# FIELD VISIT REPORT

## GERD PROJECT

**August, 2012**
**Ethiopia**

# Table of contents

LIST OF TABLES, FIGURES AND ANNEXES

# Executive summary

In April 2011, Ethiopian Prime Minister Meles Zenawi formally launched the largest engineering project ever attempted in Ethiopia – the Grand Ethiopian Renaissance hydropower dam on the Blue Nile (known locally as the River Abbay), in Beneshangul Gumuz Regional State, about 40 km from the border with Sudan.

The Grand Ethiopian Renaissance Dam Project is in line with Ethiopia's ambitious Growth and Transformation Plan for the transformation of the economy through provision of cheap power, including export to neighboring states.

The dam wall will be 145 m tall and 1,800 m (5,906 ft) long. The dam's reservoir will have a volume of 63 billion cubic meters, almost 1.3 times the annual flow of the Blue Nile (49 billion $m^3$/year). Initially the design was for a dam with the capacity to produce 5,250 megawatts (MW). However, the capacity has been upgraded to 6,000 MW. The scheme is expected to cost about US$4.8 million. The government says it will cover all project costs without outside financing, in part by selling bonds to Ethiopians at home and abroad.

The Abbay basin is by most criteria the most important river basin in Ethiopia. It accounts for almost 20% of Ethiopia's land area; 50% of its total average annual runoff; 25% of its population; and over 40% of its agricultural production.

The local people at the project area depend on agriculture for their livelihoods. The secondary livelihood sources for the population include livestock rearing, gathering wild foods, fishing, honey production and collection, traditional gold mining, hunting, handcrafts, petty trade and charcoaling. The region's agriculture is characterized by traditional farming practices and low level of productivity. Poverty is widely seen in the region. Access to social services like health and education is limited, particularly for women and girls. Providing basic infrastructure like roads to the community at large lags behind other regions in the country.

The majority of the affected people, if not all, are the indigenous people of Gumuz and Berta, who live in some of the worst economic conditions even by the standards of Ethiopia, with little access to development infrastructure. In terms of their awareness of the project, they do know that a huge project is going on the Abbay River in their area; but have not been

given the chance or the capacity to understand the extent of the project, and its potential impacts on their lives.

Local authorities that we spoke to, however, consider it a source of national pride and a sign of the country's economic development.

But popular support from the masses is not a key factor in the success or failure of this project to produce widespread, sustainable economic benefits within Ethiopia. Based on available evidence and documentation, up to this time (May 2012), there is no Environmental Impact Assessment or socio-economic study for the project, and it appears there is no information focusing on the impacts to the upstream and downstream areas and populations. Due to this lack of analysis, it is impossible to assert that the project is an appropriate development strategy for meeting Ethiopia's development needs.

This report is prepared based on a field visit to the dam site and the surrounding area, and desk research. Our trip includes travel to the Metekel Zone capital Gilgel Beles, Mankush(Guba), the dam site and to Sherkole through the recently built Blue Nile bridge (which will be demolished due to reservoir inundation).

Summarily, the field research has the following findings:

- The planning and implementation of the Ethiopian Grand Renaissance Dam project is a top-down approach and did not involve the participation of the local people. They have only lately been provided information on which villages are going to be displaced.
- At least 5,110 people will be resettled from the reservoir and downstream area. An additional unknown number of people from villages near the reservoir will be resettled (these villages are home to more than 7,380 people). This is contrary to the official presentations that state approximately just 800 people will be resettled.
- The project will result in the disturbance of a river course of over 200km.
- To date, no environmental impact assessment study has been made or disclosed. The only information we got from Zone officials was that a house-to-house survey has been made for resettlement purposes.
- The project has been shrouded in high secrecy as a matter of national security. Therefore, it is impossible to assess impacts, understand intended mitigation measures, or keep track of the project.

- Almost all of the people to be resettled are the indigenous people of Gumuz and Berta, where previous marginalization has put them in to the lowest level of living even in the standards of Ethiopia, and drifted them to the boarder low lands.

Critical outstanding issues which require strong attention or further study are:

- Environmental changes associated with the project, including loss of biodiversity, flooding of forests, impacts of changes to river flow, and the related social impacts of these changes to key natural resources..
- Sedimentation of the reservoir and its effect on future power generation as the Blue Nile should be evaluated.
- The societal changes caused by resettlement to the indigenous peoples lives.
- Greenhouse gas emissions: flooding of the land, and the breakdown of organic matter that flows into the reservoir could release significant amount of greenhouse gas.
- The impact of the project on public health, especially on the prevalence of malaria.. (Malaria is currently the number one cause of mortality in the area.)
- The development should be evaluated in light of all river-based developments being planned or built in the entire Nile basin, as part of an integrated water management planning exercise.
- Changing hydrology: The impacts of a changing climate on this dam should be evaluated.
- Resettlement and compensation plans: Those directly affected by the project should be involved in planning for their future.

# 1. INTRODUCTION

## 1.1. Study Methodology

Information for this report was collected using the following methods:

- Literature review on the few previous studies and reports on the project that are publicly available in Ethiopia
- Site visit (limited to few areas due to security risk), and
- Interviews with civil servants and local people in the project area

We have tried to report faithfully the information collected. The team consists of two independent experts: a sociologist, who has experience in social studies related to the environmental impact of projects, and an environmentalist with experience in the design of watershed management plans for irrigation projects.

## 1.2. Project background

The Grand Ethiopian Renaissance Dam is located in Guba woreda of Benishangul-Gumuz National Regional State in western Ethiopia, approximately 811 kilometers from Addis Ababa. Benishangul-Gumuz Regional State is bordered in the west by Sudan, in the north and northeast by the Amhara National Regional State, in the southeast by Oromiya National Regional State and in the south by Gambella National Regional State (See Figure 2).

The government of Ethiopia has stated that it believes that the GERD project is technically feasible and environmentally friendly. And yet the project – the largest ever built in Ethiopia, in a remote area where little data has been collected on key environmental and social factors – lacks a full Environmental Impact Assessment, in violation of the national Environmental Law. In addition to being required by law and international best-practice, it is necessary and useful to have a good understanding of the social and biophysical environments in the project area so as to know what to expect and take measures to avoid the worst impacts; understand the unavoidable costs of the impacts and plan accordingly; and to harmonize issues in water development with that of ecosystem management. The purpose of this report is to provide a preliminary analysis of the social and environmental conditions at the site, and on the potential negative impacts of the project.

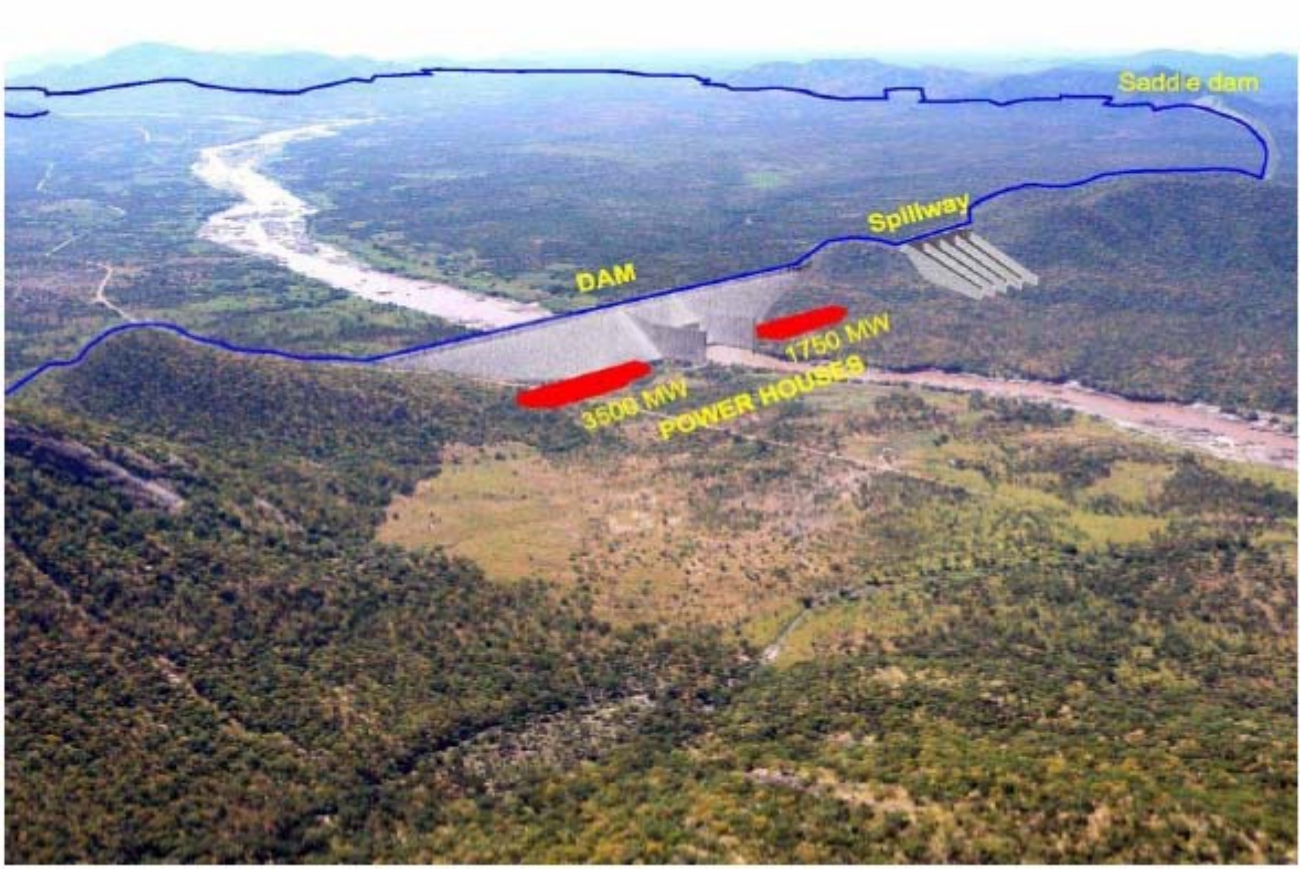



**Figure 1. Grand Ethiopian Renaissance Dam.**

*Source: Project 5000 basic design, Nov. 2010, by EEPCO, Salini Costruttori & Studio Pietrangelli Consulting Engineers*

## 1.3. General Description of the Project Area

The region is endowed with different natural resources and there is huge potential for agriculture. Farming, hunting, livestock raising, gathering of wild foods and traditional gold mining are some of the livelihood strategies of the indigenous people. Population density is sparse, with a regional average of 14 people per square kilometer (CSA 2007). The smallest population density is estimated at 3 persons per square kilometer and recorded in Guba, Yaso, Dangur and Sirba Abay districts while the largest population density is estimated at 62 people per square kilometers, which is recorded at Asosa, Mandura, Bambasi and Pawi districts (CSA 2007). Agricultural land is abundant with a mean landholding size of 3.7 hectares.

Despite the availability of huge natural resources potential and opportunities, the Benishangul-Gumuz region is one of the poorest and most food-insecure regions in the country by all standards.

To provide a glimpse of the administrative and political structures, Ethiopia is divided into regions, which have a significant degree of autonomy; the regions are structured into zones, Woredas and Kebeles.

