



NILE BASIN INITIATIVE

Eastern Nile Subsidiary Action Program

EASTERN NILE TECHNICAL REGIONAL OFFICE (ENTRO)

EASTERN NILE MULTI-SECTORAL INVESTMENT OPPORTUNITY ANALYSIS



COUNTRY CONSULTATION REPORT

SEPTEMBER 2014

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1.1 INTRODUCTION

Country consultations were undertaken over the period 26 May to 6 June 2014. Three of the four Eastern Nile Basin countries were visited during the period, namely Ethiopia, South Sudan and The Sudan. The visit to Egypt were postponed due to the political situation in the country immediately post the presidential elections. ENTRO country representatives, Mr. Jackson Elisoma (South Sudan) and Mr. Ammar Abdala (The Sudan) assisted the team in setting up meetings in each of the respective countries. The schedule of the country consultations is presented in **Erreur ! Source du renvoi introuvable.**

Annex 1 contains a list of key stakeholders who were consulted during the country consultations. Annex 2 contains the minutes from the meetings.

The objective of the country consultations (CC) was twofold. Firstly to collect and update data and documents from each of the countries visited. Secondly, through consultation with government departments and universities, identify key priorities for each country regarding water resources planning and investment.

As part of the country consultation process a concept note was sent by ENTRO to the representatives of each ministry and institution to be visited. The aim of the concept note was to inform stakeholders of the objectives of the MSIOA Projects and the key components of the study.

The project team also prepared for the consultations by:

- Identifying and collecting information available at ENTRO. An internet based library housing all the documents was established by the team leader. A link to the library was sent to the team members and ENTRO's staff. The architecture of the document library is illustrated in Annexure 2 in the Inception Report.
- Identifying potential information gaps that needed to be updated, by sector and by country.

The Country Consultation Report provides a summary of the key issues identified during the country consultation based on the meetings held in each country. These issues will be used to inform the identification and assessment of potential investment opportunities in the EN Basin. The issues are listed per country (Ethiopia, South Sudan and The Sudan) and per sector (Environmental, Social, Hydropower and Irrigation).

Table 1: Schedule of the country consultation

| Country | Date | Activity/Description | Responsible Office |
|----------|-------------|--|-----------------------------------|
| ENTRO | Mon May 26 | Team Meeting at ENTRO Office, Addis Ababa; Finalize consultation plans | • MSIOA Team Leader • ENTRO |
| Ethiopia | Tue, May 27 | <ul style="list-style-type: none">• Ministry of Water & Energy• Water Supply & sanitation• Meteorology• Ministry of Electricity and Utility (EEPCO) | Office of ENSAPT Leader, Ethiopia |

| Country | Date | Activity/Description | Responsible Office |
|-------------|-------------|--|-----------------------------------|
| | | <ul style="list-style-type: none"> Environment Agriculture Academia Other relevant sectors, TBD | Office of ENSAPT Leader, Ethiopia |
| Travel | Wed, May 28 | Travel to Juba, RSS | |
| RSS | Thu May 29 | <ul style="list-style-type: none"> Ministry of Electricity, Dams, Irrigation and Water Resources Water Supply & sanitation Meteorology Electricity (Utility) | Office of ENSAPT Leader, RSS |
| | Fri, May 30 | <ul style="list-style-type: none"> Environment Agriculture Academia Other relevant sectors, TBD | Office of ENSAPT Leader, RSS |
| Travel | Sat, May 31 | Travel to Sudan | |
| Sudan | Sun, June 1 | <ul style="list-style-type: none"> Ministry of Water Resources and Electricity Dam Implementation Unit (DIU) Water Supply & sanitation Meteorology Electricity (Transmission company) | Office of ENSAPT Leader, Sudan |
| | Mon, June 2 | <ul style="list-style-type: none"> Environment Agriculture Academia Other relevant sectors, TBD | Office of ENSAPT Leader, Sudan |
| Travel | Tue, June 3 | Travel to Egypt (Postponed) | |
| Addis Ababa | Wed, June 4 | <ul style="list-style-type: none"> Consolidation of data and documents collected Finalizing the inception report structure Adaptation of the work plan with ENTRO | |
| | Thu, June 5 | | |
| ENTRO | Fri, June 6 | | |

1.2 ETHIOPIA

1.2.1 Social Sector

The population of Ethiopia in 2011 was 84.7 million, of which 16.8% were urban. The population is projected to increase to 118.6 million by 2030. In terms of age structure, 46.3% of the population were between the ages of 0-14, 51% between 15-64 (the economically active age group) and only 2.7% were 65 years and older. Ethiopia falls within the Low Human Development grouping of countries and was

ranked 174 out of 187 countries with a HDI of 0.363. Life expectancy at birth was 59.3 years, while mean and expected years of schooling were 1.5 and 8.5 respectively. The infant mortality rate was 75.29 deaths/1,000 live births (2011 est.), while the maternal mortality rate was 470 deaths/100,000 live births (2008). The number of children underweight under the age of 5 years was estimated to be 34.6% in 2005. Access to medical specialists is poor, with 0.022 physicians/1,000 population (2007).

Gross national income (GNI) per capita, (constant 2005 PPP \$) was US\$ 971. The dependency ratio was 79.2%. In terms of poverty, 6.1% of the population was vulnerable to poverty, while 72.3% were in severe poverty. The index mundi data indicates that the literacy rate was 42.7%. The literacy levels for females (35.1%) are however significantly lower than the figure for males (50.3%) (2002 est.). In terms of employment, the agricultural sector, which accounts for 80% of employment, remains a key source of growth. However, the agricultural sector faces a number of major challenges. Rural livelihoods remain extremely vulnerable to meteorological shocks, as food production is mainly rain-fed. In addition, despite improvements, productivity levels remain low and the marketing infrastructure is weak. In addition, the rising cost of key agricultural inputs (*e.g.* chemical fertiliser) and soil erosion due to over-cultivation and limited investment in land improvement pose a major challenge to sustainable agricultural output. There has also been a general decline in per capita food production as high population growth rates have contributed to a decline in farm size. As a result approximately 4.5 million people remain dependent on food relief. Despite these constraints the potential for growth in agriculture in Ethiopia is significant, specifically given that less than 15% of the arable land is cultivated and productivity is amongst the lowest in sub-Saharan Africa. However, weather conditions remain a critical factor. In terms of its natural resource base, Ethiopia's ecological system is fragile and vulnerable to climate change. Key challenges include soil degradation, deforestation and loss of biodiversity, which have been compounded by population pressure on land, especially in the highlands. However, while the government's existing policy and institutional framework for natural-resource management at the federal and regional level has been strengthened, enforcement of the laws remains weak. In this regard weak capacity in environmental management and enforcement remain key challenges (Ethiopia Country Paper, 2012).

Despite Ethiopia's National Gender Action Plan, which provides a framework for mainstreaming gender issues into key development and sector policies, significant gender inequality continues to exist, particularly in terms of enrolment at post-primary and tertiary education, economic empowerment and political representation (Ethiopia Country Paper, 2012).

Key Challenges

- Population growth and pressure on natural systems and services;
- High poverty levels, combined with low education and skills levels;
- Food security and high dependency on rain-fed agriculture;
- Climate change and vulnerability of rural communities, specifically farmers that rely on rain fall to irrigate their crops;
- Fragmentation of land due to population pressure;
- Urbanization and pressure on services in large cities, such as sanitation and water supply;
- Land degradation and soil erosion;
- Limited infrastructure and impact on access to markets for farmers;

- Poor storage facilities for agricultural produce;
- Impact on agriculture on natural ecosystems and environmental goods and services;
- Rapid, poorly planned urbanization;
- Poverty and food security issues
- Limited access to funding and technical support for small-scale farmers;
- Poor access to safe drinking water and sanitation services;
- Limited employment opportunities outside of the agricultural sector.

Opportunities

- High hydro-power potential, specifically in the Blue Nile;
- Tourism development linked to cultural and natural environment (diverse ecosystems, rich biodiversity and wildlife);
- Good rainfall and high potential agricultural land in the highlands;
- Available and sufficient water resources to meet current and future needs (if well managed);
- Growing and diversifying economy.

