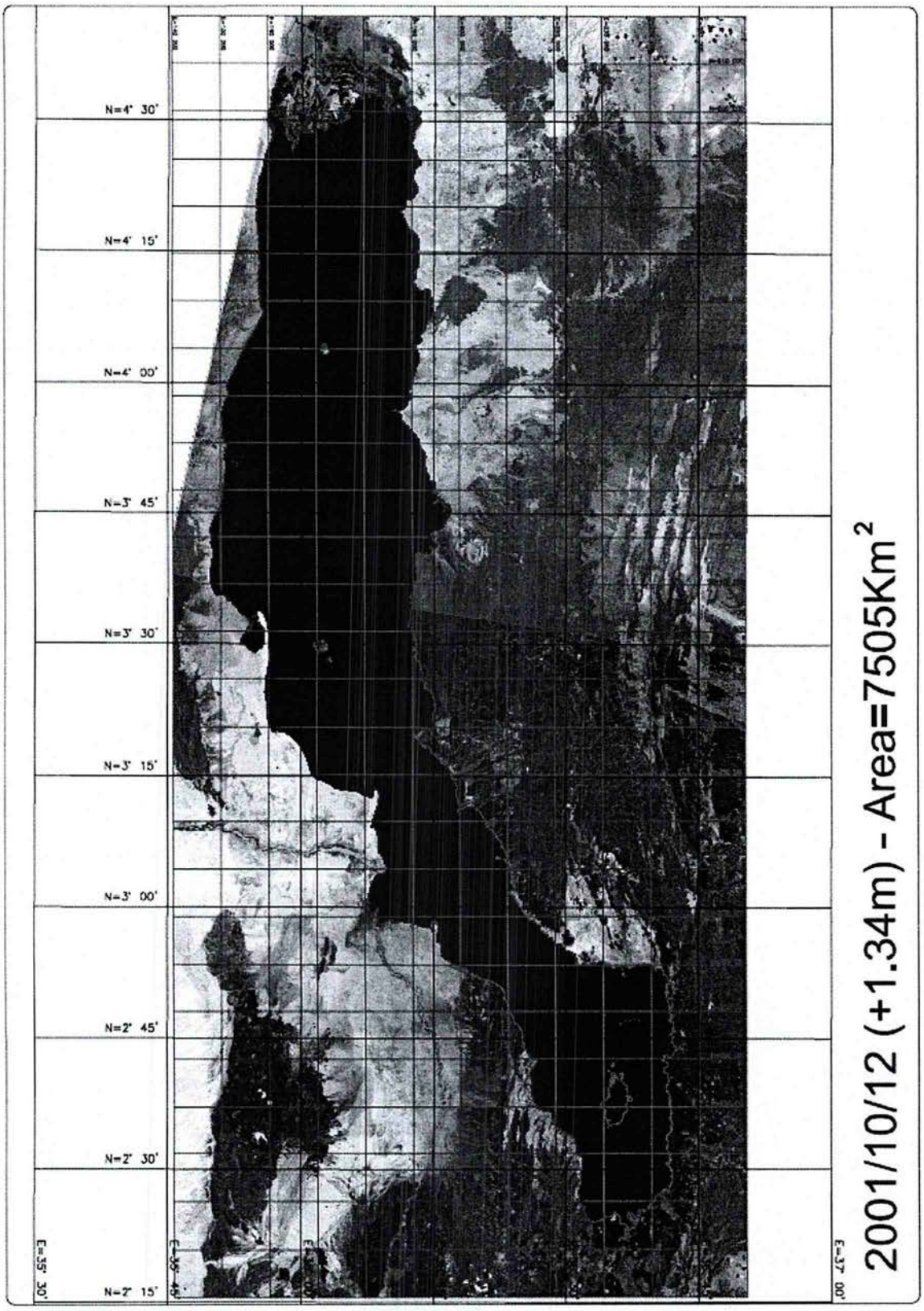


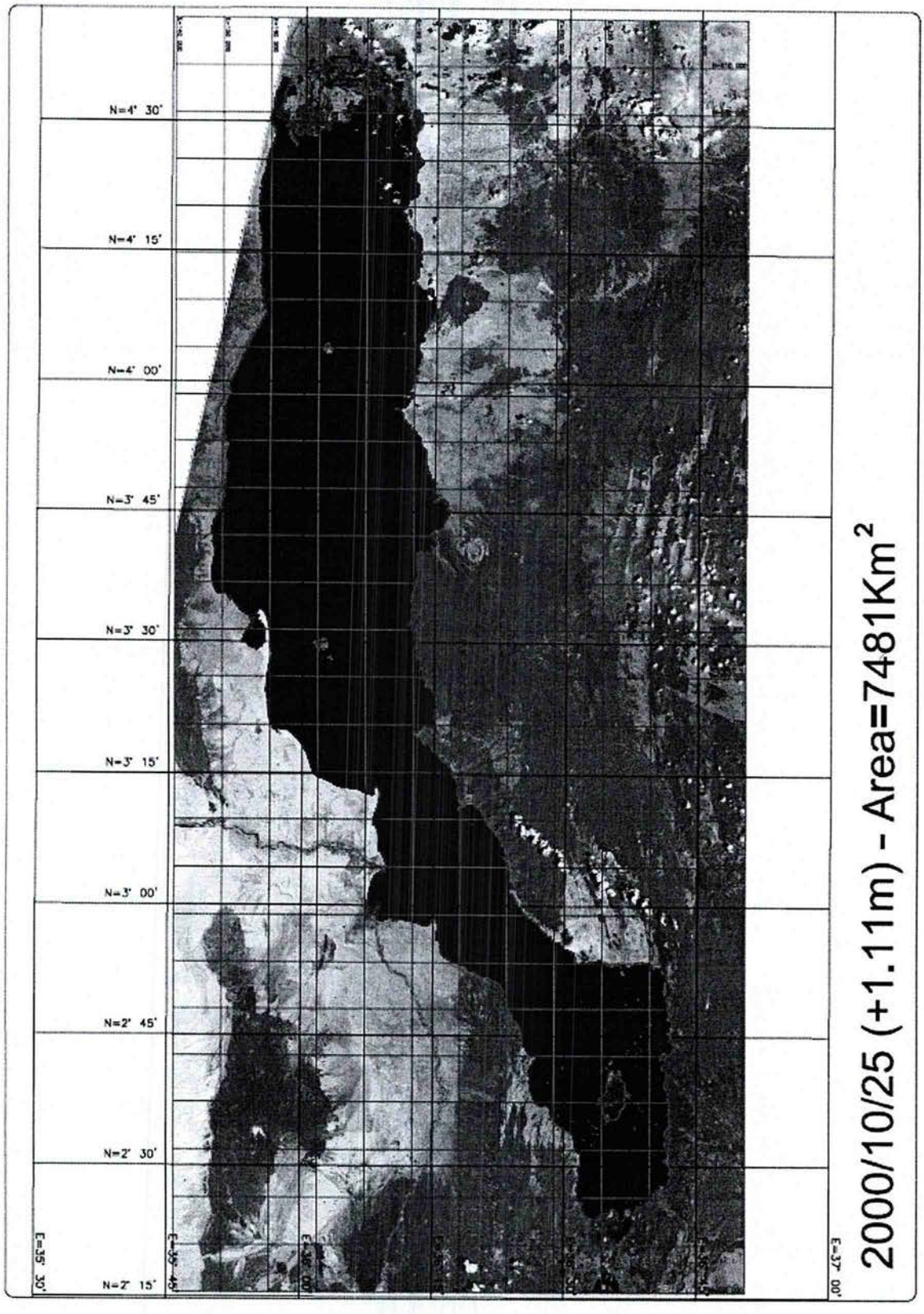


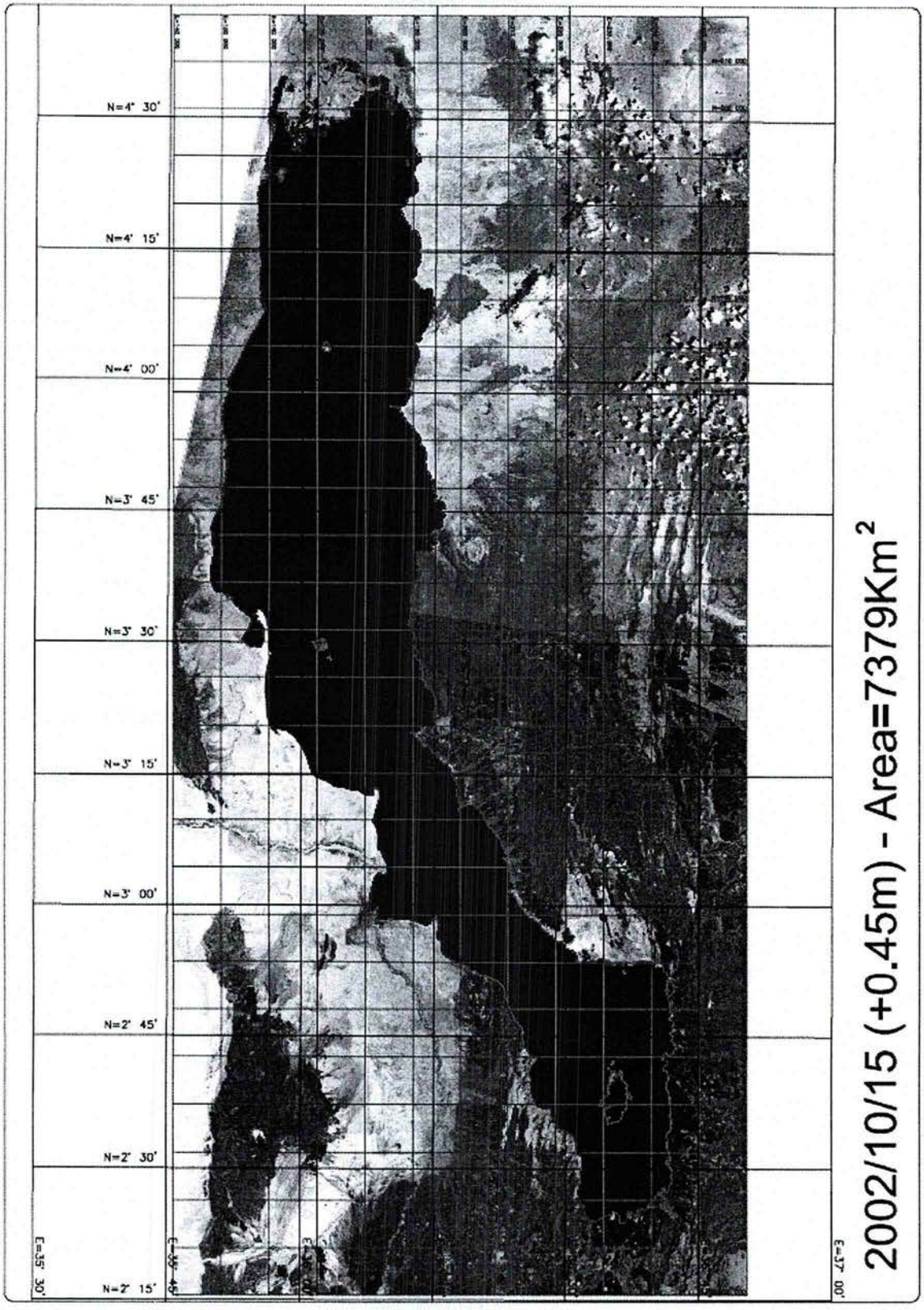


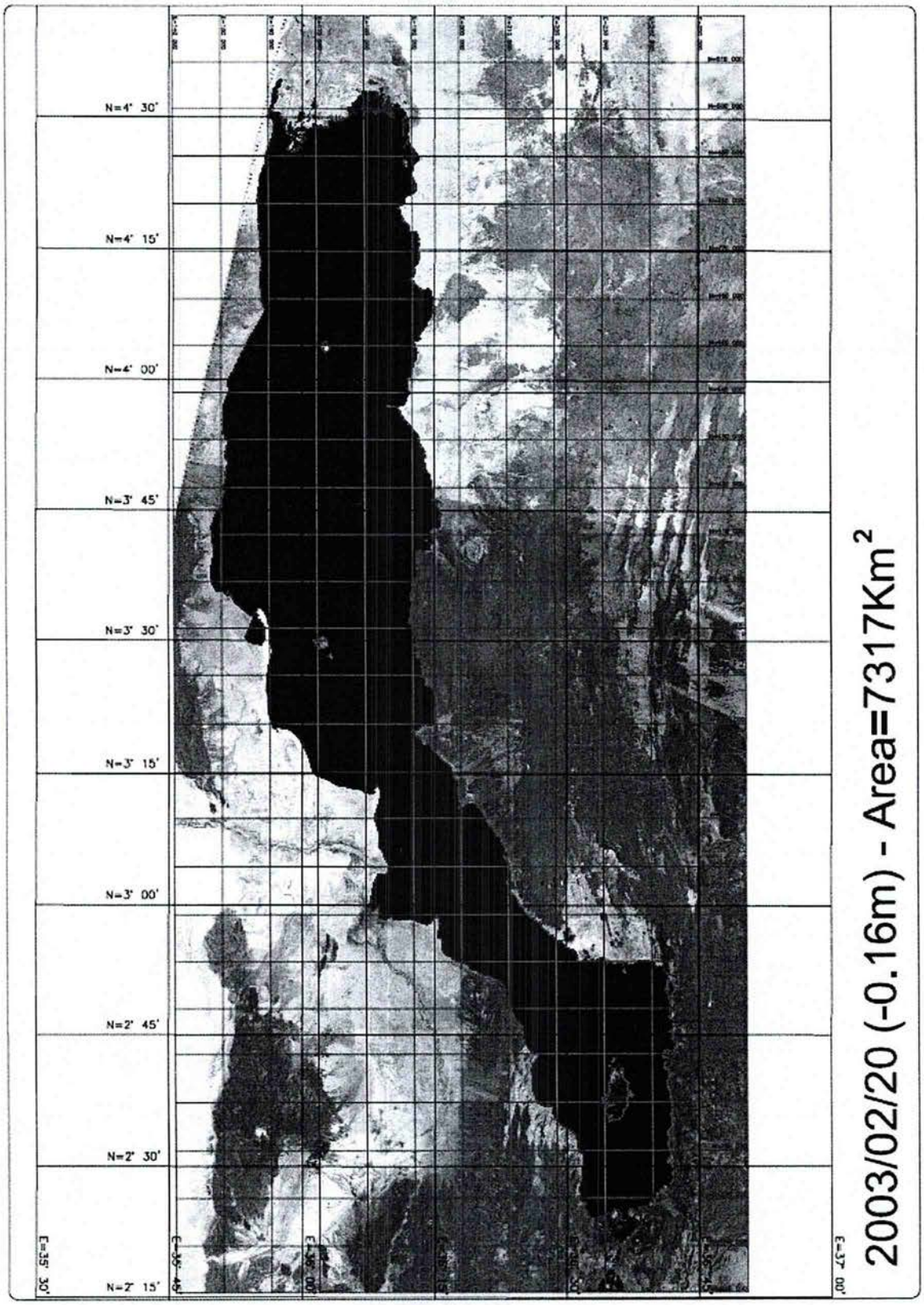
Annex 1.9: Landsat images of Lake Turkana




N=4° 30'
N=4° 15'
N=4° 00'
N=3° 45'
N=3° 30'
N=3° 15'
N=3° 00'
N=2° 45'
N=2° 30'
N=2° 15'
E=35° 30'
E=35° 45'
E=35° 00'
2001/10/12 (+1.34m) - Area=7505Km²


N=4° 30'
N=4° 15'
N=4° 00'
N=3° 45'
N=3° 30'
N=3° 15'
N=3° 00'
N=2° 45'
N=2° 30'
N=2° 15'
E=35° 30'
E=37° 00'
2000/10/25 (+1.11m) - Area=7481Km²


N=4° 30'
N=4° 15'
N=4° 00'
N=3° 45'
N=3° 30'
N=3° 15'
N=3° 00'
N=2° 45'
N=2° 30'
N=2° 15'
E=35° 30'
E=37° 00'
2002/10/15 (+0.45m) - Area=7379Km²


N=4° 30'
N=4° 15'
N=4° 00'
N=3° 45'
N=3° 30'
N=3° 15'
N=3° 00'
N=2° 45'
N=2° 30'
N=2° 15'
E=35° 30'
2003/02/20 (-0.16m) - Area=7317Km²