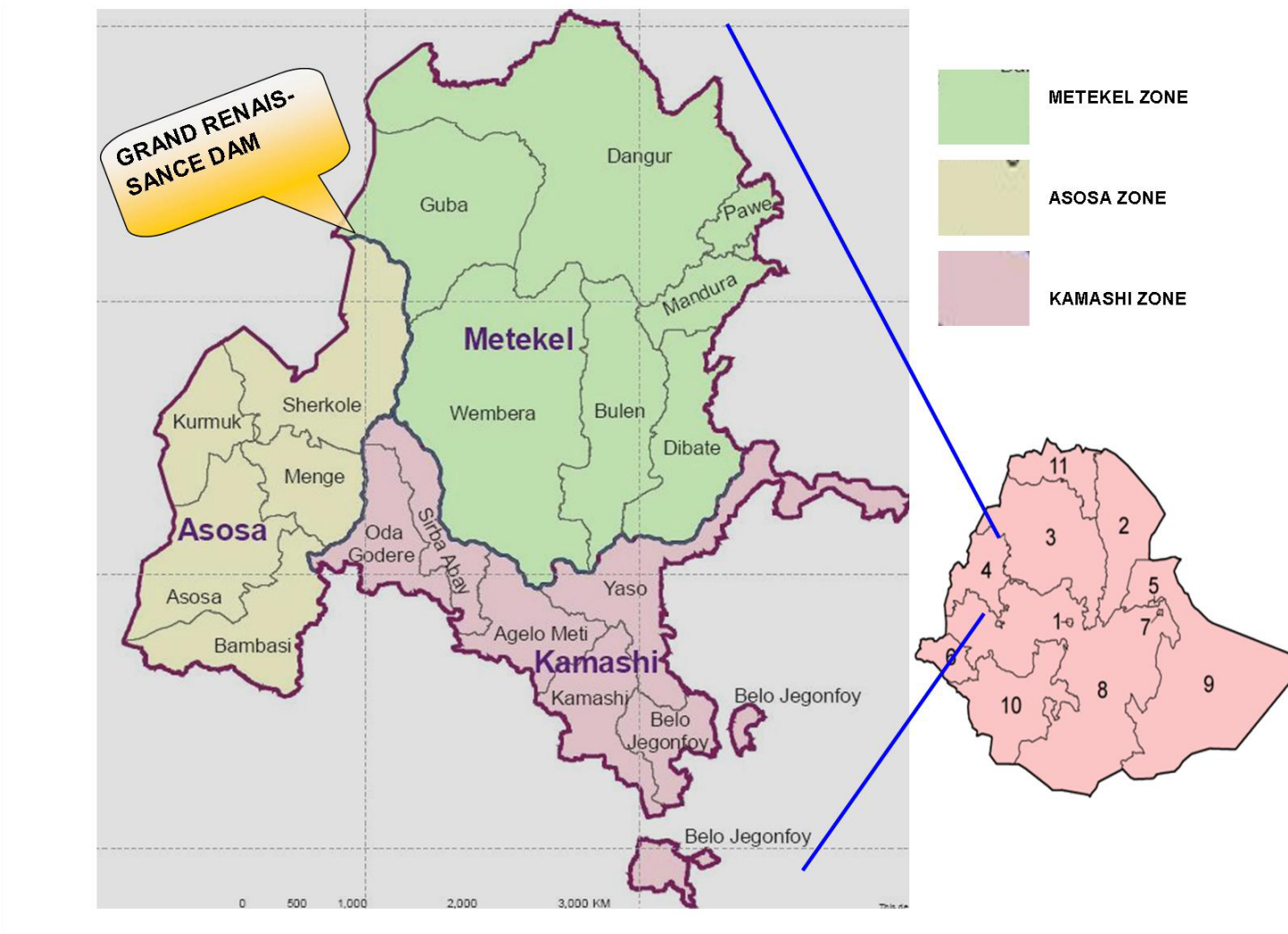



**Figure 2. Project location**

## 1.4. Current status of Project Implementation

It was very difficult to get official information about the project. This is a clear problem when trying to assess impacts and keep track of the project. However, from the field visit and personal discussion with workers on the dam site and authorities and civil servants at Mankush (capital of Guba woreda where the project is situated), the status of the project as of April 2012, is:

- House-to-house surveys on local communities have been conducted by the government for resettlement purposes, according to information from local experts involved in the survey.
- Construction of worker-camp facilities
- Mobilization of construction materials
- Access-road construction
- Clearing sites around the dam site, worker camps and access areas

# 2. DESCRIPTION OF THE ENVIRONMENT

## 2.1. Physical Environment

### 2.1.1. Climate

The region's rainfall is unimodal and obtains high rainfall from May to October. The annual rainfall is about 860 mm. The duration of the rainy season decreases from south to north. The major part of the region, about 75%, is lowlands with an altitude below 1500 masl. It is hot for most of the year with average temperature ranging from >27.5$^0$c.

The main areas affected by the project generally have a relatively high moisture deficit, which is most pronounced close to the Sudanese border. Mean and peak annual temperatures rise downstream, reflecting the change in altitude. The area around the dam site is extremely hot.

### 2.1.2. Water Resources

#### 2.1.2.1. Surface water

Four main small rivers run into Lake Tana, one of them is the little Abbay River (Gilgel Abbay), which is considered to be the source of the Blue Nile. Tana Lake is the largest lake in Ethiopia. It is 78 km long, 67 km wide, 15 m max. depth and with average depth of 8.0 m. Lake Tana catchment area is estimated to be 16500 km$^2$ while its surface area is 3600 km2. However, the contribution of Lake Tana to the Nile is less than 10% of the Blue Nile annual flow. The Blue Nile exits from the southeastern corner of Lake Tana and cuts a deep gorge first south then westwards. Along the way it is joined by a number of tributaries: Beshilo, Weleka, Giemma, Beles, Muger, Guder, Finchaa, and Didessa from the east and south; and the Birr, Fettam, and Dura from the north and Dabus from the west. The Blue Nile runs 900 km down through the Ethiopian Highlands just before crossing the frontier, which is 880 km up to the Grand Renaissance Dam, then the river enters into the clay plain of Sudan, through which it flows over a distance of about 735 km to Khartoum. The distance from Lake Tana to Khartoum is 1635 km, which is considered approximately the length of the Blue Nile.

The average annual precipitation over the Blue Nile sub-basin is 1,346 mm, making it the highest among all the sub-basins of the Nile. The lowest rainfall is recorded over the eastern

part of the sub-basin where the average annual precipitation does not exceed 800 mm, where the highest values (exceeding 1,900 mm) are found over the southern part of the catchment. On average, an estimated 20% of the rainfall will be lost as runoff.

Blue Nile river facts

- Catchment area (Km2) 199,812
- Annual runoff (BM3) 52.6

#### 2.1.2.2. Groundwater

Groundwater is almost exclusively confined to consolidated rocks whose retention capacity is low. These structures do not filter very well and the water quality can be affected by pollution. This, plus other critical geophysical factors, limit the potential storage and recharge capacity of the aquifers.

Recharge rates on groundwater sources seem to be declining, possibly due to de-vegetation in the region. As regional sources indicated that many of the twelve test boreholes, drilled during 1994 – 1996 came up dry even at the maximum depth of 138 m.

Water is a limiting factor in the Region and as such must be treated as a sensitive environmental resource.

### 2.1.3. Soil Erosion and Sedimentation

Ethiopia's Highlands (the source of the Blue Nile) is one of the most erosion-prone places on earth.

The Blue Nile River is the major source of sediment loads in the Nile basin. Soil erosion from upstream areas of the basin and the subsequent sedimentation in the downstream area is an immense problem, and threatens existing and future water resources development in the Nile basin. The deposition of large amounts of sediment in reservoirs strongly reduces the lifetime of a dam by reducing its water capacity.

Human-induced land degradation in the Blue Nile's upper catchment has dramatically increased sedimentation in Sennar, Khashm el-Girba and Roseires dams (all in Sudan) (Awulachew et al., 2008; Shahin, 1993). Consequently, the Sennar reservoir is no longer

used to store significant volumes of water but does generate a limited amount of hydropower, 15 MW). Khashm el-Girba dam lost 55% of its original capacity in 25 years and Roseires dam lost 38% in 28 years. The problem of sedimentation is also widespread in Ethiopian reservoirs in which many lost storage capacity and water quality within a short period of time.

Most of the sediment in the Nile flows from the Ethiopian Highlands through the Blue Nile and Atbara River. Nearly all the sediment (~ 95%) comes from the Blue Nile and Atbara rivers during the flood season (July- Oct.). The White Nile and its tributaries lose most of its sediment load by spilling and deposition over floodplains, lakes and marshlands inside Sudan (Ahmed, 2008).

The existing Sudanese and Ethiopian reservoirs lost about 50% of their storage capacity in the last 40 years, AHD lost about 4%, taking into consideration the amount of sediment transported by Atbara river, 95% of the sediment transported to the Aswan High Dam is from the Blue Nile. This implies most of the sediment which would have been transported to the AHD and other dams in Sudan will be held in the Grand Ethiopian Renaissance Dam.

ElMonshid et al (1997) estimated the sediment load of the Blue Nile at El Diem (the entrance of the river to Sudan) to be 140 million tons per year. At the same time their estimation of the sediment load at AHD was 160 million tons which resulted in sediment deposition of 2.5 billion $m^3$ in the period 1964-1995. Inferring from the AHD deposition rate the sediment deposition rate at GERD will be 122.5 million $m^3$ annually and 6.125 billion m3 in 50 years, which is about 10% of its storage capacity. However this depends on the reservoir management and trap efficiency (trap efficiency is defined as the ratio of deposited sediment to total sediment inflow for a given period within the reservoir economic life. Trap efficiency is influenced by many factors but primarily is dependent upon the sediment fall velocity, flow rate through the reservoir and reservoir operation).The severity of soil erosion and reservoir sedimentation in Ethiopia can be observed from several small and medium scale dams.

Angereb dam was constructed for water supply in 1986 on Angereb River, a tributary of the Blue Nile in the Ethiopian Highlands. The estimated mean annual sedimentation rate in Angereb reservoir is 1200 t/km2/year. Several studies have shown that the reservoir life would be an alarmingly short21 years due to sedimentation. According to their prediction

the reservoir lost 15% of its volume in 2005 and would lose about 30% in the year 2015. The water resources verification study carried out by the Ethiopian Ministry of Water Resources revealed that by the end of 2010 the reservoir capacity will become less than 50% (from 5$Mm^3$ to 2.5$Mm^3$) as a result of sedimentation.

Koka dam on the Awash River was made operational in 1960. In 2008 96% of the dead storage volume had been filled by sediment.

Similarly reservoirs on the Blue Nile in Sudan have experienced rapid sedimentation. Studies show that the Roseires reservoir (which is about 120 km downstream from the Grand Renaissance Dam) lost 43% of its original capacity (i.e. 100 % of the dead storage and a considerable part of the live storage). The Sinnar dam (300 km south of Khartoum) has lost 65% of its original storage after 62 years operation (Shahin, 1993)

## 2.2. Biological Environment

### 2.2.1. Fauna

The species mainly observed in the area, as documented by Metekel Zone Natural Resources department, are the common fox, Bush buck, Eland, Gazelle, Defassa Waterbuck, Duiker, Patas Monkeys, Turtles and Warthog. According to informants from the area, Lions, Leopards and Greater Kudu are also known in the area. Some of the Bird species include Secretary Bird (Sagittarius serpentarius), Ostrich (Struthio camelus), Little Grebe (Trachybaptus ruficollis), Black-Necked Grebe (Podiceps nigricollis), Great Crested Grebe (Podiceps cristatus), Great Comnorant (Phalacocorax carbo), Long-Tailed Cormorant (Phalacrocorax africanus), Great White Pelican (Pelecanus onocrotalus) and Pink-Backed Pelican (Pelecanus rufescens)

The change in the natural habitat due to the project especially the reservoir will endanger this animals and it is even worse as this area is one of the remaining natural habitat in the north western part of the country, C. Hermann who worked for the Department of Agriculture for the Region has documented much of the diversity of the bird life of Benishangul and Gumuz. Mr. Hermann has recorded over 500 species of birds in a two-year period, between 1999-2001 (personal communication May 2001). This represents over 60% of the bird life recorded (800) in the whole country. The figure amply indicates the importance of the vegetation in the area in supporting the diversity of birds.

### 2.2.2. Flora

Benishangul-Gumuz region is among the few regions in the country where remnant forest vegetation still exists. However, the recent trend shows that the speed of deforestation and degradation of natural resources is alarming (Benishangul Gumuz Region Food Security Strategy, October 2004, pp. 8). The natural resource degradation in the region is the result of the state sponsored resettlement program that took place during the Derg regime, in-migration into the region from people from the already-deforested highland regions, uncontrolled forest fires, and the absence of a well-defined land use policy. Resettlers, encroaching farmers and immigrants are plow cultivators, a practice which requires clearing the plot and uprooting the stumps. A conservation-based farming system of indigenous people is not known to these highlanders. This has left large tracts of farming lands unproductive due to removal of fertile topsoil, and has increased sedimentation rates in the river (with potential impacts for the dam, see Section 2.1.3. on Sedimentation). The increasing demand for fuel wood (for both home consumption and market) and construction materials is also accelerating the clearance of vegetation. Investment in rain fed agriculture, which took place without appropriate land use planning, has also contributed to the degradation of natural resources.

The allocation of land for large-scale agricultural investments is not made on already classified land for different purposes but based on the fact that land is "unutilized" at the time by other users in the vicinity. The lack of mechanisms to monitor large-scale agricultural investments once land has been allocated led to misuse of natural resources and adverse environmental and social impacts. (Tamrat, 2010).