1.2.2 Irrigation sector

Though Ethiopia has huge potential land suitable for irrigation (more than 4 million hectare), irrigation development in the country is at its early stage and its contribution to the national economy is insignificant. In the Eastern Nile Basin part of Ethiopia, the estimated potential land for irrigation is 1.5 million ha distributed in the three sub basins: Baro Akobo, Abbay Blue Nile and Tekeze (ENIDS – CRA study, 2010). The estimated area so far developed for irrigation is 120,000 ha. Of this amount, the existing modern large scale irrigation schemes covers only an area of 17,000 ha (10, 000 ha Fincha Sugar scheme and 7,000 ha Koga small holders irrigation scheme), whereas the remaining balance (a little over 100,000 ha) are small scale irrigation schemes, 80% of which are traditional. By proclamation, the Ministry of Water, Irrigation and Energy is responsible for the study, design and implementation of medium and large scale irrigation schemes (with sizes greater than 200 ha) whereas, the Ministry of Agriculture and the respective Regional Bureaus are responsible for the development of small scale irrigation schemes (sizes less than 200 ha). During the country consultation, relevant officials and experts at the two Ministries have been consulted to discuss issues and priorities regarding small and large scale irrigation schemes in the country, summary of which are presented as follows;

Key Issues

- Appreciating the importance of irrigation development for food security, poverty alleviation and socioeconomic development at house hold level and its contribution to the economy at national level, the government is highly committed to develop all its potential irrigable lands in the EN Sub-Basin and elsewhere in the country,
- To this regard, the Ministry of Water, Irrigation and Energy has identified and prepared a list of potential medium and large scale irrigation schemes in the whole country, which have a total area of 5 million hectares. Of this, over 1 million ha is located in the three sub basins (Abay, Tekeze and Baro Akobo) of the EN Basin,

- Of the 100,000 ha regionally identified and country implemented fast track irrigation projects (as per the 2004, ENCOM decision):
 - The 20,000 ha irrigation schemes (Megech-Seraba and Rib) are currently under implementation with World Bank financing,
 - Feasibility Studies on the remaining 80,000 ha (Upper Beles, Negesso, Anger and Robit Irrigation schemes) have been completed with World Bank financing,
- In addition, Feasibility study and Detail design have been completed on Gumara, Gilgel Abay, Jema, Birr and Megech irrigation schemes, which have a total area of 53,000 hectares,
- Feasibility studies on 95, 000 hectares of irrigation schemes (Arjo and Dabus) are currently ongoing using own resources,
- There is a further plan to undertake Feasibility studies on Lower Beles, Lower Ayima, Rahad and Gelegue irrigation schemes, which have a total area of 145,000 hectares,
- Priority schemes for implementation are the remaining 80,000 ha fast track projects and those schemes with completed or ongoing feasibility studies,
- On the other hand, the Ministry of Agriculture and the respective Water and Agricultural Bureaus of Amhara, Tigray, Oromiya, Benishangul and Gambela Regions have also plan to develop new small scale irrigation schemes (using small streams, shallow ground wells and water harvesting techniques); and rehabilitate/improve the performance of the existing small and traditional schemes. Exact sizes of planned areas are not presently available.
- Institutional capacity building is also a priority to enhance the study, design, implementation and O&M capability of the two Federal Ministries and the respective Regional Bureaus.

Opportunities

- The country has huge and untapped land and water resources potential and favorable climate for the development of both large and small irrigation schemes,
- Conducive policies and regulations are already in place and there is strong commitment and political will by the government to enhance irrigation development,
- Good local and international marketing opportunity for irrigated crops ,
- Irrigation is getting emphasis in research and higher learning institutions,
- Availability of research outputs and irrigation technologies, even though limited.

Challenges

- Lack of finance for study, design and implementation of irrigation schemes,
- Lack of capacity to undertake and/or supervise the study, design and implementation of irrigation schemes,
- Lack of access and basic infrastructure (potential irrigation schemes are usually located in remote areas with poor access and basic infrastructure)
- Poor performance of existing small scale/traditional irrigation schemes, associated with:
 - Poor design and construction,
 - Poor operation and maintenance,
 - Outdated irrigation and farming technology,
 - Weak research and extension services,
 - Lack of credit facilities,
 - Lack of agricultural inputs (fertilizers, improved seed, chemicals, etc),
 - Poor market structure and information,

1.2.3 Hydropower sector

Key Issues

Ethiopia is endowed with huge untapped hydropower resources of more than 40 GW despite this fact it is considered one of the lowest levels of energy consumption per capita and percentage of population access to electricity in the world.

Recently many projects were implemented or under implementation, also studies have been conducted targeting a strong, dependable and reliable electricity system in the country. These studies include the present system, its expansion plans and the electrical interconnection with neighbouring countries. Following are examples of these studies:

- NBI- ENTRO Eastern Nile Power Trade Program Study -2008
- NBI- Comprehensive Basin Wide Study – 2010
- EAPP- Master Plan and Grid Code- 2011

Moreover currently the following other studies are undergoing:

- EAPP- Update for Master Plan and Grid Code
- EEPCCO- Ethiopian Power System Master Plan for the period 2012-2019

Power Generation

| Within the Eastern Nile Basin | | Out of the Eastern Nile Basin | |
|--------------------------------------|----------------------|--------------------------------------|----------------------|
| Project's Name | Capacity (MW) | Project's Name | Capacity (MW) |
| Hydro Power Plants | | | |
| Existing | | | |
| Tis Abay I | 11 | Melka Wakena | 115 |
| Tis Abay II | 73 | Melka Wakena | 38 |
| Finchaa | 134 | Koka | 43 |
| Tana Beles | 460 | Awash II | 32 |
| Tekeze | 300 | Awash III | 32 |
| Amorti Neshe | 98 | Sor I | 5 |
| | | Gilgel Gibe I | 184 |
| | | Gilgel Gibe II | 420 |
| Under Construction | | | |
| Grand Renaissance | 6000 | Gilgel Gibe III | 1870 |
| | | Genale Dawa III | 254 |
| Planned till 2020 | | | |
| Aleltu East | 189 | Wabi Shebele | 87.8 |
| Aleltu West | 264.6 | Halele Warabessa | 96 |
| Yeda1 | 118 | Gojeb | 150 |
| Yeda 2 | 162 | Gibe IV | 1472 |
| Karadobi | 1600 | Gibe V | 660 |
| Beko Abo | 935 | Geba 2 | 157 |
| Lower Didessa | 550 | Genale 5 | 100 |
| Upper Mandaya | 1700 | Genale 6 | 246 |
| Lower Dabus | 250 | Genji | 216 |

| | | | |
|-----------------------------|-------|---------------------------|-----|
| Upper Dabus | 326 | Abu Samuel | 6 |
| Tekeze 2 | 450 | | |
| Tams | 1000 | | |
| Sor 2 | 5 | | |
| Baro I | 166 | | |
| Baro II | 479 | | |
| Geba1 | 214.5 | | |
| Birbir | 497 | | |
| Wind Power | | | |
| | | Under Construction | |
| | | Adama I | 51 |
| | | Ashegoda I | 30 |
| | | Ashegoda II | 30 |
| | | Planned | |
| | | Adama II | 153 |
| Thermal Diesel Units | | | |
| | | Existing | |
| | | Dire Dawa | 40 |
| | | Awash | 35 |
| | | Kality | 12 |
| Geothermal | | | |
| | | Existing | |
| | | Aluto Langano | 7 |
| | | Planned | |
| | | Aluto Langano | 75 |

Transmission

Existing National Transmission system

The Interconnected System (ICS) links the major generation to load centers via transmission lines at 400 kV, 230 kV and 132 kV and sub-transmission lines at 66 kV and 45 kV. The system frequency is 50 Hz.

Planned National transmission projects

Major expansion of the 400 kV network is underway to facilitate evacuation of power from Gilgel Gibe II & III power plants. Grand Renaissance HEP will include a 500/400 kV substation and will be connected to Addis Ababa at 500 kV and to Beles at 400 kV. A partial 400 kV ring will be formed around Addis Ababa. From the other hand the electricity utility plans to phase out 45 kV in favor of 66 kV and also to replace some 66 kV lines with 132 kV.

Regional Electricity Interconnection

| Within the Eastern Nile Basin | | Out of the Eastern Nile Basin | |
|---|----------------------|---|----------------------|
| Project's Name | Capacity (MW) | Project's Name | Capacity (MW) |
| Existing | | | |
| Ethiopia / Sudan 230 kV | 200 | Ethiopia / Djibouti 230 kV | 180 |
| Planned | | | |
| Ethiopia / Sudan / Egypt 500 kV AC & 600 kV DC | 3200 | 2 nd Ethiopia / Djibouti 230 kV | |

| | | | |
|---------------------------------|------|--|--|
| Ethiopia / Kenya 500 kV HVDC | 2000 | | |
|---------------------------------|------|--|--|

Challenges

The above mentioned previous studies have been conducted based on certain assumptions, some of which have been changed e.g introducing new hydropower projects and regional interconnection, this situation necessitates the need to update the above mentioned data.

1.2.4 Environmental sector

Key issues

As one of the least developing countries, the Economy of Ethiopia is principally based on the natural resources (land, forests and water). Most of the environmental problems are due to the uncontrolled exploitation of these natural resources. Deforestation, land degradation, desertification and pollution are the main environmental concerns that being continuously addressed by the relevant environmental authorities.

Migration from rural to urban areas creates continuous pressure on resources and the services found within the cities which might lead to pollution and health hazards. Agriculture is the backbone of the economy, 70% of the land in Ethiopia is prone of degradation; expansion of the agricultural activities on the account of forest areas has led to sever land degradation and erosion. Utilization of forests as source of fuel is also contributing to the rapid degradation.

The Federal Ministry of Environment & Forestry is the concerned government body to oversee environmental issue in the country; however each of the Ethiopian nine states has its own environmental bureaus.

Ethiopia constitution has given due consideration to the environmental issues through articles 4.3, 4.4, 9.2. There are many policies, proclamations and regulations in place to form the national legal framework for the environmental issues in Ethiopia. At the national level, Ethiopia has officially pursued a visionary document "Climate Resilience Green Economy (CRGE)" to guide/lead the country to middle income status by 2025. CRGE Facility has also been established to implement and finance all the activities related to this strategy

Opportunities

- Integrated approach to study and handle water shed issues
- Diverse ecosystems, rich biodiversity and wildlife
- Potential funding opportunities within the regional and international funding agencies (AFDB, WB , USAID, JICA, GIZ, etc.)
- Great Hydropower potential provide a chance for clean energy production and sustainable development as well as regional cooperation
- Promising development in the tourism sector which will enhance the associated environmental ecosystems.
- Available and sufficient water resource for potable water supply.
- Well formulated environmental policies and strategies for green and sustainable economy
- Well trained environmental personnel who participate in the monitoring, control and licensing activities.

Challenges

- Land degradation and soil erosion
- Intensive farming causing major threats to forestry areas and natural ecosystems
- Urban and industrial effluents / Pollutions
- Poverty and food security issues
- Lack of political support when it comes to environmental issues.
- Inadequate environmental education and awareness among politicians , executives, community leaders and local people
- Poor access to safe drinking water and sanitation services causing major threats to the natural and human environments
- Farmers and pastoral communities are vulnerable to climate change impacts

1.3 SOUTH SUDAN

1.3.1 Social sector

The Republic of South Sudan gained independence on July 9, 2011. The present population of South Sudan is estimated to be in the region of 9-10 million. The population of Juba is in the region of 1 million, while the majority of the population is rural, ~ 83%. Initial studies indicate that only 27 % of the population have access to improved water supply, while on 15 % have access to improved. Subsistence rain-fed agriculture and the raising of livestock, mainly cattle, are the principal livelihood systems for more than 95 % of the population. The livelihood systems are heavily dependent on timely and ample rainfall and access to water in the dry season. Poverty and vulnerability are widespread, with the poverty rate estimated to be ~ 51 % (Nihal Fernando and Walter Garvey, World Bank, 2013).

The potential for agriculture is large, with an estimated 70 % of the total land area— 647 000 km²—considered suitable for agriculture (World Bank 2011). Subsistence agriculture under rain-fed conditions presently covers an estimated 2.6 million hectare (ha) (approximately 6.19 million feddans), which constitutes on 5.7 % of the land that is suitable for agriculture. Irrigated agriculture is insignificant and is limited to ~ 2 000 ha located in the Renk scheme in Upper Nile State. Three other public irrigation schemes exist, namely the Mangalla (Central Equatoria) and Penykou (Jonglei) schemes, which are derelict, and the partly rehabilitated Aweil scheme (Northern Bahr el Ghazal), which is largely dysfunctional. Securing water for the roughly estimated 10 million head of livestock, mainly cattle, in the dry season and in areas where rainfall is marginal is a major problem and a source of serious social conflict. Fishing is a primary source of livelihood for about 12-15 % of the population, and water resources development for livestock and fisheries offers a significant economic potential to support food security and poverty alleviation in the new country (Nihal Fernando and Walter Garvey, World Bank, 2013).

Despite the richness of South Sudan's natural resources, many South Sudanese continue to depend on external food assistance. Enhancing food security, increasing financial returns to the farmer and the economy from agriculture, and improving livelihoods of the people, including returning and conflict-affected people, are urgent priorities, and development opportunities in the water sector can play a vital role in reaching these goals (Nihal Fernando and Walter Garvey, World Bank, 2013).

Key Issues

- Internal conflict and political instability;
- Low education and skills levels;

- Lack of resources and skills;
- Poor infrastructure;
- Lack of reliable baseline socio-economic data;
- Sanitation and access to potable water, especially in large cities;
- Urbanization and pressure on services in large cities, such as sanitation and water supply;
- Limited infrastructure and impact on access to markets for farmers;
- Loss of biodiversity and pressure on natural systems and services;
- Poverty and food security;
- Conflicts between pastoralists and farmers, specifically farmers involved in rain-fed mechanized irrigation;
- Climate change and vulnerability of rural communities, specifically pastoralists and farmers that rely on rain fall to irrigate their crops;
- Poor storage facilities for agricultural produce.

Opportunities

- Oil in northern South Sudan;
- Large, un-tapped agricultural potential;
- Relatively undisturbed natural ecosystems;
- Tourism potential linked to diverse ecosystems, rich biodiversity and wildlife
- Potential funding opportunities from international funding agencies (WB, IMF and AFDB etc.)
- Hydropower potential along the Nile and other rivers in South Sudan.

1.3.2 Irrigation sector

Though proper study and inventory have not been yet conducted, South Sudan has substantial water resources (River Nile and its tributaries, wet lands and reach aquifers) and suitable land for irrigation development. However, irrigation development and its contribution to the country's economy so far is insignificant. The only existing irrigation schemes include Aweil scheme, in Bahir El Ghazel Sub basin and Renk and Melut irrigation schemes located in the EN Sub Basin. There are 23 pumped small irrigation schemes with a total area of 35,000 ha at Renk. Most of the schemes have been abandoned due to the civil war and the few schemes which are currently operating by contract farmers; have poor overall performance. All the existing schemes require heavy rehabilitation works to bring them to the required level of operation and production. The Ministry of Electricity, Dams, Irrigation & Water Resources has conducted feasibility study and detail design on two schemes to start the rehabilitation works.

In order to formalize the irrigation sector, currently the Ministry is also preparing Irrigation and Drainage Master Plan with the assistance of JICA. The Master Plan is planned for completion by the end of June, 2015, and among others, is expected to identify and properly inventory the potential areas for small and large scale irrigation development and develop a strategic framework for irrigated agriculture in the country. In addition, the Baro Akobo-Sobat Integrated Water Resources Management and Development Study, recently launched by ENTRO, is also expected to identify potential irrigable areas in the sub basin.

Key Issues

- As indicated in the country's water resources policy, expanding irrigated agriculture in general is a national priority for enhancing food security, alleviation

of poverty and improve the living standard of the population and reduce the country's dependence and vulnerability to rain fed agriculture.

- However, the exact size, location and priorities for development of specific irrigation schemes are not yet known. The ongoing Irrigation and Drainage Master Plan and the Baro Akobo-Sobat Integrated Water Resources Management and Development Studies are expected to identify the location and size of potential irrigable areas
- Rehabilitation and modernization of the existing irrigation schemes is also among the priorities to enhance production and achieve the expected benefits from the schemes,
- Due emphasis is also given to the development of water harvesting schemes for community and livestock uses, spate irrigation, reducing conflicts among communities, and environmental protection purposes,
- Capacity building is also among the priorities to enhance irrigation development in the country.

Opportunities

- There is strong commitment and political will by the government to enhance irrigation development,
- High Potential for the development of large scale, Smallholder Irrigation and water harvesting schemes,
- Regional integration offers huge domestic and regional markets for agricultural commodities. Huge opportunities exist in the COMESA and IGAD regions.

Challenges

- Lack of coherent policy framework to guide water sector development. Various reforms and regulations are still under preparation,
- Inadequate sector institutional arrangements: There is a need to review and clarify the functions of water sector institutions, and the roles and responsibilities of sector organizations in relation to policy objectives,
- Underdevelopment of available water resources compared with neighboring countries: Absence of studies and master plans for sustainable development and use of water resources. Providing services to remote and dispersed rural populations is especially difficult.
- Limited participation by water users in sectoral development processes (planning, management and financing of water resources management and development),
- Sustainability of water infrastructure: Most of the existing irrigation schemes are no longer functional and systems of operation and maintenance are extremely weak or absent,
- Water use conflicts: There is a need to strengthen mechanisms for solving disputes over access to water which is often a source of conflict, especially at local level,
- Limited human resources and weak organizational capacity for planning, study, design, implementation and OMM of water resources projects,
- Lack of a clear financing strategy: It is necessary to attract investment required for effective development and management of water resources projects,
- Inadequate provision of agricultural services (research and extension, input supply, credit facilities),

1.3.3 Hydropower sector

Key Issues

The Republic of South Sudan has large Hydropower potential located on Bahr El Jabal River shares with the Republic of Uganda, in addition to small hydropower resources distributed all over the country states. Despite of the existence of these resources the country lacks the infrastructure and electrification is limited to major cities through Diesel generating units as follows:

Power Generation

| Within the Eastern Nile Basin | | Out of the Eastern Nile Basin | |
|--------------------------------------|----------------------|--------------------------------------|----------------------|
| Project's Name | Capacity (MW) | Project's Name | Capacity (MW) |
| Hydro Power Plants | | | |
| Planned | | | |
| Grand Foula | 900 to 1000 | Yel | 3 |
| Bedden | 540 | Wau | 12 |
| Shokuli | 400 | | |
| Lakki | 210 | | |
| Juba Barrage | 10 | | |
| Kenyeti I, II, III, IV | 3.5 | | |
| Kaia Barage | 13.5 | | |
| Thermal Diesel Units | | | |
| Juba | 12 | Wau | 4 |
| Malakal | 8 | Yambio | 3 |
| Rumbek | 3 | Bor | 3 |

Source of data: Feasibility Study for the hydropower in Bahr El Jabal conducted by SMEC International Consultant in 2010 & from .internet

In addition to the above South Sudan imports about 12 MW from Sudan through 33 kV Transmission system connecting Rossieres Hydropower Plant to Renk City the Capital of the Upper Nile State in South Sudan.

Opportunities

Previous studies have been made to assess the potential of the hydropower sources in South Sudan e.g:

- Feasibility Study for the hydropower in Bahr El Jabal – by SMEC International Consultant in 2010.
- NBI- Preliminary Basin Wide Study, 2008.

And the undergoing study:

- FS for Wau hydropower Project- by the consultant EPS from Egypt

Challenges

The Eastern Nile Power Trade Program Study- Phase I conducted by ENTRO in 2007 considered Sudan as one country, most of the planned future projects were sited in the north part of the country in addition the recommended regional electrical interconnection and power trade project passed through the northern part of the country. With the new situation and with the existence of South Sudan in addition to Sudan there is a need to update the data and identify the future expansion plans based on new updated geographical situation.