The vegetation in the specific area of the dam and reservoir can be categorized in to 6 physiognomic units, namely: forest, wood, bamboo, bush, shrub and grassland.

**Forest land:** There are two types of forests: the primary riverine forest (constitutes more than 90% in the reservoir inundation area) and dense forests which are found on a well-drained land. Major tree species with in this unit are *Cordia affricana, Albiza cafra, Acacia spp., Adonsonia digitata, Stereospermum canthianum, Lonchocarpus luifolium.*

**Woodland:** Open woody vegetation, with tree species over 5 meters height, constitutes more than 40% of the area under this category. It is found interspersed with bamboo, bush, shrub and

grasslands. Major tree species include**:** *Albiza cafra, Cordia africanna, Oxitenanthera abysinica, Jasminium abysinica, Combretum spp.,Lonchocarpus luifolium.*

**Bamboo land:** Growing mostly in well drained red soils/nitosols of up to 20% slopes, the bamboo (Oxytenanthera abysinica) is also found interspersed with other vegetations such as, scattered wood lands, bushes, shrubs and sparsely cultivated lands. The major tree species identified with in this category are *Albiza cafra, Jasminium abysinica, Lonchocarpus luifoliumand Ekebergia capensis.*

**Bush land:** Bush vegetation cover is mostly found on the black soil/vertisol where the relief of the terrain ranges from undulating to rolling. The composition of bush species include: *Ficus mochstteri, Cassia singueana, Euphrbia Arabica, Gladielus spp., Borelia spp., Ischemum fasciacalatum, Piliostigma thoningii, Albiza spp., Tomarindus indica, Diospyros spp., Clerodendum spp., Anivona senegalensis, Dombeya spp., Combretum molle, Adonsonia digitata, Jasminum abysinia, Lonchocospus luxifolium.*

**Shrub land:** The shrub vegetation type is found in both the lower (poorly drained) and higher relief (shallow soils). The major species are: *Ficus mochstteri, Ekevergla capensis, Carissa edulis, Ganrdenia lutea, Euphorbia arabica, Acacia spp., Heliotropicum cineraseems, Ximenia americana, Hyperrhenia spp., Penisetum spp.*

**Grass land:** This grass vegetation type is found generally on flat land – seasonal wetland- (0-1% slopes) which is subject to flooding for 4-5 months by the heavy rainfall. It is also found, to some extent, on moderately drained areas (over 2% slopes). Roughly, the grass vegetation, mixed with few bush and shrub vegetation, covers about 40% of the area under study. Some of the grass and tree species are: *Hyperhenia spp., Pnisetum spp., knphia Spp., Acacia spp., Ekebergia capensis, Jasmenium abysinica, Ficus mochisteri.*

A number of unique and rare plants such as *Gladiolus daleni* and *Merremia gallabatenis* are found in the general area, according to the study for the Environmental Impact Assessment of the Assosa-Guba road project.

This vegetation has been burned annually for such a long time that the plants show clear adaptation to fire, and it must be assumed not to be adversely affected by controlled annual fires. It occurs along the western escarpment of the Ethiopian Plateau.

The conversion of forest land to large scale cultivation or mining will result in the loss of forest reserves and a depletion of the natural resource base; from information from the woreda Rural development office almost 90% of the inundated area is forest land. Consequently local people will not be able to sustainably exploit forest reserves that remain. Traditional grazing areas are likely to be lost to agriculture or mining activities, and access to traditional water resources may be restricted or denied.

## 2.3. Social and Economic Context

### 2.3.1. Demography

#### 2.3.1.1. Population numbers

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), the Benishangul-Gumuz Region has a total population of 784,345, consisting of 398,655 men and 385,690 women. With an estimated area of 49,289.46 square kilometers, this Region has an estimated density of 15.91 people per square kilometer.

For the entire region 174,445 households were counted, which results in an average for the Region of 4.5 persons to a household, with urban households having on average 3.6 and rural households 4.7 people.

The settlement pattern of the Gumuz people in the region indicates a direct economic dependence on the rivers, particularly on the fisheries resources(Fish Resource Survey in Benishangul-Gumuz Regional State, Agricultural Extension Directorate, Ministry of Agriculture, July 2011).

#### 2.3.1.2. Project affected Woredas and Kebeles

The basic design of the dam was described in a PowerPoint presentation (16 Nov. 2010) by the Ethiopian Electric Power Corporation (EEPCO), Salini Costruttori and SP Studio Pietrangelli consulting engineers. In the section on environmental impacts, it states:

> *"There are NO VILLAGES in the reservoir area (probably due to the fact that the elevation is very low -500 masl and therefore the climatic conditions are unfavorable."*
> *"There are some scattered fishermen's huts ONLY ALONG THE RIVER (approximately 800 people). These huts will have to be moved a short distance to the banks of the reservoir."*

But in our field visit and information from the local people and civil servants we discovered that the government is in the process of resettling the kebeles indicated below, about 5,110 people in Guba woreda.

There will also be partial displacement of people living in Wonbera and Sirba Abay woreda, the estimated numbers which we cannot verify. These partially affected villages have a population of more than 7,380 and includes Baniya(1,324 people in 262 households) and Begondi (1,800 people in 367 households) kebele's of Wonbera woreda and Chesega (1729 people), Zami Dabus (1603 people), Bapapararo (923 people) of Sirba abay woreda.

**Table 1. Project affected Kebeles in Guba woreda**

| Geographical Area | Both Sexes | Male | Female | Number of households | Number of Housing units |
|---|---|---|---|---|---|
| BAMZA | 850 | 429 | 421 | 205 | 204 |
| FANGUSO | 1,061 | 521 | 540 | 282 | 276 |
| YARENJA | 1729 | 856 | 873 | 506 | 493 |
| JADIYA | 514 | 231 | 283 | 116 | 114 |
| BABI ZENDA | 956 | 497 | 459 | 223 | 217 |
| **TOTAL** | **5,110** | **2534** | **2576** | **1332** | **1304** |

The displacement of these areas is in conformity with the topography, as they are in the elevation range of 500 m amsl and 650 m amsl, which makes them inside the reservoir.

#### 2.3.1.3. Migration

In the northern and central highland areas of Ethiopia, increased population, combined with the disruption of the rural economy due to deforestation and resultant soil erosion/degradation, has led to a continuous decline in production. The situation was exacerbated by recurrent and severe drought, which affected these areas for many decades. In response to these conditions, a large number rural people moved out of these highlands areas, usually to nearby towns, and sometimes to neighboring Regions.

The Gumuz people have been retreating from the central highlands of Ethiopia to the lowlands west due to their exposure to intermittent slave raids and conflicts (James Bruce, Salt and Beke- as quoted in Wendy James, 1986, P.121).

People from the highlands continuously migrate to the areas inhabited by the Gumuz people while the Gumuz people are forced towards the border and faced a brutal oppression and exploitation. For centuries they were unable to protect their rights and utilize their natural resources. (A brief explanation about the history of migration and natural resource use in the area is annexed.)

An estimated 32.5% of the population in Benishangul Gumuz Region are migrants, and 22.5% of these are considered "recent" migrants (i.e., have moved within the last five years).The Regional offices indicate that there is still a considerable amount of migration into Benishangul-Gumuz Region from other regions.

#### 2.3.1.4. Age structure

The population in agricultural households in both rural and urban areas is characterized by young age. A data from the study on the socio-economic characteristics of the Benishangul Gumuz region population in Agricultural households (2001/02) shows, 53.9% and 52.7% of rural and urban population in agricultural households are under 18 years of age. Those persons aged 60 years and above constitute only small proportion (3.6% in rural and 2.2% in urban areas).

#### 2.3.1.5. Ethnicity

According to the Central Statistical Agency (CSA) (2008), the region is characterized by a high level of ethnic diversity. According to the results of the 2007 Population and Housing Census of Ethiopia, report by CSA, the major indigenous ethnic groups in the region include Berta (25.41%), Gumuz (20.88%), Shinasha (7.72%), Mao (1.96%), and Komo (0.99%). Other ethnic groups in the region include the Amhara (21.69%), Oromo (13.55%), Agew (4.22%), and Tigre (0.71%).

The dam project's reservoir area is inhabited by the indigenous Gumuz and Berta people. The Gumuz are by far the majority among the affected people, especially on the upstream, and the second is the Berta people. The Shinasha, Amhara, Agew and Oromo peoples live on the upper edge of the reservoir in smaller numbers.

### 2.3.2. Infrastructure and Settlements

#### 2.3.2.1. Infrastructure

The region is characterized by very poor infrastructure. Most roads are dry-weather roads and hence access is difficult during rainy seasons. Moreover, the road network connecting the region with zones and *woredas* is very poor. Until recently, Metekel zone is reached from the regional capital, Asossa by driving through Oromiya and Amhara regions, which is more than 600 kms away. Kebeles are in most cases not connected with *woredas*. Market network is almost negligible. Only one government Bank at the regional capital and one at the Zone capital serve the region. Telecommunication services are found only in a few *woredas* of the region and mobile network along the main road.

A road linking the regional capital Assosa to Mankush and Metekel zone was completed in 2010, along the Blue Nile River, which has a crucial role in developing and integrating the regional economy, as the road represents a potentially important inter-regional link, serving presently inaccessible districts and interconnecting the Western and North-Western Corridors. However this road will be flooded by the reservoir, so a new road is in its initial stage of construction downstream.

#### 2.3.2.2. Population settlement

Guba Woreda, where as much of the reservoir area is located, has a population density of 11 persons per $km^2$.The settlement pattern of the indigenous communities is highly scattered. The distance between villages within a kebele often means hours of walking. This condition makes delivery of services such as health, education, and extension services very challenging with the meager available resources.

### 2.3.3. Livelihoods and the Agricultural System

The Berta and Gumuz tribes practice rain fed shifting cultivation. Typically, this involves clearing of irregular plots at some distance from the village by cutting and burning off trees and shrubs prior to tilling with the hoe. Plots are cultivated for one or two years, then left to recover to woodland by laying fallow for five or more years. The size of land holding is about 3-5 ha, but the capacity to cultivate is governed mainly by availability of family labor. Main crops include sorghum, sesame, beans, maize, pumpkin, groundnuts and peppers.

The dam will flood unknown amount of farmland, which belongs to local small scale farmers, but local officials claim there is ample land for resettlement nearby inside the woreda as well as for large scale investors.

From local officials it is understood that land for resettlement has been identified and preparation are underway. As for the leased investment farms, there is no large scale farm land leased for domestic or foreign investors in the project affected or relocated area.

The regional economy depends on agriculture where 93.2% of the economically active population is engaged. The subsidiary livelihood sources for the population include livestock rearing, gathering wild foods, fishing, honey production and collection, traditional gold mining, hunting, handcrafts, petty trade and charcoaling. The region's agriculture is characterized by traditional farming practices and low level of productivity. Poverty is widespread in the region. Access to social services like health and education are limited, particularly for women and girls. Providing basic infrastructures like roads and water supply lag behind other regions in the country.

#### 2.3.3.1. Income

Even though the region has important income-generation potential, most income-generation activities are geared towards satisfying daily needs (to supplement food gaps). Some of these activities include traditional mining, sale of fuel wood and charcoal, daily labor, pottery and other similar activities. Households also sell food crops, cash crops and livestock to fulfill their cash needs. The dam is expected to impact the already fragile livelihood strategies of local people (especially those resettled for the project).

Per capita cash income from both agriculture and off-farm activities is very low. For example, the baseline survey of May 2004 conducted in seven woredas of the region shows that the annual cash income from the sale of both crops, livestock and other off-farm income generation sources is as follows: Sherkole Birr 347 ($40 USD), Kurmuk Birr 299 (US$35), Sirba Abay Birr 537($62), Belo Jiganfoy Birr 1,499 ($173), Dibate Birr 755 ($87), Mandura Birr 506 ($59USD) and Guba Birr 169 ($20). This is generally not enough to fulfill the cash needs of the households for human and livestock medication, to purchase farming inputs, to pay government tax and other obligations.

To fill the gaps created by shortfalls in production, the indigenous people largely rely on a few income generation activities. However, the viability of these sources is also constrained by many factors. For example, traditional gold mining in most cases require digging of very deep pits, which reach sometimes to the depth of about 10-15 meters. Every bit of soil extracted from these pits is washed carefully and finding of gold depends on the luck. The income from such practice is generally meager to meet the needs of households. Fetching water, drawing soil out of the pit and washing is done by women, which is tedious and energy-intensive. Women sometimes leave newborns at home to go for gold mining; otherwise there will be no food for the family as a whole. Moreover, if the location of the water point is far from the mining place it adds another burden on women and children. On that basis, the sustainability of gold selling as a means of allowing getting food is under question unless mining and exploration technology is improved, water availability is ensured and alternative income sources are sought.