1.3.4 Environmental sector

Key issues

Sudd marches (Jungli wetlands) is one of the key environmental hot spots in South Sudan. The marches require careful management to maintain its natural ecosystem and the associated communities livelihood; Sudd wetlands in South Sudan provide key ecological goods and services. The Ministry of Environment (MoE) is presently trying to develop a strategic management plan for Sudd area for better management and control. Having considered its environmental and socioeconomic importance, MoE opposes any kind of development plans (draining, canalization, etc) to be conducted in the Sudd wetlands. Wetlands in South Sudan, specifically the Sudd marshes, play a key role in the ecology and hydrology of the Nile Basin region. The produced wastewater from the oilfields is affecting parts of Sudd wetlands, yet there are ongoing efforts by the oil companies to control the problem. Solid and liquid waste management is very poor in South Sudan; MoE is currently working on projects to restore the natural environment situation. South Sudan is known of its diverse wildlife and ecosystem. Six national parks have been gazetted and monitored by the wildlife authority. South Sudan has one of the biggest herds of antelope in the world. Endangered and rare species like hippos and elephants are found within Nimule National Park at the borders with Uganda

Concerning the institutional setup, MoE has only been established three years back - after the separation from Sudan - and it is not yet fully taking off due to lack of resources; many administrative and financial challenges are faced by MoE affecting noticeably its roles and responsibilities. MoE is mainly working on; environmental management, pollution & Control, environmental education, biodiversity & wetlands, climate change and sustainable development planning. Since its formation in July 2011, South Sudan has ratified number of international environmental treaties; Biodiversity, RAMSAR, IPCC, etc. The environmental Policy draft is under review by the cabinet.

Many international and regional NGOs are working in collaboration with the MoE i.e. UNEP is funding the Environmental Information Centre Project that will avail all relevant environmental databases in one center, IGAD is also supporting the Drought Resilience project. JICA has funded the rehabilitation of Juba Landfill. MoE has proposed the environmental management plan for Sudd Marches as one of the strategic projects to be considered by EN-MSIOA.

Opportunities

- Country major infrastructures have not been established yet, and there are great chances to develop it in a sustainable way.
- Diverse ecosystems, rich biodiversity and wildlife
- Potential funding opportunities within the regional and international funding agencies (AFDB, WB, USAID, JICA, GIZ, etc.)
- International community support to the newly born country.
- Great Hydropower potential along the Nile (Baher-Eljabel river) and the other seasonal rivers (i.e. Sue, Kinnatei) provide a chance for clean energy production and sustainable development
- Promising development in the tourism sector which will enhance the associated environmental ecosystems.
- Available and sufficient different water resource for potable water supply.

Challenges

- Ongoing conflicts and political unrest is contributing to the deterioration of natural ecosystems and wildlife.
- Lack of information , researches and studies due to the civil war between south and north Sudan that lasted for more than thirty years
- Lack of studies on environmental hot spots and i.e. wetlands, national parks, forests, etc.
- Insufficient financial and human resources allocated for the environmental institutions and policy formulation
- Lack of political support when it comes to environmental issues.
- Inadequate environmental education and awareness among politicians , executives, community leaders and local people
- Poor access to safe drinking water and sanitation services causing major threats to the natural and human environments
- Produced wastewater from oilfields is one of the major challenges
- Farmers and pastoral communities are vulnerable to climate change impacts

1.4 SUDAN

1.4.1 Social sector

The population of Sudan after partition in 2011 was 34 million, of which 47% were urban. The population is projected to increase to 66.9 million by 2030 (UNDP Human Development Report, 2011). Khartoum, the capital, with a population of 5.021 million (2009 est) is the largest city in Sudan (North and South). The rate of urbanisation is estimated to be 3.7% annual rate of change (2010-15 est.). In terms of age structure, 42.1% of the population are between the age of 0-14, 55.2% fall with the economically active defined range of 15-64, and 2.7% are 65 years and older. The median age is 18.5 years. The median age for males and females are similar to each other and the total figure, namely 18.1 and 18.9 years respectively (2011 est.).

Sudan falls within the Low Human Development grouping of countries and is ranked 169 out of 187 countries in 2011 with a HDI of 0.408. The indexmundi data indicates that the literacy rate is 61.1%. For males the literacy rate is 71.8% while for females the literacy rate is considerably lower, namely 50.5% (2003 est.). Life expectancy at birth is 61.5 years, while mean and expected years of schooling are 3.1 and 4.4 respectively. The infant mortality rate is 55.63 deaths/1,000 live births, while the maternal mortality rate was 750 deaths/100,000 live births (2008). The number of children under the age of 5 years underweight is 31.78% (2008). Access to medical services is poor, with 0.28 physicians/1,000 population (2009).

The dependency ratio is 76.7%. There is no information on the Sudan with regards to the percentage of the population that is vulnerable to poverty and or in severe poverty. However, since succession of the south there has been a slowdown in economic growth which is attributable to the loss of population (20%) and oil revenues (75%). Due to the loss of oil revenues, the revival of the agricultural sector is critical for overall economic growth and poverty reduction in Northern Sudan, particularly in rural areas. The contribution of agriculture to Sudan's GDP increased from 31.2% in 2010 to 34.1% in 2011 and is expected to rise further to 39.4% in 2012. Agriculture is also the key sector in terms of employment, with 45% of youth

and 42% of adults directly employed in the sector. Sudan also faces critical environmental challenges, including severe land degradation, deforestation, desertification and other impacts of climate change that threaten the prospects of lasting peace and sustainable development. The country paper notes that poverty remains the main cause of the extensive use of marginal land, water and forest resources, further burdening the already fragile and limited environment base. According to the CBS 2009 baseline household survey, 46.5% of Sudanese are considered poor. Poverty reduction in Sudan will therefore continue to remain a serious challenge. Gender inequality is also striking in Sudan in the sense that women are not equal to men in terms of education, literacy, and quality of life approximately 50% of women are illiterate; the gender inequality index in Sudan is 0.708; and, the maternal mortality ratio is 750 women per 100 000 female live births. Many social factors constrain women's labour force participation and employment in Sudan. Generally, women tend to be full time homemakers, and traditions and culture limit their mobility (Sudan Country Report, 2012).

Challenges

- On-going economic sanctions against Sudan and impact on access to funding and development;
- Population growth and pressure on natural systems and services;
- High poverty levels, combined with low education and skills levels;
- Food security and large area under rain-fed agriculture;
- Climate change and vulnerability of rural communities, specifically farmers that rely on rain fall to irrigate their crops, and pastoralists;
- Fragmentation of land due to population pressure;
- Rapid urbanization and pressure on services in large cities, such as sanitation and water supply;
- Access to funding and loans for small-scale farmers;
- Limited infrastructure and impact on access to markets for farmers;
- Poor storage facilities for agricultural produce;
- Land degradation and soil erosion;
- Impact on agriculture on natural ecosystems and environmental goods and services;
- Rapid, poorly planned urbanization;
- Poverty and food security issues;
- Limited access to funding and technical support for small-scale farmers;
- Poor access to safe drinking water and sanitation services;
- Limited employment opportunities outside of the agricultural sector;
- Competition for resources and conflicts between pastoralists and farmers.

Opportunities

- Improve efficiency and productivity of existing irrigation schemes;
- Large potential to expand irrigated and rain-fed mechanised irrigated land;
- Hydropower potential linked to existing and future schemes;
- Catchment management and water harvesting programs involving other EN countries;
- Potential funding opportunities within the regional and international funding agencies (World Bank, IMF, AFDB etc.);

1.4.2 Irrigation sector

Next to Egypt, Sudan has the second largest irrigated area (1.9 million hectare) in the EN Sub basin. If water is not a limiting factor, it has also huge potential for expansion of irrigated agriculture. Most of the existing public large scale irrigation schemes were established in the 60s and 70s, following the establishment of the Gezira scheme in 1920s. All the schemes involve pumping from the water source except the three largest schemes. The Gezira scheme is gravity-fed while in Rahad I and New Halfa schemes pumping is supplemented by gravity water supply.

According to the ENTRO's -Eastern Nile Irrigation and Drainage - CRA study, the average cropping intensity on the existing irrigation schemes does not exceed 60 %. This is mainly attributed to the reduced storage capacities of the existing dams due to siltation. Main crops grown in the public schemes are sorghum, cotton, wheat, groundnut and vegetables. There are also recently developed commercial private irrigated farms covering an area of up to 200, 000 ha, that grow sugar cane, wheat, sunflower, vegetables and fruit crops. Many studies conducted in the past indicate that the performance of the existing public large scale irrigation schemes is below the expectation. The main reasons, among others, include the use of outdated irrigation and agricultural technologies, siltation in reservoirs and canal systems, lack of finance for providing credit facilities and farm inputs to farmers and little involvement of the end users in the OMM of the irrigation schemes.

Key Issues

- The Government gives high priority for irrigation expansions (development of new modern irrigation schemes) in order to meet food demands of the growing population and boost the contribution of the irrigation sector to the national economy,
- Priority schemes for expansion are Upper Atbara Dam and irrigation project (117,600 ha) on Atbara tributary; Rahad phase II project (210,000 ha) and Great Kenana project (420,000 ha) on the Blue Nile; So far:
 - Construction work for heightening Roseires Dam by 10 m has been completed,
 - Construction of Upper Atbara Dam is at its final stage of completion,
 - Following the completion of the feasibility studies, detail design of the irrigation projects is currently under preparation, using own resources,
- Improving the performances of the existing irrigation schemes, through Rehabilitation and modernization is also among the country's priority. To this regard, many studies have been conducted in the past. To implement the various action plans and recommendations made by the studies has been a challenge to date,
- Strong emphasis to the importance of establishing transe boundary projects for mutual socio economic benefit of the riparian countries, protection of the environment, boosting regional agricultural trade, and enhancing the cooperation and regional integration has been given. The suggested projects include:
 - Integrated water resources development and management project on Rahad and Dinder tributaries,
 - Ditto on Tekeze (Setit) and Atbara tributaries,
 - Water harvesting projects at the borders between Sudan and South Sudan, Ethiopia and Sudan,
 - Improvement the road networks to enhance regional agricultural trade.

- The idea of establishing a joint irrigation project by all the four EN countries has also been suggested as one means for enhancing the cooperation and regional integration,
- The need for Intensive capacity building of institutions and personnel engaged in the irrigation sector has been stressed.

Opportunities

- Strong commitment and political will of the government to develop new expansion irrigation projects and improve the performance of the existing irrigation schemes,
- Availability of huge potential for new expansions and improvement of the performance of the existing irrigation schemes,
- Improved storage capacity due to the heightening of the Roseries Dam and the construction of Upper Atbara Dam in Sudan and the ongoing GERD in Ethiopia,
- Existence of conducive policies and country strategies for the development of irrigated agriculture,
- Availability of potential market for agricultural products in the sub region and the Middle East,
- Availability of technically proven and economically viable agricultural technology packages developed by Research Stations.

Challenges

- Lack of finance for the development of new expansions and for rehabilitation and modernization of existing irrigation schemes,
- Lack of capacity to undertake and/or supervise the study, design and implementation of new irrigation schemes, as well as for improving the performance of the existing irrigation schemes,
- Sedimentations in reservoirs and canal networks,
- Lack of water supply for irrigation during the cold season,
- Poor performance of existing public large scale irrigation schemes, associated with:
 - Old infrastructure and outdated irrigation and agricultural technologies,
 - Poor operation and maintenance,
 - Little involvement of the end users/WUAs in OMM of irrigation schemes,
 - Weak extension services,
 - Lack of credit facilities,
 - Lack of agricultural inputs (fertilizers, improved seed, chemicals, etc),
 - Poor market structure and information,

1.4.3 Hydropower sector

Key Issues

Same as for Ethiopia the following studies and documents were investigated:

- NBI- ENTRO Eastern Nile Power Trade Program Study -2008
- NBI- Comprehensive Basin Wide Study – 2010
- EAPP- Master Plan and Grid Code- 2011
- Long and Medium Term Power System Plans- Expansion and Investment Planning- December 2013 by Lahmeyer International consultant

From these studies the followings existing situation has been identified:

| Within the Eastern Nile Basin | | Out of the Eastern Nile Basin | |
|--|----------------------|--------------------------------------|----------------------|
| Project's Name | Capacity (MW) | Project's Name | Capacity (MW) |
| Hydro Power Plants | | | |
| Existing | | | |
| Roseires | 270 | | |
| Sennar | 26 | | |
| Khashm_El_Girba | 18 | | |
| Merowe | 1250 | | |
| Jebel_Aulia | 30 | | |
| Small Hydro | 13 | | |
| Committed | | | |
| Upper Atbara | 320 | | |
| Al Fula | 381 | | |
| Kosti | 500 | | |
| Planned till 2020 | | | |
| Shereik | 420 | | |
| Kajbar | 360 | | |
| Dagash | 312 | | |
| Thermal Power Plants | | | |
| Existing | | | |
| Khartoum North ST 1 & 2 (Dr Sherif 1) | 28 | Port Sudan | 25 |
| Khartoum North ST 3 & 4 (Dr Sherif 2) | 110 | | |
| Khartoum North ST 5 & 6 (Dr Sherif 3) | 190 | | |
| Khartoum North CT 1 & 2 (Dr Sherif GT) | 34 | | |
| Garri CC1 | 194 | | |
| Garri CC2 | 194 | | |
| Garri ST4 | 100 | | |
| Committed | | | |
| | | Red Sea Thermal I | 600 |
| | | Red Sea Thermal II | 900 |
| | | Red Sea Thermal III (a,b,c) | 900 |
| | | Red Sea Thermal IV (a,b,c) | 900 |
| | | Gas Oil GT (17x70) | 1200 |
| Wind and Solar generation | | | |
| Sudan PV Solar Plant | 90 | Wind Farm on Red Sea | 90 |
| Khartoum Wind Farm | 20 | Sudan CPS | 50 |
| Khartoum Waste of Energy | 56 | | |
| Dongola Wind Farm | 100 | | |

Transmission System

The transmission grid system is divided into Khartoum, Al Gezira, Eastern, White Nile and Northern areas. The electrical system comprises the 500 kV National Grid branched to the 220 kV and 110 kV level to the West and 220 kV / 110 kV / 66 kV at the East of Sudan. The distribution of electricity is performed on 33 kV and 11 kV voltage levels.

Electric Interconnection

Sudan is interconnected to Ethiopia through a 230 kV TL.

Study has been conducted from the interconnection of Sudan to Egypt through 500 kV TL.

Opportunities

Also from the above mentioned studies the following planned generation projects till year 2030 are identified:

Transmission

- Expansion for the 500, 220 kV, 66 KV Networks to connect the generating units.

Electric Interconnection

- Interconnection with Ethiopia on 500 kV level – under study
- Interconnection with Egypt on 500 kV level –studied

Challenges

The Eastern Nile Power Trade Program Study- Phase I conducted by ENTRO in 2007 at that time Sudan was one country, most of the planned future projects were sited in the north part of the country in addition the recommended regional electrical interconnection and power trade project passed through the northern part of the country. With the new situation and with the existence of South Sudan in addition to Sudan there is a need to update the data and identify the future expansion plans based on new updated geographical situation.

1.4.4 Environmental sector

Key Issues

Sudan faces a number of critical environmental challenges, including desertification, sand dunes, land degradation, deforestation, urban and industrial pollution, oil industry discharges, poor water and sanitation services and the impacts of climate change on farmers and pastoralists. These challenges remain as a threat for the long-term peace, food security and sustainable development. In addition, complex but clear linkages exist between environmental problems and the ongoing conflicts. Conflicts over natural resources (water, land) are among the major reasons for the political unrest that prevails in the western and southern part of the country. Despite the efforts done by Sudan government and the working NGOs to provide access for safe drinking water and sanitation, yet substantial inputs to achieve the millennium development goals are required.

In connection to the Nile Basin and Eastern Nile issues, Sudan is always concerned about the environmental consequences of the upstream developments; there are many important environmental and socioeconomic activities that principally depending on the Nile system. Significant number of the population are drinking directly from the Nile water and surviving on the recession agriculture, fisheries and nilotic forests. Large agricultural schemes and major hydropower infrastructures are exist within the Nile System in Sudan which requires certain environmental and socioeconomic considerations when planning for new development on the basin. In addition, very important natural ecosystems are found along the river banks which also require carefully observation and conservation. Therefore, concerns of upstream watershed conditions, flow regime, water quality and sediment transport are very essential issues to the environmental and socioeconomic conditions in Sudan.

Dinder National Park is one of the environmental hotspots that falls within this eastern Nile sub-basin. The park is presently undergoing a lot of pressure due to pastoral activities and mechanized rain-fed schemes.

The country institution setup linked with the environmental sector is well formulated and requires further logistical and building capacity support to enable the sector to fully take over its responsibility in conserving the natural ecosystem and protecting the environment. The Ministry of Environment, Forestry and Physical Development together with its technical environmental arm the Higher Council for Environmental and Natural Resources (HCENR) are the main responsible authorities to oversee the environmental policies, formulate strategies and plans, and control the environmental issues and to license and approve projects that require EIA in accordance to the Environmental Protection Act of 2001. A number of environmental acts and regulations were issued, yet requires and update and enforcement.

The Ministry of Environment & HCENR has proposed building capacity and climate resilience project to be considered by MSIOA study in particular for traditional farmers and pastoralists. Many development partners are working in collaboration with Sudan government to improve the overall environmental situation in the country such as JICA, IGAD, GIZ, UNEP and UNDP. The Ministry of Environment and IGAD are currently working on a climate resilience project in the livestock sector at the borders of Sudan, Eritria and Ethiopia.

Opportunities

- 200 million acres of arable land will contribute to regional food security , poverty reduction and consequently the enhancement of environmental services
- Great Hydropower potential provide a chance for clean energy production and sustainable development
- Water harvesting programs will enhance the long term peace and contribute to settle the conflicts over natural resources.
- Potential funding opportunities within the regional and international funding agencies (AFDB, JICA, GIZ, etc.)
- Well formulated environmental legislations, policies and strategies for sustainable development
- Qualified and well trained environmental personnel who participate in the monitoring, control and licensing activities.