The indigenous communities are not currently benefiting from jobs created by the existing investments in the region. Mainly due to lack of appropriate skills of the indigenous people.

#### 2.3.3.2. Livestock Husbandry

Livestock (goats, cattle, sheep and poultry) are important means of livelihood in the region next to crop production. They are important sources of food, cash income, and assets to buffer shocks. The dam will reduce access to common property such as forest and grazing land. Livestock diseases endemic to the region are affecting the food security of the people through direct death of animals, reducing market value, and the need to sell crops to purchase animal medication, which depletes the people's resistance to shocks during crop failure. The project's livelihood-restoration strategies for affected people should seek to address the loss of grazing land as well as measures to mitigate animal disease.

***Impacts***

The project will

- Reduce the area available for grazing due to direct land take for the infrastructure and reservoir.
- Increase the risk of livestock disease

- Affects existing access routes and footpaths

**Table 2. Estimated livestock population of Guba woreda**

| Sr. No | Type of livestock | Estimated population |
|---|---|---|
| 1 | Cattle | 6,193 |
| 2 | Sheep | 3,175 |
| 3 | Goats | 12,322 |
| 4 | Donkey | 950 |
| 5 | Poultry | 8,699 |
| 6 | Beehives | 297 |

Source: BG Region Bureau of Agriculture and Rural Development (2010)

#### 2.3.3.3. Fisheries

Scientific studies reveal that there are about 153 to 183 valid indigenous freshwater fish species in 25 families; 37 to 57 of them are endemic to Ethiopia (Glubtsov and Mina 2003, Abebe Getahun, 2005b). Fish families in the Blue Nile River are:

- Bagridae,
- Centropomidae,
- Channidae,
- Cichlidae,
- Malapteruridae,
- Mochokidae and
- Tetraodontide

Culturally the peoples of the Benishangul Gumuz Region, especially Gumuz and Bertha, are dependent on fish as a major source of their protein requirement. A survey made by Agricultural Extension Directorate of the Ministry of Agriculture (Fish Resource Survey in Benishangul-Gumuz Regional State, July 2011), Fish is one of the historical widespread and significant diets in the region especially for Gumuz and Berta peoples. Along the rivers per capita consumption of fish amongst these peoples is about 22 kg/person/yr. In most part of the country individuals prefer a very limited species of fish (mainly Nile Tilapia, Nile perch and Labeobarbus species). But in this region there is no fish species refused by any member of the family. Each fish species has specific local name.

The survey notes that all members of the family were seen involved in fisheries activities: men fish throughout the day along the river, women make basket traps called "Gambudi" and use them for fishing, and children use hooks of different sizes for fishing. Apart from the demand of the local people, there is market demand in all towns with a reasonable price. Some people kill fish using poisonous plant materials, like Birbira (crushed seed) and Bitsa

(Katiba tree bark), and poisonous chemicals (including Malathione, Endosulfan, 2,4D and other herbicides). These actions not only poison the fish stock but also the water bodies themselves, thus affecting human beings and livestock directly.

The indigenous people use fish in their daily diets and virtually every family living alongside the rivers supplement their diet with fish. The major rainy season is June to October. During this time the river level becomes high and fishing is very difficult. Therefore, fishing tends to intensify as the dry season progresses or it occurs during downturns in agricultural and other activities.

Even in times of good harvest, local people prefer to preserve fish for their future consumption and sometimes to sell to the nearby markets.

Fishing in the study area is mostly artisanal, except for a few organized groups of fishers like Chesega Fishers Association, and its purpose is limited to meeting subsistence needs of fishing communities.

In Guba Woreda, Bamza town, the newly formed Bamza Fishers Cooperative has 22 members. Each member contributed Ethiopian Birr 300 for purchasing 3 gillnets dig-out boats and different sized hooks. The fishing site is at River Blue Nile below the Grand Ethiopian Renaissance dam, where the river is stable and suitable for long gillnets.

There is promising fish market in Bamza town and Renaissance Dam construction camps. The highest fish potential river of the Benishangul Gumuz Regional State is Blue Nile, with an estimated potential of 1680 tons/year which covers 70% of the region's total potential.

Due to the habitat loss, turbidity, chemicals formed by decomposition of the biomass and check in the movement of the fishery, there will be significant impact on the fishery in the area immediately downstream and in the reservoir area itself. It is not known whether local fish species will adapt to reservoir conditions, or whether there are plans to stock the reservoir with fish.

*Impact*

During operational phase, access to the reservoir may be more difficult to fishermen after inundation due to the operational drawdown of water within the reservoir, which may leave a muddy margin on the bank.

Therefore, the traditional fishing opportunities for rural communities especially will be negatively affected. They usually fish in the smaller streams and tributaries or ponds with hook and line or small nets. These, for them safe and accessible areas will be inundated, making them wider and deeper. For men and women alike, fishing in an open, large lake-like area will need new skills, safety measures and probably other tools than currently used.

#### 2.3.3.4. Mining

Gold is the main and widely occurring metallic minerals in the project area as well as the region. It is found in all the three administrative Zones of the region. Artisanal gold mining activity is practiced in all the three Zones and is of the means of subsistence for a large number of people in the region.

The lack of access into the Region has hindered exploration and so little is known of the quality and quantity of mineral deposits. In the case of gold it is believed by local planners that with improved access, the costs of mine development will be lowered and will attract investors.

Gold is currently recovered on a small scale by local people primarily from riverine sources. According to studies conducted by the Mines and Energy Department (MED), the number of artisanal gold miners is estimated to be between 55,000 to 65,000. On average 180 kg of gold is mined each month of the mining season (February-April).

Mining is family based. Generally, 3-4 members are employed in mining for income generation. It is observed that 65-70% women and 5% children actively work on artisan mining operations at Metekel zone (where the affected area is located) and Assosa zone.

*Impact*

The construction of the dam and inundation caused by the reservoir has a significant impact in terms of traditional gold mining as all the people to be relocated have been involved in the traditional gold mining.

The traditional gold mining depends on the alluvium deposit along the river, which will be lost due to the dam.

In our visit we came across about 30 people at one place in the Blue Nile river panning gold, from the regional report about 180 Kg of gold is mined each month (from February to April) by artisans gold miners.

**Table 3. Artisan Gold Mining Sites in Metekel Zone**

| No | Woreda | Kebele/River | Duration of Mining Operation |
|---|---|---|---|
| I | Mankush * | Yarenja /Abay | February -April |
| | | Beles /Beles | February -April |
| | | Fangusa/Beles | February -April |
| | | Babzinda/Beles | February -April |
| 2 | Manbuk Dangur | Dachigir/Beles | March -April |
| 3 | Mandura | Dabuh Giorgis/Libit | No data |
| | | Jaiem Dafile/sah | |
| 4 | Dibate | AIbasa-Korka zourice | No data |
| | | Galesa/raba | |
| | | Golfun Donben-Gerber Zuria | |
| | | Zegi/shar | |
| 5 | Bullen | GechiDuki/Kila | No data |
| | | Elgood | |
| | | Kompaneger | |
| | | G usher river | |
| 6 | Wonbera ** | Dekoka/Dura | |
| | | Ajoba | December -May |
| | | Wabo/Abay | |
| | | Mendija | |
| | | Baniyam | |
| | | Kiseya Begala | |
| | | Bengound | |
| | | Atshaga Kebele | |
| | | Jelekata | |
| | | Merare &Yousa river | |
| | | Epar/Beles. | _ |

Source: Mines and Energy Department of the Region. 1997

Note:

**Areas totally affected by the dam reservoir*

***Areas partially affected by the dam reservoir*

During our visit to the area especially around the Blue Nile Bridge there were many indigenous people inside the river working to recover gold traditionally.

#### 2.3.3.5. Other livelihoods

***Hunting and gathering***

Hunting and gathering have traditionally been part of the livelihood system of the indigenous communities in the region. These activities are a coping mechanism to fill seasonal food gaps. However, hunting was declared illegal by the State in 2002. Moreover, most of the wild animals have disappeared or retreated to inaccessible areas due to encroachment on their former territory by agriculture, forest fire or other related factors. Therefore, hunting has greatly diminished as a source of livelihood and food security.

Gathering wild foods both for supplementing the regular diet and coping during food deficit seasons is another major activity for the indigenous people in the region. However, availability of these foods is challenged with expansion and intensification of agriculture, deforestation for charcoal making and other factors. Thus, wild foods could not be dependable sources to meet the need for food in the future based on current environmental trends. In some *woredas*, people have already started to rely on agriculture alone due to unavailability of wild foods.

***Impact***

The dam will affect wildlife distributions, with economic implications for community and resident hunting. Wildlife species will migrate to areas outside the riverine forest which will be impounded by water, negatively affected the number of animals being hunted, though hunting is prohibited the indigenous people still hunt wild animals for food.

The other impact is the loss of the riverbank vegetation, as a number of edible plant species were found to be freely harvested by the locals (mostly women) for domestic consumption. And many medicinal plants were reportedly found near the riverbanks. Loss of these plants due to inundation means significant loss of biodiversity as well local food and health security. The dietary, nutritional, medicinal and economic importance of local vegetation was overlooked and ignored, as the compensation did not make up for such losses

#### *Beekeeping*

Ethiopia is known for its diversity of wild bee species, and is Africa's biggest producer of honey. A vast area of Benishangul Gumuz Region is covered with vegetation that has favored bee colonies that produce honey without hives. The indigenous people hunt for such forest honey to supplement their livelihood. Modern bee keeping is not widely practiced.

Honey hunting is one of the major causes of forest fire and killing of bee colonies. Changing the mode of honey production in the region could reduce forest fires (which are accidentally set in an effort to smoke out or kill the bees, to get at the honey), which in turn would have a positive impact on vegetation, bee colonies and hence honey production.

#### *Impacts*

The drowning of the forest will have negative impact on collection of honey, as the indigenous people mostly depend on wild honey in the forest.

#### *Handcraft*

Handcraft is another important economic activity in the region, especially for the women. Several handicraft products are produced from clay soil, wood, iron, bamboo, and barks/grass mostly for home use. However, some basketry products from bamboo and palm leaves and pottery are produced for sale.

### 2.3.3.6. Energy

The energy sources of the region are mainly dominated by traditional forms of energy that are derived from biomass. Biomass is often the only sources of energy in rural areas. Of course, it is also the major source of energy in urban centers of the region.

Firewood is the most important among the biomass sources contributing to about 97% of total domestic energy supply (source: Benishangul Gumuz profile, Facts about BGRS, 2007).

The local community depends entirely on the forest resources for their livelihood; i.e. hunting, collecting/gathering of fruits, honey and roots. Forests are important sources of energy/fire wood, medicine, wood lots for house construction, feed/fodder source for livestock.

In the specific area of the project including the town Mankush there is no electric power supply.

*Impact*

Due to the huge area of inundation and the trend in providing large farm lands for investors there will be significant impact on the availability of fuel wood as the indigenous people are totally dependent on the forest for fuel wood.

### 2.3.3.7. Domestic Water Supply and Use

In spite of abundant water resources of the region, safe drinking water for the population was in a short supply. The regional bulletin, *Facts about Benishangul gumuz - 2007*, indicates that 44.1% of the total populations have access to potable water from hand dug wells, deep wells and developed springs. The supply is much better in urban areas (66.16% have clean water supply) than in rural areas (40.13%) _. However, most of the region's water supply is mainly through traditional dug wells and to some extent boreholes.

In our assessment the indigenous people around the Grand Ethiopian Renaissance Dam Project use either river water or spring water for drinking, cooking, washing, bathing, and watering animals, except a few people who have recently built deep wells. A small number of families depend on spring water all the year round. During dry months, more families supplement their needs with river water.

Large dams can create significant long-term water quality problems. Clearing of trees and vegetation in impoundment areas removes only partially organic carbon. During impoundment, decomposition of organic carbon is consuming Dissolved Oxygen and producing humic and fulvic acids. Depending on reservoir operation management, water quality in the reservoir and/or downstream water quality are affected by direct oxygen consumption and pollution loads through decomposing organic material.