Challenges

- In the northern parts of the country desertification is an issue , and only limited resources available along the river banks
- Deforestation , overgrazing and land degradation
- Land degradation and soil erosion
- Intensive farming causing major threats to forestry areas and natural ecosystems
- Urban and industrial effluents / Pollutions
- Poverty and food security issues
- Lack of political support when it comes to environmental issues.
- Inadequate environmental education and awareness among politicians , executives, community leaders and local people
- Poor access to safe drinking water and sanitation services causing major threats to the natural and human environments
- Farmers and pastoral communities are vulnerable to climate change impacts

1.5 EGYPT

Since Consultations in Egypt have been postponed, the following overview has been prepared based on data already available.

| | | | | |
|--------------------------------|--------------------|-----------------|------------------------------|---------------------------------|
| HDI | 0.662 | (Rank: 112/186) | (PDNU) | |
| Public debt | 83.4 | % of GDP | CIA World Factbook (01/2012) | |
| Young unemployment rate | 24.8 | % | | |
| Inflation rate | 10 | % | | |
| External debt | 33.7 | Billion \$US | | |
| Birth rate | 24.22 | ‰ | | |
| Mortality rate | 4.8 | ‰ | | |
| Infant mortality rate | 24.23 | ‰ | | |
| Life expectancy | 73 | years | | |
| HIV incidence rate | 0.1 | % of adult | | |
| Literacy rate | 72 | % | | |
| Economic structure | Agriculture | 32 | % of GDP (2001) | www.statistiques-mondiales.com/ |
| | Industries | 17 | | |
| | Services | 51 | | |

The population of Egypt in 2011 was 82.5 million, of which 43.5% were urban. The majority of the population live along the Nile in an area that makes up 5% of the country's total area. The rural population makes up approximately 51% of the total population. The population is expected to increase to 106.5 million by 2030 (UNDP Human Development Report, 2011). In terms of age structure, 32.7% of the population are between the age of 0-14, 62.8% fall with the economically active defined range of 15-64, and 4.5% are 65 years and older. The median age is 24.3 years.

Egypt falls within the Medium Human Development grouping of countries and was ranked 113 out of 187 countries in 2011 with a Human Development Index (HDI)¹ of 0.644. The life expectancy at birth was 68.7 years, while mean and expected years of schooling were 8.9 and 11.9 respectively. The infant mortality rate was 24.23 deaths/1,000 live births, while the maternal mortality rate was 82 deaths/100,000 live births (2008). The number of children under the age of 5 years underweight was 6.8% (2008)(www.indexmundi.com). In terms of health, the World Health Organization (WHO) 2011 report indicated that most of the population has relatively easy access to health care. Nevertheless, equity and access to health care for rural populations remains a challenge. In terms of poverty, 7.2% of the population was vulnerable to poverty², while 1% was in severe poverty³. Although the MDG target on extreme poverty reduction has been achieved, general poverty remains daunting. Approximately 25% of all Egyptians are poor, according to the Household Income and Expenditure Survey of 2011 (against 21.6% in 2008). Social justice and income

¹ : Human Development Index (HDI): Is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.

² : Population vulnerable to poverty: Percentage of the population at risk of suffering multiple deprivations—that is, those with a deprivation score of 20–33 percent.

³ Population in severe poverty: Percentage of the population in severe multidimensional poverty—that is, those with a deprivation score of 50 percent or more.

distribution, notably in rural and slum areas, are major challenges in a society where large regional disparities occur. Rural Upper Egypt is the most deprived with 51% of its residents now considered poor compared with 43% in 2008. About 44% of those aged between 18 and 29 in Upper Egypt are considered poor. The social and political unrest, together with the economic slow-down in 2011 is likely to hamper the government's efforts to reduce poverty levels. The growing Informal sector, labour rights, wages, women's participation and child labour also remain major challenges. The indexmundi data indicates that literacy levels are at 70.3%. For males the figure is 77.6% while for females the literacy rate is 62.7% (2006 est.) (Egypt Country Report, 2012).

In terms of gender, women are marginalized by economic, social and political obstacles. They are the most vulnerable group in the labour market since the highest percentage of women work in the informal sector, or are non-wage family workers. Culture and tradition are obstacles to women's full participation in Egypt's economic, social and political life. Nevertheless, women's access to education has improved (Egypt Country Report, 2012).

In terms of resource management, despite increased investment and targeted government policies, progress on environmental sustainability has been slow. The high population growth rates pose a heavy burden on Egypt's natural resources, particularly water. In this regard the implementation of a national water management plan will be crucial for organizing the supply and demand of available water. On the energy front renewable energy represents a potential growth area for Egypt, specifically wind and solar energy. In this regard the government aims to obtain 20% of its energy from renewable sources by 2020. It has a five-year plan (2012-17), aimed at positioning Egypt as a top generator of solar energy in North Africa (Egypt Country Report, 2012).

The Egyptian economy has traditionally relied heavily on the agriculture sector as a source of growth, both in terms of contribution to GDP as well as a source of employment to a significant part of the Egyptian labour force. Following the completion of the High Aswan Dam (HAD) in 1968, the agriculture sector accounted for 30% of GDP, 25% of export earnings and 47% of employment. However, this dominance has declined gradually over the years and the share of agriculture in GDP and export was each about 20% in 1990. This share now accounts for 16% in GDP, 20% in export and about 34% employment. Despite the decline in the share of sector's contribution to the national GDP the agricultural sector remains crucial to the future of Egypt's economy. Agriculture in Egypt is entirely dependent on irrigation from the Nile which is the main source of water supply. It has the largest irrigated area (3.3 million ha) in the EN sub basin. There is also a plan to extend the irrigated area substantially. A secure and guaranteed water supply from the Nile is therefore critical to the well-being of Egypt and its economy (Egypt Country Paper, 2006).

ANNEX 1: LIST OF PEOPLE MET DURING COUNTRY CONSULTATIONS

| NAME ORGANIZATION POSITION |
|---|
| ETHIOPIA |
| Mr. Gosaye Mengistie Ministry of Water, Irrigation and Energy Undersecretary |
| Teshager Abebaw, Federal Ministry of Agriculture Agronomist |
| Fekede Adane, Federal Ministry of Agriculture Soil and water conservation expert |
| Eng Teshome Atenafe, Federal Ministry of Water and Energy Director Irrigation and Drainage |
| Eng Getaneh Assefa, Federal Ministry of Water and Energy Project Coordinator |
| SOUTH SUDAN |
| Mr. Tomas Jang Kan Ministry of Electricity, Dama, Irrigation & Water Resources Deputy Director- ENSAPT Team member- MSIOA focal Point |
| Eng. Peter Jalyath Saverio, MoEDIWR- Water resource |
| Eng. Garang Yong Deng, MoEDIWR- Water resource |
| Eng. Makisae Ador Malek, MoEDIWR- Water resource |
| Eng. Doki Lako Busuk, MoEDIWR- Water resource |
| Eng. Cham Budha Didumo, MoEDIWR- Water resource |
| Eng. Chuf Isaac Chol, MoEDIWR- Water resource |
| Mr. Tom Remis, MoEDIWR-Electricity D/G Engineering & Grid Operation |
| Mr. George Adrako, MoEDIWR-Electricity Senior Engineer |
| Mr. Evans Wudo, MoEDIWR-Electricity Senior Engineer |
| Eng. Jiben Jeremiah, MoEDIWR-Irrigation Director for Irrigation and Drainage |
| Makuac Ador Malek, MoEDIWR-Irrigation |
| Garang Yong Deng, MoEDIWR-Irrigation |
| Dr Pio Kowr Ding, Ministry of Agriculture |
| Mr Alfred Amido Andrea, Ministry of Agriculture |
| Peter Anyleth Mayen, Ministry of Agriculture |
| John Pangech, Ministry of Agriculture |
| Many Benjamin Liki, Ministry of Agriculture |
| Henyi Bullen Baggu, Ministry of Agriculture |
| Victor Silvano Bennet, Ministry of Agriculture |
| Erneo Balasio Peter, Ministry of Agriculture |
| Hon. Victor, wurda Lo Tumbe Ministry of Environment Acting Undersecretary |
| SUDAN |
| Mr. Abdelfatah Ahmed, Ministry of Finance and National Economic |
| Mr. Omar Mohammed Ahmed, MoFNE-International Cooperation Directorate Director General |
| Mr. Eltayeb Mohamed Ibrahim, MoFNE |
| Mr. Abdel Fattah Khaireseed, MoFNE |
| Mr. Ibtisam Hassan Ali, MoFNE |

| |
|---|
| Dr. Gamaleldin Murtada, Water Research Center/ Khartoum University |
| Dr. Kamaleldin Bashar, UNESCO Chair for Water Resources/SUDAN UNESCO Chair in Water Resources |
| Muna M. Musnad, UNESCO Chair for Water Resources/SUDAN Researcher |
| Hassan M.Fadal, UNESCO Chair for Water Resources/SUDAN |
| Dr. Babiker Abdalla, Ministry of Environment, Forestry and Physical Development |
| Ms. Galal El Hag, Higher Council for Environment and Natural Resources |
| Eng. El Hadi El Sideeg, Ministry of Agriculture and Irrigation |
| Lt. Gen. Charles Yosam Acire, Ministry of Wild life conservation and Toursim Under Secretary |
| Eng. Hasabelnabi Musa, Ministry of Water Resources and Electricity |
| Eng. Ahmed Eltayeb, Ministry of Water Resources and Electricity |
| DR. AHMED Mohamed ADAM, Ministry of Water Resources and Electricity |
| DR. OSMAN ELTOM Hamad Ministry of Water Resources and Electricity |
| Prof. Seifeldin Hamad Abdalla, Ministry of Water Resources and Electricity |
| Prof. Yasir Abbas+ Eng. Ali Noureldin, Ministry of Water Resources and Electricity |
| Dr Salih Hamad Hamid, Ministry of Water Resources and Electricity Senior WR Planer |
| Eng. Musa Abu Elgasim, Ministry of Water Resources and Electricity Undersecretary |
| Eng. Gaafar Ali ElBashir, Sudan Electric Transmission Company Managing Director |
| Eng. khider Mohamed Gasmelseed, Dam Implementation Unit MoWR & E Director General- projects |
| Eng. Abdelrahman Saghayroon Elzein, Dam Implementation Unit MoWR & E Head of Hydrology Department |
| ENTRO |
| Dr. Yosif Ibrahim, ENTRO Senior WR Planner/ENTRO-OIC |
| Dr. Salah Shazali, ENTRO Senior Operations Officer |
| Dr. Solomon Abate, ENTRO Regional Project Coordinator for Watershed Management |
| Dr. Wubalem Fekade, ENTRO Head, SDCU |
| Mr. Michael Abebe, ENTRO Hydropower Expert |
| Mr. Jackson Elisoma, ENTRORegional Project Coordinator for BAS |
| Mr. Awoke Kassa, ENTRO Monitoring & Evaluation Officer |
| Ms. Azeb Mersha, ENTRO Junior Water Resource Modeller |
| Mr. Zelalem Tesfaye, ENTRO Junior Water Resources Engineer |
| Mr. Tesfaye Gudeta, ENTRO |
| Ms. Genet Alemayehu, ENTRO |