*Impacts*

- Reduced water quality

## 2.3.4. Social Indicators

### 2.3.4.1. Education

It is needless to say that the age-old marginalization of the Benishangul Gumuz community at large is expressed by the poor educational coverage and opportunities during the previous regimes.

**Table 4. Proportion of Literate Population in Agricultural Households by Place of Residence, Sex, Zone and Woreda**

| Geographic Area | Rural + Urban | | | Rural | | | Urban | | |
|---|---|---|---|---|---|---|---|---|---|
| | Both Sex | Male | Female | Both Sex | Male | Female | Both Sex | Male | Female |
| Benshangul-Gumuz Region | 37 | 51 | 22.9 | 34.8 | 49.2 | 20.3 | 71.6 | 80.6 | 62.9 |
| Metekel Zone | 34.5 | 46.3 | 22.5 | 31.2 | 43.2 | 18.8 | 67.2 | 78.1 | 56.9 |
| Dangur Woreda | 23.8 | 32.1 | 15 | 21.8 | 30 | 13.3 | 49.6 | 60.6 | 38 |
| Guba Woreda | 18.6 | 26.6 | 10.7 | 15.3 | 23 | 7.8 | 69.4 | 81.7 | 57 |
| Wenbera Woreda | 32.8 | 50 | 16.5 | 31.3 | 48.7 | 14.5 | 65.7 | 81.2 | 53.7 |
| Mandura Woreda | 18.1 | 26.9 | 8.7 | 15.9 | 24.7 | 6.5 | 67.2 | 76.6 | 57.4 |
| Dibate Woreda | 32.8 | 45.1 | 20.3 | 31.1 | 43.7 | 18.4 | 74.4 | 84.4 | 65.7 |
| Pawe Woreda | 57.5 | 67.9 | 46.3 | 54 | 64.7 | 42 | 69.2 | 79.2 | 59.3 |
| Bullen Woreda | 32.5 | 43.7 | 20.3 | 29 | 40.5 | 16.2 | 68 | 80.7 | 57.2 |

### 2.3.4.2. Health

According to the Regional Profile of Benishangul-Gumuz National State, Ethiopia has one of the world's worst health statuses because of poor socio-economic conditions resulting in low living standards, poor environmental conditions and inadequate health infrastructure and services. Within Ethiopia Benishangul-Gumuz Region has one of the worst health statuses.

In the specific project area around the dam, malaria was considered to be the main cause of morbidity, followed by diarrhea and stomach disorders (*Source: Regional Profile of Benishangul-Gumuz National Regional State, Bureau of Planning and Economic Development of BGNRS)*.

Reservoirs in Ethiopia have been shown to increase the incidence of malaria. The area of impoundment may lead to the increase in breeding ground for mosquitoes which may lead

to increased incidence of malaria and is likely to increase significantly the incidence of waterborne disease. A study on the health impacts of the Gibe dam complex, published in Malaria Journal, states: "Children living in close proximity to a man-made reservoir in Ethiopia are at higher risk of malaria compared to those living farther away. It is recommended that sound prevention and control program be designed and implemented around the reservoir to reduce the prevalence of malaria. In this respect, in localities near large dams, health impact assessment through periodic survey of potential vectors and periodic medical screening is warranted. Moreover, strategies to mitigate predicted negative health outcomes should be integral parts in the preparation, construction and operational phases of future water resource development and management projects." (Source: http://www.malariajournal.com/content/8/1/21) It is unknown if such precautions are in place for this dam project.

Currently there are more than 138 health facilities and one governmental health institution, which is found in Pawe special woreda (a special woreda in Metekel Zone established by the resettlement program of 1984) with more than 314 medical and technical personnel out of which fourteen of them are general physicians or medical doctors and, about 299 of them are nurses. Of course, there are also private medical colleges which can play a vital role in providing medical professionals, with the exception to hospitals which are only found in the capital of region and in Pawe special woreda town, most of the woreda towns and their Keble councils have access to health centers, health stations and health posts.

### *Impact*

The project would compromise public health and safety as most of water development projects. As stated in all regional reports Malaria is endemic in the area and a major cause of disease and death. The project is likely to increase and change the pattern of malaria infections during the year, with an extension into the dry season. Malaria will continue to have a very high impact on human health, especially for children.

The project has the potential to increase the risk of infections by creating additional habitat for the vectors and increasing exposure of the population to water, which increases the spread of waterborne diseases such as cholera, dysentery, bilharzia and typhoid, both are among the major health problems in the area next to Malaria.

### 2.3.4.3. Gender Differentiation

Women in the region are the primary agricultural producers, income earners, and responsible for food preparation and care for the family, yet they are more vulnerable than men for a variety of reasons. They are predominantly illiterate and have neither basic education nor appropriate technical skills. They invariably lack access in their own right to productive assets such as arable land and inputs for production. They do not have opportunities to participate in local decision-making processes and have no access to credit, and to improved technologies. Generally women have been neglected and are not considered in the development process in the region though they comprise 50% of the total population and are the backbone of the family and the community. In one survey (rapid food system scan, by Benishangul Gumuz Region, 2003) community groups among Gumuz defined the poor as ''one who does not have wife'', reflecting strongly the importance given to women's role in development. Yet, women don't benefit from treatment reflecting this.

Moreover, there are different practices affecting women and gender equity. The main ones are: female genital mutilation/circumcision (particularly among the Bertas and Shinashas); early, exchange and levirate marriages; during child delivery, Gumuz women leave their home and stay a certain distance away and deliver without any one's assistance sometimes with disastrous consequences; Gumuz women are not allowed to stay at home during menstruation; and abduction and polygamy.

*Impacts*

Although almost all the populations in the area are poor and vulnerable, women are likely to be the group most severely affected by the project due to

- further increases in workloads, as women are the responsible in most of the agriculture activity, and
- Possible exclusion from participation in new management structures due to patriarchal cultural norms.

### 2.3.4.4. Incomes & Poverty

Despite the availability of huge natural resources potentials and opportunities, the Benishangul-Gumuz region is one of the poorest and most food insecure regions in the

country by all standards. This is due particularly to marginalization and isolation from development processes and initiatives in the past. The development efforts in the region during past regimes also greatly marginalized the indigenous people of the region. Moreover, different guerilla wars that took place in the area particularly during the Derg regime and the civil wars in the Sudan aggravated the existing problems.

The study conducted by Ministry of Finance and Economic Development shows that the incidence of poverty in the region is 54% (MOFED, 2004), which is one of the highest among the regions in the country. Other studies also show that the region is one of the most vulnerable regions in the country (World Bank, 2003). The wealth ranking exercise conducted based on local criteria during baseline survey (May, 2004) in seven woredas of the region shows the proportion of well-off, medium and poor households as follows: 12.8%, 29.1% and 58.1% respectively. The poor category in this analysis of community defines people in a desperate state who don't have any asset and cannot feed themselves from their production.

### *Impacts*

- Loss of income sources such as farm land (silt rich agriculture land which will be inundated) or other means of livelihood related to the natural resource of the area.
- Disruption of the existing agriculture system and the labor and time required to develop a residential as well as farm land will reduce time spent in the farm and result in shortage of food to many households.
- Loss of traditional fishing opportunities may affect livelihoods
- Loss of riverbank vegetation impacts the livelihood of the indigenous people, as a number of wild edible plant species and medicinal plants s were reportedly found near the riverbanks.
- Exposure to health risks resulting from the implementation of the project, such as malaria will affect labor in agriculture and other livelihood activities and increase expenditure for medicine.
- Loss of income from gold mining as the traditional gold mining depends on the alluvium deposit along the river, which will be lost due to the dam and reservoir.
- The relocation will result in disintegration of the social fabric and change the cultural pattern of indigenous people, which is highly adapted to survival in the natural environment in which they live.

# 3. IMPACTS OF THE PROJECT ON THE COMMUNITY

The river is used by local people in the following key ways:

- For daily water needs such as: drinking, cooking, cleaning ...etc for humans and animals.
- Of food through fishing
- Cash income through artisanal mining for gold

The land in the upstream and downstream area is used by the local communities for crop cultivation and for settlement. Extensive use of land resources (for shifting cultivation and grazing of animals) and putting the land under fallow (for 3-4 years) for reclamation is a common practice in the fragile ecosystem.

The local community depends entirely on the forest resources for their livelihood; i.e. hunting, collecting/gathering of fruits, honey and roots. Forests are important sources of energy/fire wood, medicine, wood lots for house construction, feed/fodder source for livestock.

The Grand Ethiopian Renaissance dam will certainly cause extensive changes in the environment, to mention some:

- A significant amount of land will be impounded and hence the physical resources previously available to local people will be lost.
- Vegetation and associated biological resources will be lost.
- The cultural and social environment will also change as a result of the project.
- Downstream impacts are expected to be significant as well (these are being looked at by a team of experts from Sudan, Egypt, Ethiopia and internationally).

In the following sections, we describe the situation on the ground, and raise questions about how the dam project might bring changes to the human and natural environments. This is not meant to be an assessment of these impacts, but to reveal information that a project EIA should have reported on and analyzed.

# 4. COMMUNITY'S PERCEPTION AND KNOWLEDGE OF THE PROJECT

## 4.1. Awareness of the project

It was breaking news for most Ethiopians when the Grand Renaissance Dam project was disclosed publicly. However, there was mobilization some months earlier by the contractor Salini Costruttori such as deploying heavy construction machinery to the site, labor recruitment and clearing works for camp construction, and local government officials were made aware of the project by top level government officials.

Indeed, it is not clear how much advance warning (and up to what level of administrative hierarchy) local officials got on the project, because there were projects upstream, sited inside the reservoir, which should not have been put into operation--for instance the road construction from the regional capital Assosa to Mankush town (which cost Birr 440 million), which includes a 365 m span bridge on the Blue Nile river; this is now subject to inundation just 2 years after completion. There has also been villagization work in the area; people moved into these new villages will now require a second relocation, the amount of relocated people from 2007 to 2011 is 3368.

The majority of the affected people, if not all, are the indigenous people of Gumuz and Berta, who are living in the worst economic condition even in the standards of Ethiopia, with little access to every development infrastructure. In terms of awareness of the project they do know that some huge project is going on the Abay (Blue Nile) River in their neighborhood; but do not have the chance or the capacity to understand the extent of the project, its effects and benefits.

However there is huge excitement and motivation among the local authorities and the wider population who consider it as a national pride and a sign of the country's economic development. The army guards the area in huge number; one army member at the gate during our visit proudly told us how he is surprised by the enthusiasm of every visitor.

Teachers and one official (high ranked official of the local governing party), friends to one of the expert involved in this field visit, told how devoted are the civil servants, investors

engaged in the area and political leaders to realize the project, they are convinced that "any Ethiopian against this project is an enemy".

This is the mood in every town from the start of our trip up to the end including the educated indigenous people; bizarrely the indigenous people near the dam site did not show us any love or hate of the project.

Though the affected villagers were not consulted at the early stage of decision making, they have been informed formally by the local administrative officials, local residents told us the information was first known from the huge vehicle and human activity in the area, after a couple of months official from the woreda came and told them in public meeting, in the presence of local leaders.

The Woreda administrative bodies have been provided information by Federal government officials on areas that will be inundated by the reservoir and downstream residents and given order to facilitate the relocation of villagers in June of 2011.

## 4.2. Compensation and resettlement issues

Recently a team of experts and officials from the federal and regional government, Metekel Zone and the affected woredas made a study in the area and expected to establish the people to be displaced, eligibility criteria and finalize compensation to the affected community. As we have been informed from local people community elders with local officials have been involved in selecting the site for relocation.

The local authorities confirmed that there is plenty of land available in the nearby areas for the purposes of relocation and resettlement. The size of land will be decided by a committee which comprises the government officials and local elders as there is no land registration.

While land is compensated for land, property (structure or farm) on affected land will be compensated with cash.

The fear of the local authorities, as we come across in our discussion, is there is no land registration in the area and no authority can clearly define the amount and boundaries of farm land for the persons to be relocated, and the agriculture system is shifting cultivation in which every family clears the forest and cultivate it for few years which requires a large

amount of land, therefore unless sufficient planning is made there may rise a conflict of resource utilization.

The cash compensation will be made in the following manner:

For annual crops

- Information on the yield per hectare and market price will be taken from responsible local offices
- Net income per hectare will be used for compensation
- Compensation for not less than ten years (not decided at the time of our field visit) lost crop has been considered as reasonable.

For perennial crops

- The present value of the stream of incomes that could be earned over the entire life of the perennial crops at the local market value will be considered.