ANNEX 2: MINUTES OF MEETINGS OF COUNTRY CONSULTATIONS

MINUTES OF MEETING: ETHIOPIA

| ETHIOPIA | AGRICULTURE | 26-05-2014 |
|--|---|------------|
| Organisation met | Federal Ministry of Agriculture | |
| Persons met | 1. Teshager Abebaw, Agronomist phone : +251 931524060 teshagerabe@gmail.com 2. Fekede Adane, Soil and water conservation expert phone: +251 911 91 7849, email: fekedeadane@yahoo.com | |
| Consultant | Ayalew NIGUSSIE | |
| Other participants | - | |
| Main purpose of the meeting: | | |
| Gathering information and documentation on irrigation sector. | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed. • Existing situation regarding areas and types of crops, production levels, land tenure, extension services, credit facility, inputs supply, marketing and food security issues were discussed • Existing challenges and opportunities in the agricultural sector were discussed. • Documents showing 10 years survey results of production areas and yields was obtained • Other relevant documents are promised to be sent to the consultant in due course | | |
| Follow-up activities: | | |
| Consultant to ensure in due course that above reference documents have received. | | |

| ETHIOPIA | AGRICULTURE | 27-05-2014 |
|--|--|------------|
| Organisation met | Ministry of Agriculture | |
| Persons met | Teshager Abebaw, Agronomist phone : +251 931524060 email : teshagerabe@gmail.com Fekede Adane, Soil and water conservation expert Phone: +251 911 91 7849 email: fekedeadane@yahoo.com | |
| Consultant | Tony BARDOUR and Ayalew NIGUSSIE | |
| Other participants | - | |
| Main purpose of the meeting: Gathering information and documentation on irrigation. | | |
| Key information: <ul style="list-style-type: none"> • Each region in Ethiopia has a Regional Bureau of Agriculture • Each region is broken down in to smaller zones with development groups made up of groups of farmers. Technical extension services are provided by the department to the groups of farmers. More than 90% of the country is covered in terms of extension services. • Co-ops set up in the different regions and zones provide fertilizer, pesticides and seeds. • Rain-fed agriculture is the dominant form of agricultural in Ethiopia • Average size of land available to a household is 1 ha. Each household consists of 4-5 people on average • Land is scarce, especially in the Ethiopian Highlands • Majority of farmers use traditional farming methods, ox driven ploughs etc. • Some areas groups of farmers work together and hire tractors to plough the land. Key issues <ul style="list-style-type: none"> • Storage of produce is a key issue. Technology and storage techniques are poor, as a result up to 60% of produce can be lost (pests, rotting etc.). • Access to finance/credit and markets; • Access to improved technology, including improved seeds; • Dependence on rain-fed agriculture and vulnerability of climate change and unreliable rain-fall patterns; • Population pressure and growing scarcity of arable land, especially in the highlands; • Reduced soil productivity due to increased population pressure; • Erosion and loss of productive top-soil; • Food security linked to issues listed above (dependence on rain-fed agriculture, climate change, reduced soil productivity, erosion, lack of access to technology etc.) Need for watershed management programmes to address erosion and loss of productive top-soil. | | |
| Follow-up activities: Collect reports and documents. Key documents provided to Ayalew. Consultant to ensure in due course that above reference documents have received. | | |

| ETHIOPIA | AGRICULTURE | 26-05-2014 |
|---|---|------------|
| Organisation met | Federal Ministry of Water, Irrigation and Energy | |
| Persons met | 1. Teshome Atnafe, Director Irrigation and Drainage phone : +251 924 403512 @gmail.com 2. Getaneh Assefa, Project coordinator phone: +251 911 401175, email: getanehtadese@yahoo.com | |
| Consultant | Ayalew NIGUSSIE | |
| Other participants | - | |
| Main purpose of the meeting: | | |
| Gathering information and documentation on irrigation sector. | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed. • Current status of the 100,000 ha which are regionally identified and country implemented fast track irrigation projects were discussed, • 20,000 ha is under implementation and feasibility study for the remaining 80,000 ha is completed • Priorities for implementation of new irrigation projects were discussed, • Possibilities for implementing transe-boundary integrated water resources development and management project on Rahad, Dindir and Gelague tributaries were discussed • Existing challenges and opportunities in the irrigation sector were discussed. • Document showing potential areas for irrigation in the whole country, including in the Nile Basin has been obtained, • Other relevant documents and studies are available in the Ministry's library and can be accessed upon request | | |
| Follow-up activities: | | |
| Consultant to ensure in due course that above reference documents have received. | | |

| ETHIOPIA | AGRICULTURE | 27-05-2014 |
|--|---|------------|
| Organisation met | | |
| Persons met | Ministry of Water, irrigation and energy Attendance list prepared | |
| Consultant | Consultant team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on energy and water resources in Ethiopia | | |
| Key information: <ul style="list-style-type: none"> • Each region in Ethiopia has a Regional Bureau of Agriculture • Each region is broken down in to smaller zones with development groups made up of groups of farmers. Technical extension services are provided by the department to the groups of farmers. More than 90% of the country is covered in terms of extension services. • Co-ops set up in the different regions and zones provide fertilizer, pesticides and seeds. • Rain-fed agriculture is the dominant form of agricultural in Ethiopia • Average size of land available to a household is 1 ha. Each household consists of 4-5 people on average • Land is scarce, especially in the Ethiopian Highlands • Majority of farmers use traditional farming methods, ox driven ploughs etc. • Some areas groups of farmers work together and hire tractors to plough the land. | | |
| Key issues <ul style="list-style-type: none"> • Storage of produce is a key issue. Technology and storage techniques are poor, as a result up to 60% of produce can be lost (pests, rotting etc.). • Access to finance/credit and markets; • Access to improved technology, including improved seeds; • Dependence on rain-fed agriculture and vulnerability of climate change and unreliable rain-fall patterns; • Population pressure and growing scarcity of arable land, especially in the highlands; • Reduced soil productivity due to increased population pressure; • Erosion and loss of productive top-soil; • Food security linked to issues listed above (dependence on rain-fed agriculture, climate change, reduced soil productivity, erosion, lack of access to technology etc.) <p>Need for watershed management programmes to address erosion and loss of productive top-soil</p> | | |
| Follow-up activities: Collect reports and documents. Key documents provided to Ayalew. | | |

| ETHIOPIA | HYDROPOWER | 27-05-2014 |
|---|------------|------------|
| <p>Organisation met: Ministry of Water, Irrigation and Energy</p> <p>Persons met GOSAYE MENGISTIE - Deputy Minister phone: +251 (0) 911254116 email: gosayea@yahoo.com</p> <p>Consultant Dr. Fatma MOUSTAFA</p> <p>Other participants -</p> | | |
| <p>Main purpose of the meeting: Gathering information and documentation on Electricity projects (hydropower resources, transmission system, regional electrical interconnection, regulation, institutions, etc) for the present and planned Ethiopian power system.</p> | | |
| <p>Key information:</p> <p>1- Dr. Fatma Highlighted the objective of the project and the countries consultation visit: MISOA is one of ENTRO's projects aiming to identify and prioritize water related investments that promotes sustainable economic growth for the region. Among other sectors involved in the project is the Electricity and Energy sector. A Consultation Team of Experts has been assigned by ENTRO to carry out the consultancy services during the second half of year 2014. It is expected by the completion of the project to explore regional investment opportunities in hydropower development and regional interconnection. Consultancy Tasks include 1) review and update of Data, 2) Document Regional Power Context, 3) Develop Knowledge Base on Potential Power Projects (hydropower, power transmission) of regional significance and 4) Power Analysis in an MSIOA Context.</p> <p>2- Mr. Gosaye acknowledged the project and expressed the readiness of Ethiopia Ministry of Water, Irrigation and Energy to assist.</p> <p>3- Dr. Fatma presented a list of the data required from Ethiopia Ministry of Water, Irrigation and Energy as in attachment 1.</p> <p>4- Mr. Gosaye Mengistie will review and reply to the consultant within a month.</p> | | |
| <p>Follow-up activities:</p> <p>1. Dr. Fatma Moustafa to ensure in due course that above reference documents have received.</p> | | |