For Structures

- For loss of houses, the replacement amount for residences is calculated to be sufficient to build a new house with the same material and having the same area (dimensions).

Forests, fisheries and other common property resources, which support subsistence livelihoods, are often not replaced during resettlement with women often bearing a disproportionate share of the resulting costs.

## 4.3. Perception on resettlement

Many of the indigenous people in the area have already been subject to villagization, so the dam will bring a second round of resettlement for some.

Experience shows as the indigenous people, especially the Gumuz people (the huge majority of the affected people); prefer to live in their traditional villages as practiced in their ancestors.

The government's effort to collect the community in one area and provide the impetus for self-sustaining rural village with infrastructures like water, schools and health centers had been tried in this area, with little success.

This indicates that the local people are reluctant in resettlement both in the case of the villagization as well as in the case of this project.

The Benshangul-Gumuz Regional Government is implementing a villagization program to resettle farmers/peasants into centralized villages where the water is available. The objective of this water-centered villagization is to introduce improved technology and infrastructure for ensuring food security and to change the lifestyle of native ethnic groups.

**Table 5. Villagization Program in the area & number of people resettled**

| No | River | Village | Population | Woreda |
|---|---|---|---|---|
| 1 | Abbay | Yarenja * | 1729 | Guba |
| | | Bamza * | 250 | Guba |
| | | Fanguso* | 106 | Guba |
| | | Dancho Abbay | 135 | Agelo |
| | | Chesega** | 1729 | Sirba Abay |
| | | Zami Dabus ** | 1603 | Sirba Abay |
| | | Papararo** | 2021 | Sirba Abay |
| | | Adenkish | 201 | Sirba Abay |
| | | Bekasa | 110 | Sirba Abay |
| | | Payabala | 91 | Sirba Abay |
| | | Debi aregam | 94 | Yaso |
| | | Debi gurcha | 117 | Yaso |
| | | Begondi * | 729 | Wonbera |
| | | Melkan | 210 | Wonbera |
| 2 | Beles | Jadiya * | 554 | Guba |
| | | Bamijnda/belshi | 956 | Guba |
| 3 | Ayma | Ayneshmish | 167 | Guba |
| | | Omedla | 295 | Guba |

** areas that will be affected by the project*

# 5. CRITICAL ISSUES

## 5.1. Status of EIA study

No EIA report has been disclosed publicly up to date.

## 5.2. Public Involvement and Disclosure

Affected villagers were not consulted at the early stage of the decision making process not even the administrative bodies, and there was no attempt to include them.

The indigenous people do not know what impact the construction of the dam will have on their lives and benefits for the country, nor do they know which of their rights are protected or abused. Therefore, their reaction at this time is watching and waiting. People we communicated responded they will accept whatever the government brought as there is no way out. It is considered suicidal for anybody to question the project negatively. Local officials express excitement about the project, perhaps because they consider it to be a way out from the past marginalization.

## 5.3. Resettlement plan and implementation

According to the regional authorities, scattered settlement of the indigenous population is also one of the key issues impeding development efforts in the region which require due attention.

Villagization is another important issue that will deserve due attention in attaining food security in the region. According to the regional government, villagization is one of the regional development priorities. This strategy encourages need based collectivization of people to well-chosen and positioned development centers within given Kebeles. The process should take place on a participatory basis and take the environmental, social and cultural realities of the region into consideration. The change will be made voluntarily and step by step. In it, imperative that social services and infrastructures are put in place first. It is also proposed to draw appropriate lessons from the settlement site established by the Derg regime in the region. The strategy strongly proposes the need for the empowerment of grassroots communities through organizing for development activities and delivering required technical and financial supports to ensure food security and community driven

development in general. Special emphasis will also be given in developing key local potentials to improve the life of the people.

Despite the doomed attitude by the indigenous people, the villagization process has brought some improvement in supplying physical infrastructure, such as roads, health centers, schools, etc in the area.

## 5.4. Sedimentation of reservoir

The rate at which sediment deposited on a reservoir depends on the amount of silt carried by the river which feeds it – and that, in turn, depends on the rate of soil erosion in the river's catchment area.

Given the present rate of soil erosion in the catchment of the Blue Nile River it is hardly surprising that the river will carry enormous quantities of silt.

The government of Ethiopia has stated that this dam will reduce sedimentation for downstream dams. Yet there is no known analysis of the sedimentation risk to the dam. Another risk factor is that climate change could increase sedimentation rates. Because so little information has been released on the Grand Renaissance Dam, it is not clear how the new dam will fare with the heavy sedimentation burden that the Blue Nile brings. This is a serious issue for the dam's economic viability. No soil conservation plans, special organizational structure or implementation strategies seem to be in place for the watershed to date. In addition, the dam could affect the river's erosive quality downstream, by reducing the sediment load of the river. The clear water released from reservoirs often increases erosion downstream, and lead to riverbed deepening. This can lower the groundwater along a river, threatening vegetation and local wells in the floodplain. This impact would affect Sudan and Egypt.

# 6. CONCLUSIONS

The study team conducted this study with extreme care, not to confront with the government, conversations with local people and civil servants were made informally, even without taking notes. However, we tried to put all the talks of the area to the best of our recollection.

In our conclusion, undoubtedly there will be adverse impacts on the environment and local communities during and after construction. The reservoir is expected to be one of the main causes of elimination or severe decrease in the integrity of critical natural habitat. The project will result in the disturbance of a river course of over 200km.

Based on available evidence and documentation, there is no Environmental Impact Assessment or socio-economic study focusing on the upstream and downstream areas, therefore no one can assert that the project is an appropriate development strategy, in spite of popular support from the masses.

Our concerns with the project can be divided into two distinct geographical regions: the upstream reservoir area and downstream. Each region has distinct issues and interests that need to be considered separately, as well as in relation to each other, and as a whole. The following issues need to be clearly considered:

- Disturbance and loss of terrestrial ecology under the dam and reservoir.
- Disturbance to traditional village life including relocation and compensation issues.
- Sedimentation of reservoir

Our final conclusion confers an irremediable decision that has been made in the design of this project: the decision to not include all stakeholders and local populations. This participation should have been an integral part of project planning, and cannot be fully remedied at this point in the project cycle.

The issue of participation pervades all levels of project planning and implementation in the rhetoric of major institutions working in the name of poverty alleviation. Those whose rights and livelihoods will be most affected by the Dam – the indigenous community at the reservoir area and downstream community – were not consulted on this project in any evident way.

In addition to the main concerns listed above, there are several unresolved and ambiguous issues regarding the project of which the team is concerned, but needs more information about. It is our hope that we will continuously update information as far as we can.

# 7. ANNEXES

## Annex 1. Facts about the project

The main dam is an RCC gravity type dam with the following characteristics:

| | |
|---|---|
| Dam height | 145 m |
| Dam length | 1,780 m |
| Reservoir volume | 63 billion m3 |
| Reservoir area | 1,680 $Km^2$ |
| Installed capacity | 6,000 MW |
| Energy production | 15,130 gWh/year |
| Estimated cost: | 3.561 billion € |
| | 4.8 billion US$ |
| | 80 billion Et.Birr |

The dam project includes a saddle dam 4,800 m long and 45 m high and three spillways. According to the presentation the main spillway will control the entire flow, limiting the maximum level at storage level, i.e. 640 masl. The other two spillways will become operative only for higher discharge.

## Annex 2. Partial bird species list for the Benishangul - Gumuz Region

| | | |
|---|---|---|
| 1 | Secretary Bird | *Sagittarius serpentarius* |
| 2 | Ostrich | *Struthio camelus* |
| 3 | Little Grebe | *Trachybaptus ruficollis* |
| 4 | Black-Necked Grebe | *Podiceps nigricollis* |
| 5 | Great Crested Grebe | Podiceps cristatus |
| 6 | Great Comnorant | *Phalacocorax carbo* |
| 7 | Long-Tailed Cormorant | *Phalacrocorax africanus* |
| 8 | Great White Pelican | *Pelecanus onocrotalus* |
| 9 | Pink-Backed Pelican | *Pelecanus rufescens* |
| 10 | African Darter | *Anhinga rufa* |
| 11 | Little Egret | Egretta dimorpha |
| 12 | Great White Egret | Egretta alba |
| 13 | Yellow-Billed Egret | *Egretta intermedia* |
| 14 | Black Heron | *Egretta ardesiaca* |
| 15 | Cattle Egret | *Bulbulcus ibis* |
| 16 | Green-Backed Heron | *Butorides striatus* |
| 17 | Common Bittern | *Botaurus stellaris* |
| 18 | Little Bittern | *Ixobrychus minutus* |
| 19 | Dwarf Bittern | *Ixobrychus sturmii* |
| 20 | Squacco Heron | *Ardeola ralloides* |
| 21 | Black-Crowned Night Heron | *Nycticorax nycticorax* |
| 22 | Goliath Heron | Ardea goliath |
| 23 | Grey Heron | *Ardea cincera* |
| 24 | Black-Headed Heron | Ardea melanocephala |
| 25 | Purple Heron | *Ardea pupurea* |
| 26 | White Stork | Ciconia ciconia |
| 27 | Black Stork | Ciconia nigra |

## Annex 3. Flora list

| Sr. No | Name | Sr. No | Name |
|---|---|---|---|
| 1 | Acacia hecatopylla | 70 | Floscopa glomerata |
| 2 | Acacia polyacantha | 71 | Flueggea virosa |
| 3 | Acacia seyal | 72 | Gardenia temifolia |
| 4 | Acalypha sp. | 73 | Gladiolus roseolus |
| 5 | Acanthus sennii | 74 | Grewia mollis |
| 6 | Achyrantus aspera | 75 | Guizotia sp. |
| 7 | Adansonia digitata | 76 | Hibiscus calophyllus |
| 8 | Aframomum alboviolaceum | 77 | Hoslundia opposita |
| 9 | Albizia malacophylla | 78 | Hygrophila auriculata |
| 10 | Albuca c. | 79 | Hyphaene the bica |
| 11 | Allophylus macrobtrys | 80 | Hypoxis villosa |
| 12 | Aloe sp. | 81 | Hypparhenia sp. |
| 13 | Amorphophallus abyssinicus | 82 | Indigofera garckeana |
| 14 | Ampelocissus schimperiana | 83 | lpomoea aguatica |
| 15 | Annona senegalensis | 84 | lpomoea eriocarpa |
| 16 | Anogeissus leiocarpa | 85 | Kniphofia sp. |
| 17 | Asparagus flagellaris | 86 | Lannea fruticosa |
| 18 | Asparagus racemosus | 87 | Lannea welwitschii |
| 19 | Aspilia kotschyi | 88 | Ledeburia kirki |
| 20 | Balanites aegyptiaca | 89 | Lonchocarpus laxiflorus |
| 21 | Bonatea steudneri | 90 | Loudetia arundinacea |
| 22 | Boswellia papyrifera | 91 | Maesa lanceolata |
| 23 | Breonadia salicina | 92 | Maytenus senegalensis |
| 24 | Carissa edulis | 93 | Merremia gallabatensis |
| 25 | Ceropegia racemosa | 94 | Merremia kentrocaulos |
| 26 | Cissus comifolia | 95 | Momordica foetida |
| 27 | Cissus populinea | 96 | Neorautanenia mitis |
| 28 | Clematis hirsuta | 97 | Ochna leucophloeos |
| 29 | Clerodendrum alatum | 98 | Oxalis anthelmintica |
| 30 | Clerodendrum cordifolium | 99 | Oxytenanthera abyssinica |
| 31 | Combretum aculeatum | 100 | Ozoria insignis |
| 32 | Combretum collinum | 101 | Panicum comorons |
| 33 | Combretum molle | 102 | Pavetta gardenifolia |
| 34 | Commelina africana | 103 | Pelargonium sp. |
| 35 | Commelina bengalensis | 104 | Phoenix reclinata |
| 36 | Commelina imberbis | 105 | Phyllanthus sp. |
| 37 | Commelina latifolia | 106 | Physalis ixocarpa |
| 38 | Commiphora pedunculata | 107 | Piliostigma thonningii |

| | | | |
|---|---|---|---|
| 39 | Corchonus olitorious | 108 | Protea gaguedi |
| 40 | Costus spectabilis | 109 | Pterocarpus lucens |
| 41 | Crinum omatum | 110 | Rhus vulgaris |
| 42 | Crossopteryx febrifuga | 111 | Rumex nepalensis |
| 43 | Croton macrzstachyus | 112 | Salacia sp. |
| 44 | Cucumis sp. | 113 | Sapium ellipticum |
| 45 | Cussonia (Araliaceae) | 114 | Scadoxus puniceus |
| 46 | Cyanotis sp. | 115 | Securidaca longpedanculata |
| 47 | Cypereus spp. | 116 | Seneciosp. |
| 48 | Cyperus rotundus | 117 | Senecio gigas |
| 49 | Cyphostema sp. | 118 | Senna obtusifolia |
| 50 | Dalbergia melanoxylon | 119 | Siphonochilus aethiopicus |
| 51 | Dichrosthchys cinerea | 120 | Sorghum bicolor |
| 52 | Dioscorea bulbifera | 121 | Spermacoce spharostigma |
| 53 | Dioscorea dumetonum | 122 | Sporobolus sp. |
| 54 | Dioscoree praehensilsis | 123 | Sterculia africana |
| 55 | Dioscorea schimperiana | 124 | Sterospermum kunthianum |
| 56 | Disa aconitoides | 125 | Strychnos innocua |
| 57 | Dombeya torrida | 126 | Syzygium guineense |
| 58 | Dorstenia bammiana | 127 | Tacca leontopetaloides |
| 59 | Drimia altisima | 128 | Tamarindus indica |
| 60 | Echinops longifolius | 129 | Terminalia laxiflora |
| 61 | Ensete ventncosum | 130 | Terminalia macroptera |
| 62 | Entada africana | 131 | Tylosema fassogiensis |
| 63 | Eriosema Sp. | 132 | Vangueria apiculata |
| 64 | Etytrina abyssinica | 133 | Vigna membranacea |
| 65 | Eulophia guineensis | 134 | Vitex doniana |
| 66 | Faretia apodanthera | 135 | Ximenia americana |
| 67 | Faurea sp. (Proteaceae) | 136 | Ziziphus abyssinica |
| 68 | Ficus sycomorus | 137 | Ziziphus mauritania |
| 69 | Ficus thonningli | 138 | Zygotritonia praecox |

## Annex 4. Spatial Distribution of Population in the Region

| No. | Zone/woreda | Population | | Area | Population density | |
|---|---|---|---|---|---|---|
| | | 1994 | 2007 | | 1994 | 2007 |
| 1 | Pawe Sp. | 45,167 | 45,552 | 569 | 79 | 80 |
| 2 | Mao komo sp. | 17,724 | 50,061 | 2,245 | 8 | 22 |
| 3 | Metekel Zone | 208,671 | 276,367 | 25,993 | 8 | 11 |
| *3.1* | *Dangur woreda* | *38,722* | *48,537* | *8,590* | 5 | 6 |
| *3.2* | *Guba Woreda* | *10,029* | *14,907* | *3,942* | 3 | 4 |
| *3.3* | *Wonbera* | *52,508* | *60,000* | *7,201* | 7 | 8 |
| *3.4* | *Mandura* | *28,458* | *40,746* | *1,036* | 27 | 39 |
| *3.5* | *Dibate* | *52,362* | *66,654* | *2,277* | 23 | 29 |
| *3.6* | *Bullen* | *26,592* | *45,523* | *2,947* | 9 | 15 |
| 4 | Assosa zone | 244,471 | 310,822 | 12,604 | 19 | 25 |
| *4.1* | *Mengie* | *36,491* | *40,240* | *1,519* | 24 | 26 |
| *4.2* | *Kurmuk* | *13,370* | *16,734* | *1,434* | 9 | 12 |
| *4.3* | *Assosa* | *93,153* | *104,147* | *2,317* | 40 | 45 |
| *4.4* | *Sherkole* | *17,621* | *24,679* | *3,216* | 5 | 8 |
| *4.5* | *Banbasi* | *43,425* | *48,694* | *1,921* | 23 | 25 |
| *4.6* | *Odabuldiglu* | *28,115* | *54,584* | *1,518* | 19 | 36 |
| *4.7* | *Komosha* | *12,296* | *21,744* | *679* | 18 | 32 |
| 5 | Kamashi Zone | 63,967 | 101,543 | 8,970 | 7 | 11 |
| *5.1* | *Yasso wore* | *9,788* | *12,747* | *2,859* | 3 | 4 |
| *5.2* | *Sirba Abay* | *11,615* | *17,996* | *1,314* | 9 | 14 |
| *5.3* | *Kamshi* | *10,499* | *17,883* | *1,598* | 7 | 11 |
| *5.4* | *Agalo meti* | *17,874* | *22,774* | *1,546* | 12 | 15 |
| *5.5* | *Belojegantoy* | *14,191* | *30,143* | *1,653* | 9 | 18 |
| | **Total** | **580,000** | **784,345** | **50,381** | **12** | **16** |

## Annex 5. Brief overview of the Gumuz people

**(Excerpt from the BENISHANGUL GUMUZ NATIONAL REGIONAL STATE Regional Conservation Strategy 1997, Vol: Ch3)**

*In 18th and early 19thcenturies the people of Gumuz lived in the higher altitudes of central and southern Gojjam from where they retreated down to the lowlands due to their exposure to intermittent slave raids and conflicts (James Bruce, Salt and Beke- as quoted in Wendy James, 1986, P.121). The Bruce expedition (1768-1773) observed trading in wildlife and agricultural products including elephants, ivory, rhinoceros horn, gold in small pellets, and very fine cotton.*

*These commodities were exchanged with the Agew for cattle, honey, butter, wheat, hides and wax. (James Bruce- as quoted in Wendy James, 1986, P.119).*

*…….*

*In the early times, the communal ownership of land prevailed, which gradually turned to the clan owner ship of the land, particularly in the south Easter parts of Gumuz occupied areas (Kamashi and Gumuz Villages in Oromiya territory). The same principle is applied in Berta, Mao and Komo areas where land is owned based on kinship and bloodline relation. According to Patrick Wallmark (in M.L Bender, 1981, P.83) in Southeaster parts of Gumuz areas, every family has one river side field, one to three forest fields, and one main field which, may be separated by two to ten km.*

*Among the Gumuz, farmers live inside their clan territory which they consider to be their own land.*

*Inside his own territory a clan member can farm as much land as he can. The size of farms depends on the farmers' initiative and the size of his family. A man may, but is not obliged, to share land with another having less or poorer land, but he will very rarely do so with brothers in the agnostic lineage.*

*Land is not sold under any circumstances either inside or outside the clan of the Gumuz particularly of the Southern back of Abay River. (Patrick Wallmark, 1981, PP. 83-85)*

*As indicated above, shifting cultivation has been practiced also among the Berta for the long span of their history, which partly resulted in the indiscriminate cutting of trees and the setting forest fires.*

*This has diminished the forest density. The Berta cultivates any plot of land not used by others, provided it is within the traditional boundaries of their immediate kin group or village. In addition to reclaiming cultivable land, Berta also burn pasture land periodically in order to*

*eliminate disease and useless weeds. This traditional practice resulted in aridity. (Aleasandro Iriulzi , 1976, P.4).*

*The tradition of small scale gold mining activities in the Region and tribute paying to the central government in gold (kind) has a long recorded history beginning in the Aksumite Empire. As the Region is rich in gold deposits, gold mining is said to have been known in antiquity, and the area appears to have been a regular supplier of gold since Aksumite times ( Sergew Hable Sellassie, 1972, P.233- as quoted in Alessandro triulzi,1976, P.1-2). Gold mining activities in Benishangul-Gumuz area, where women play significant role, were one of the traditional practices linking the subjugated peoples of Berta and Gumuz, with the high land ruling classes which persistently derived gold tributes.*

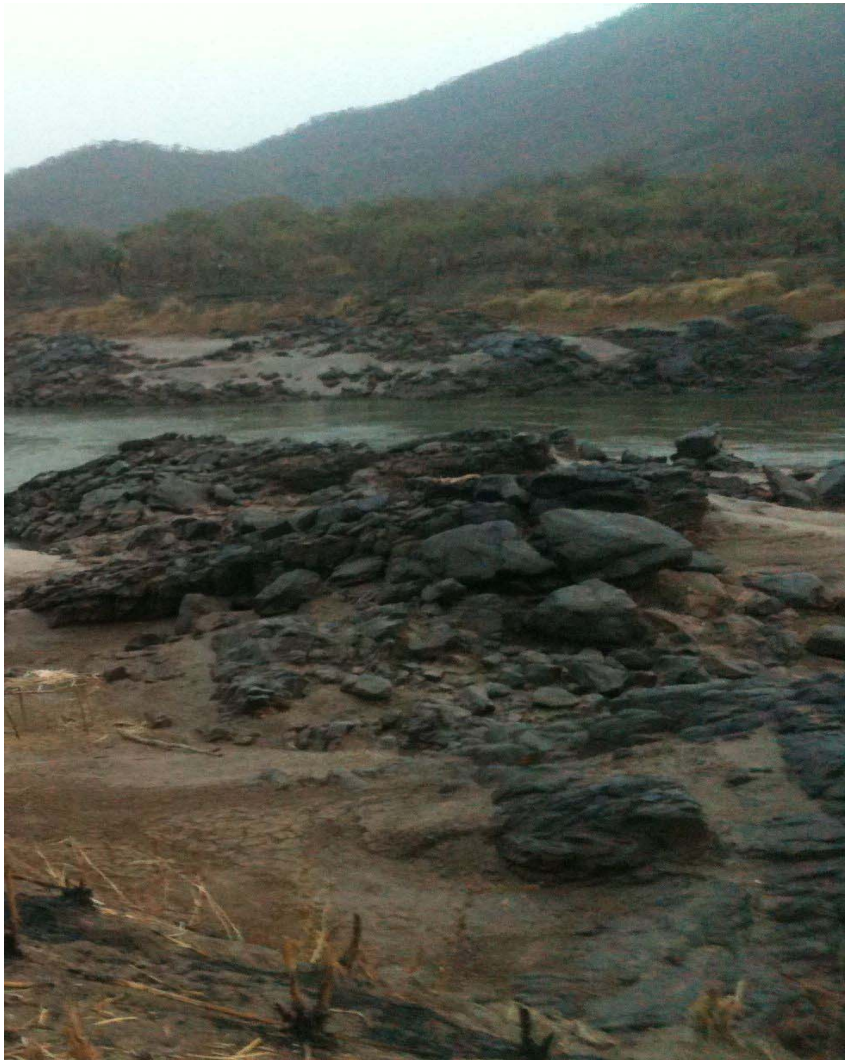
*The aboriginal nationalities were under brutal oppression and exploitation for a long time. They were unable to move further away to freely and effectively act upon their own traditional knowledge of natural resources and environment. The traditional values, beliefs and practices with reference to natural resource utilization and environmental management which emerged from indigenous communities were not encouraged and supported. Rather there was serious negation and abuse towards such traditions, which resulted in a loss of self confidence and sense of ownership on the part of the local people.*

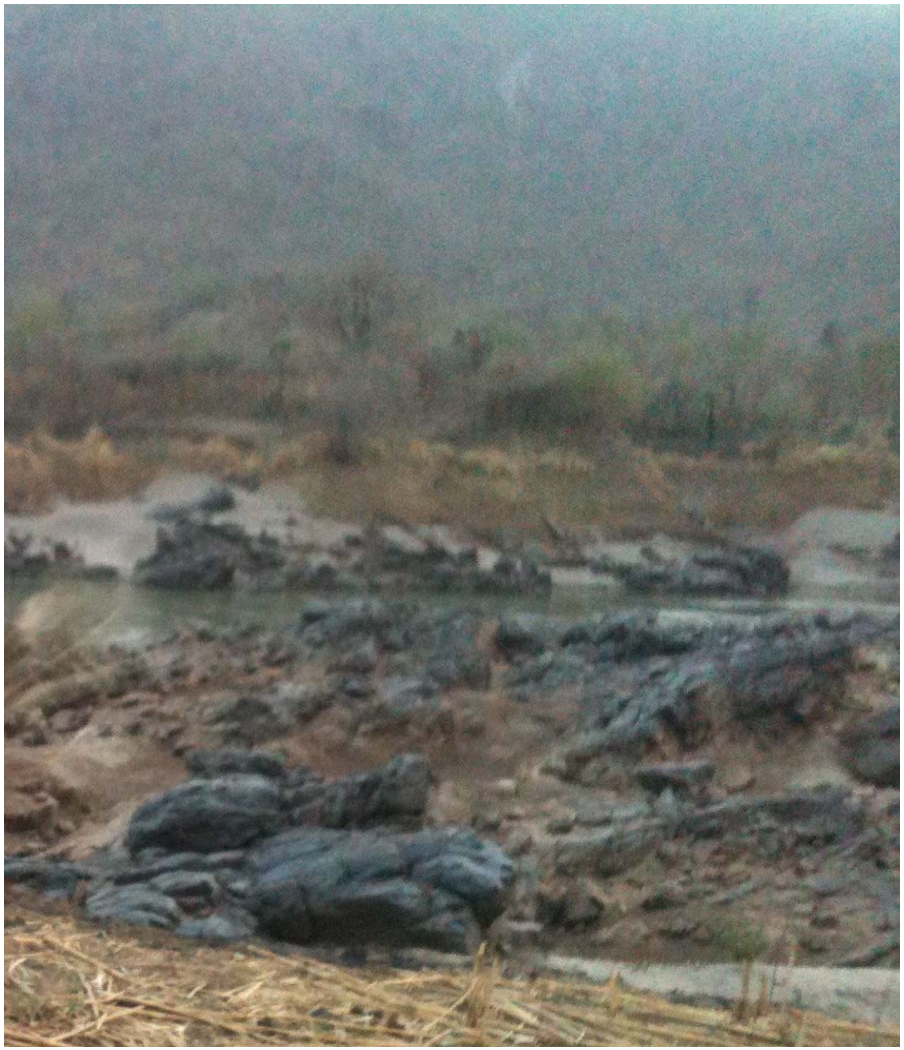
*The recent phenomena of resettlement programs and the immense Influx of people from different parts of the country into the Region has brought various cultures and traditions of national resource utilization and environmental management together. This has created greater pressure on local natural resources and on the environment and has lead to deterioration in natural wealth of the Region.*

## Annex 6. Pictures

*Areas around the dam*

*Dam site as of May 2012*





*Area around the Abay Bridge (which would be inundated)*

*Traditional gold recovering near the Abay Bridge*

*Indigenous people of the project area*

Gumuz women

Berta Women

*Traditional gold recovering*

*Local Women using Hand pump*

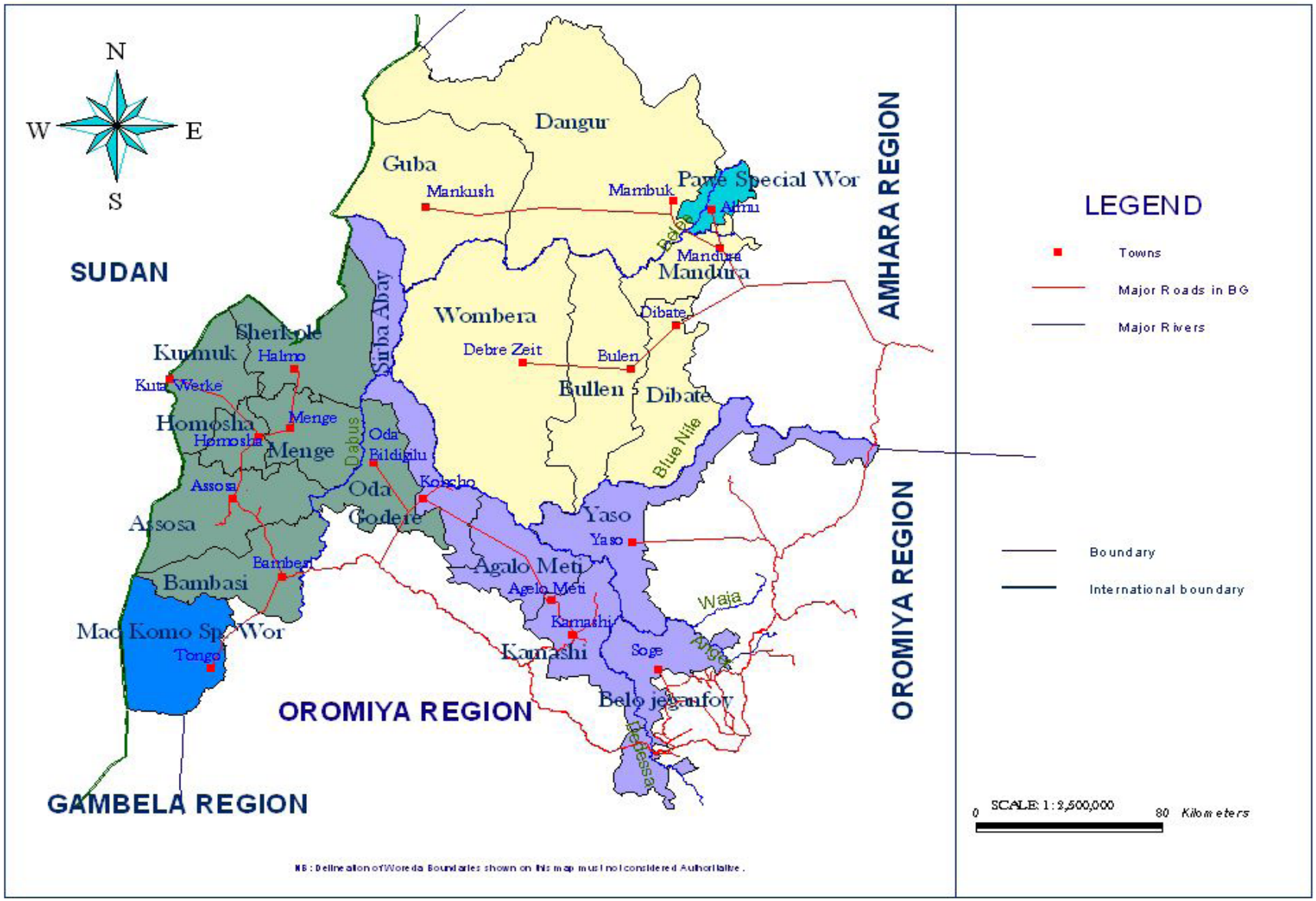



**Figure 3.Benishangul gumuz Region**

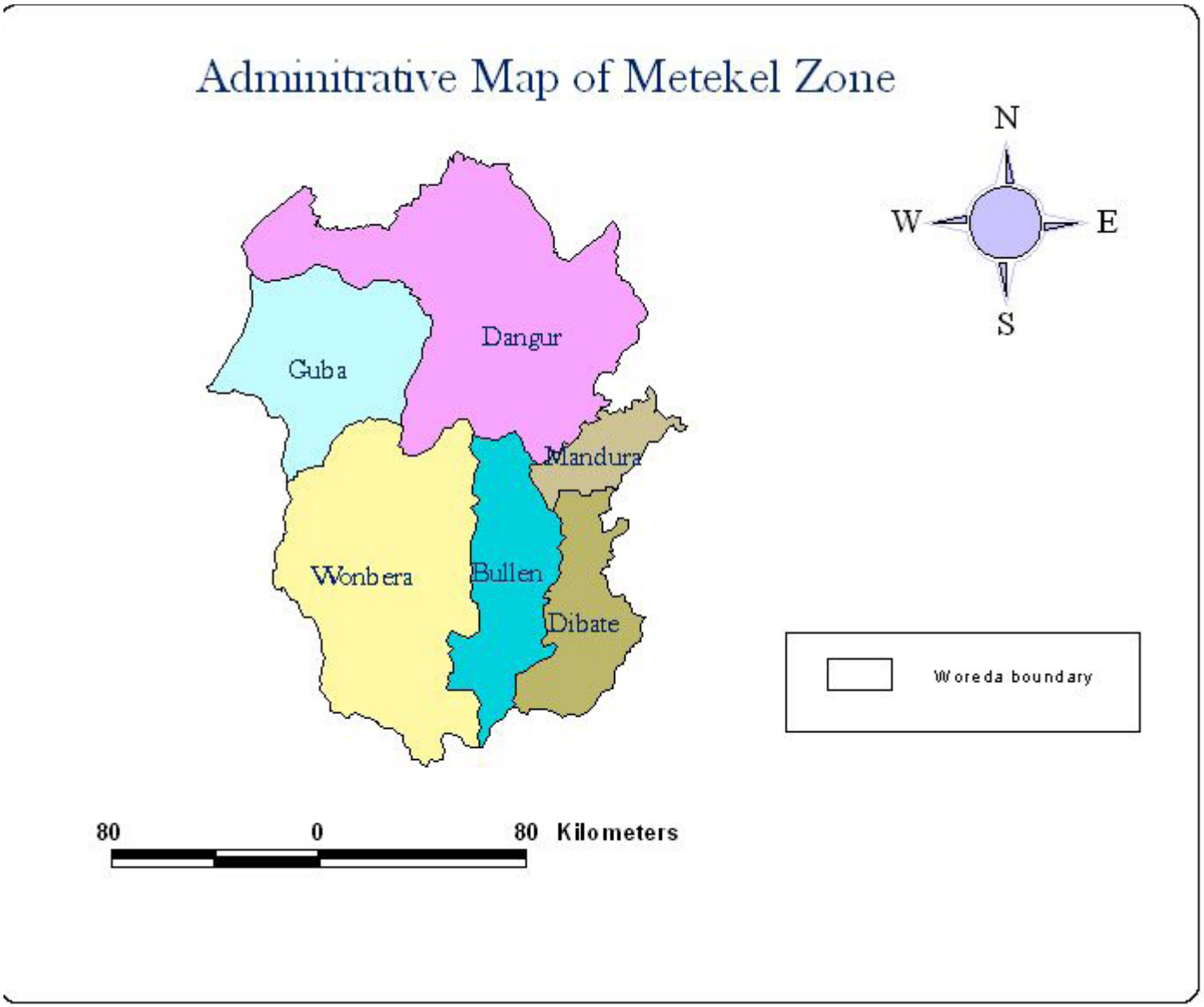



**Figure 4. Map of Metekel Zone**

# References


1. Ahmed, A. A. Assisted by Ismail U.H. (2008), “Sediment in the Nile River System”, UNESCO-IHP-International Sediment Initiative, Khartoum, Sudan, January 2008.
2. Benishangul Gumuz Regional State annual bulletin (2007), Facts about BGRS, Assosa.
3. Benishangul-Gumuz Investment Office, (2002/3). Resource Potential, Project Identification, Profile Preparation, and Industrial Zone.
4. Benishangul-Gumuz Region Bureau of Health (2004). Annual Report, Assossa.
5. Benishangul-Gumuz Region Capacity Building Coordination Office (2004) Three-year Strategic Plan (2003/04-2005/06).
6. Benishangul-Gumuz Region Rural Development Coordination Office (2004) Three-year Strategic Plan (2003/04-2005/06).
7. Carl Bro a/s and Dana Consult Plc, Final Environmental Impact Assessment. Assosa-Guba Road Project. Ethiopian Roads Authority, Addis Ababa, November 2001.
8. ElMonshid, B.E.F., ElAwad, O.M.A. and Ahmed, S.E., (1997), “Environmental effect of the Blue Nile Sediment on reservoirs and Irrigation Canals", Int. 5th Nile 2002 Conf., Addis Ababa, Ethiopia.
9. Federal Democratic Republic of Ethiopia; The Conservation Strategy of Ethiopia: Vol I-V: Secretariat for the Conservation Strategy of Ethiopia, Environmental Protection Authority in collaboration with Ministry of Economic Development and Cooperation, Addis Ababa, April 1996.
10. Hussein, A.S.A. (2006), "Sudanese Experience in Sedimentation Engineering An Overview", Power Point Presentation, International Sediment Initiative Conference, Khartoum, Sudan.
11. Kebede Wolka Wolancho , 2012. Watershed Management: An Option to Sustain Dam and Reservoir Function in Ethiopia. *Journal of Environmental Science and Technology, 5: 262-273.*
12. Norplan, Norconsult & Lahmeyer International, (2005), “Pre-feasibility Study”, Ministry of Water Resources, Addis Abba, Ethiopia.
13. Norplan-Norconsult-Laymeyer (2006) Pre-feasibility Study of the Karadobi Multi Purpose Project", for Ethiopian MWR, May 2006.
14. Solomon Kibret, Matthew McCartney, Jonathan Lautze and Gayathree Jayasinghe . 2009.“Malaria Transmission in the Vicinity of Impounded Water: Evidence from the Koka Reservoir, Ethiopia,” IWMI Research Report #132.
15. Tamrat I. (2010), “Governance of Large Scale Agricultural Investments in Africa: The Case of Ethiopia”, paper presented at the World Bank Conference on Land Policy and Administration, Washington DC.