| ETHIOPIA | ENVIRONMENT | 27-05-2014 |
|---|---|------------|
| Organisation met | Ministry of Environment and Forests | |
| Persons met | Mr Dereje Asonafir, Director Project Monitoring, Evaluation and Licencing | |
| | derejeagonafir@yahoo.com | |
| Consultant | Tony BARBOUR and Khalid ABDELRAHMAN | |
| Other participants | - | |
| Main purpose of the meeting: | | |
| Collect and gather information on environmental issues in Ethiopia | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Constitution of Ethiopia include section on environmental rights (Article 44), and environmental objectives (Article 92); • The Environmental Policy for Ethiopia flows from the Constitution; • Ethiopia has adopted a Climate Resilient Green Economic Strategy Vision Document. This is a key document guiding future development in Ethiopia; • Two State of Environment Reports have been produced for Ethiopia; • Other key documents include Sustainable Development and Poverty Reduction Paper; • Growth and Transformation Plan; • Institutional set up-Federal Government system, with 9 regions and 2 city administrations. At regional level each region has a regional ministry of Environment and Forestry; • National Parks under the Ministry of Culture and National Parks; • Catchment Management falls under Ministry of Agriculture. | | |
| Key issues | | |
| <ul style="list-style-type: none"> • Climate change and adaptation • Loss of natural resource base, including forests and catchments, due expansion of rain-fed farming ; • Land degradation. Agriculture is the mainstay of the economy and 70% of the land in Ethiopia is prone of degradation; • Deforestation and loss of trees for fuel and building material; • Rural-Urban migration and pressure on resources and services in cities • Pollution threat that cities pose to water supplies due to poor sanitation services and industries | | |
| Follow-up activities: | | |
| Collect reports and documents. Key documents provided to Khalid. Consultant to ensure in due course that above reference documents have received. | | |

| ETHIOPIA | ENVIRONMENT | 27-05-2014 |
|--|---|------------|
| Organisation met | Ministry of Environment and Forests | |
| Persons met | Mr Dereje Asonafir, Director Project Monitoring, Evaluation and Licencing derejeagonafir@yahoo.com | |
| Consultant | Tony BARBOUR and Khalid ABDELRAHMAN | |
| Other participants | - | |
| Main purpose of the meeting: | | |
| Collect and gather information on environmental issues in Ethiopia | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Ethiopia constitution has given due consideration to the environmental issues through articles 4.3, 4.4, 9.2. • There are many policies, proclamations and regulations put in place to form the national legal framework for the environmental issues in Ethiopia. • At the national level, the Federal Ministry of Environment & Forestry is the concerned ministry to oversee environmental issue in the countries, however each of the Ethiopian nine (9) states has its own environmental bureaus • Ethiopia has officially pursued a visionary document "Climate Resilience Green Economy (CRGE)" to guide/lead the country to middle income status by 2025. CRGE Facility has also been established to implement and finance all the activities related to this strategy • As one of the LDCs, the Economy of Ethiopia is mainly based on the natural resources (land, forests and water). • Most the environmental problems arise due to the uncontrolled exploitation for these natural resources. Forests degradation, land degradations, desertification, and pollution are main environmental concerns that are being continuously addressed by the ministry's activities. • Expansion of the agricultural activities on the account of forest areas has led to sever land degradation/erosion. Utilization of forests as source of fuel is also contributing to the rapid degradation • Hydropower can be considered as one of the Key development opportunities in Ethiopia. • The following documents were collected during the meeting: <ol style="list-style-type: none"> 1- Environmental Policy- English version 2- Environmental Policy - Amharic version 3- Proclamation No 655/2009 - Bio-safety 4- Proclamation No 295/2002 - Environmental Protection Organs Establishment 5- Proclamation No 300/2002 - Environmental Pollution Control 6- Proclamation No 299/2002 - Environmental Impact Assessment 7- Proclamation No 513/2007 - Solid Waste Management 8- Regulation No159/2008 - Industrial Pollution 9- EIA Directives - Amharic version • The Ethiopia's Climate-Resilient Green Economy Strategy has also been downloaded from the ministry's website and put available at EN-MSIOA library | | |
| Follow-up activities: | | |
| EN-MSIOA Country Consultant Report (2013/2014) to be requested officially through EN-MSIOA September 2014 | | |

MINUTES OF MEETINGS: SOUTH SUDAN

| SOUTH SUDAN | AGRICULTURE | 30-05-2014 |
|---|---|------------|
| Organisation met | Ministry of Agriculture, Forestry, Cooperation and Rural Development | |
| Persons met | Dr Erneo Balasio (presentation). Attendance list collected | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on agriculture sector in South Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • 8.2 million people, 51% live in poverty, of this 52% are young; • 85% of population are rural; • 95% of South Sudan is available for agriculture, of this 50% has good potential; • Mission statement for agriculture stresses importance of sustainable development; • Majority of farming in South Sudan is rain fed; • Small scale irrigation takes place along the Nile, but no large schemes; • Food insecurity is an issue of concern; • Key documents, are South Sudan Development Plan, and South Sudan Development Initiative, Agriculture Sector Policy Framework (2012-2017); • Documents being prepared include Comprehensive Agriculture Development Master Plan and Irrigation Development Master Plan; • Key challenges facing the sector include strong currency due to oil. Exports therefore not competitive; • South Sudan has highest per-capita income of countries in East Africa; • Cost of imports high due to distances and poor road infrastructure; • Food insecurity also linked tribal conflicts and internal displaced populations. The IDPs can no longer farm, therefore food production drops; • Conflicts between armed pastoralists and farmers also an issue; • Fragile land tenure system also contributes for food insecurity challenges; • Due to challenges facing farmers many stop farming; • Up to 70% of produce can be lost due to poor storage methods, pests etc. <p>Key issues</p> <ul style="list-style-type: none"> • Food security and need to improve productivity and storage methods; • Access to markets for produce; • Internal conflicts and impact on food security. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Juba, including South Sudan Development Plan, and South Sudan Development Initiative, Agriculture Sector Policy Framework (2012-2017), Comprehensive Agriculture Development Master Plan and Irrigation Development Master Plan (Draft). | | |

| SOUTH SUDAN | HYDROPOWER | 29-05-2014 |
|---|---|------------|
| Organisation met | | |
| Persons met | Ministry of Dams and Electricity | |
| | Attendance list prepared | |
| Consultant | Tony BARDOUR and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on energy supply and generation in South Sudan | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Population of South Sudan, ~10 million, 1% have access to electricity; • Total power supply 30MW; • Of ten states in South Sudan, only 3 states have access to power; • Juba, population of 1 million, powered by generators; • Hydropower schemes proposed on White Nile just north of border with Uganda (Grand Fuller etc.); • Studies done by SMEC, but before separation, reports are held by Sudan. In the process of trying to get these projects; • Current transmission lines in South Sudan limited to 132KV line from Sudan to Renk in northern South Sudan; • Thermal energy also being looked at. Two refineries in South Sudan require energy for operation. Proposal to develop 500 and 750MW thermal plants to provide energy. | | |
| Key issues and opportunities | | |
| <ul style="list-style-type: none"> • Hydropower on the White Nile between Juba and border with Uganda; • Small hydro projects (20MW Sua, 2 MW Keneti); • Option of getting energy from Ethiopia, from Gambella (220MW). | | |
| Follow-up activities: Collect reports and documents. Key documents provided to project team | | |

| SOUTH SUDAN | HYDROPOWER | 29-05-2014 |
|---|--|------------|
| Organisation met | Ministry of Electricity, Dams, Irrigation and Water Resources | |
| Persons met | Attendance list prepared | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on energy and water resources in South Sudan | | |
| Key information: | | |
| <ul style="list-style-type: none"> • July 2013 Ministry of Water Resources merged with Ministry of Electricity and Dams; • Key documents, Water Policy 2007, WASH Strategic Framework 2011, Water Act (expected in 2014), Irrigation Development Master Plan (being financed by JICA). • Presentation made that provided good baseline information on Sudan and the challenges | | |
| Key issues | | |
| <ul style="list-style-type: none"> • Water supply and sanitation, especially in Juba and other large towns; No large projects currently planned, focus is on addressing local needs, such as water supply and sanitation. | | |
| Follow-up activities: Collect reports and documents. Key documents provided to project team | | |

| SOUTH SUDAN | ENVIRONMENT | 30-05-2014 |
|---|---|------------|
| Organisation met | Ministry of Environment | |
| Persons met | Hon.Victor Wurda Lo Tombe (acting undersecretary). Attendance list collected | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on environmental challenges in South Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Wetlands in South Sudan, specifically the Sudd marshes, play a key role in the ecology and hydrology of the EN region. Major drainage area to the south (equatorial lakes region), area to the west formed by the borders with Congo and Central African Republic, and area to the east (Baro-Akobo-Sobat sub-basin); • Sudd marshes key habit area, and also play important role in livelihoods of local communities that live in the area, especially during the dry season when they provide grazing for livestock; • Sudd and wetlands in South Sudan provide key ecological goods and services; • Report on water and wetlands have been prepared. <p>Key issues</p> <ul style="list-style-type: none"> • Any potential plans to develop Jonglei canal would be strongly opposed; • Artisanal mining and use of mercury poses pollution threat to rivers; • Need for a study to assess role of the Sudd in terms of contribution to the EN hydrological systems and the value of the ecological goods and services it provides. No detailed studies have been carried out in the Sudd since the 1950's due the war. • Need for management plan for the Sudd; • Need for a wetlands inventory for South Sudan and biodiversity assessment and evaluation of key wetlands in South Sudan; • Department lacks resources; • Need for GIS and technical support; • Need for capacity building and training; • Climate change. <p>Potential MSIO's</p> <ul style="list-style-type: none"> • Funding for detailed assessment of the Sudd wetland and development of a management plan. Sudd plays a key role in the hydrology of the Nile system, so benefits would be regional. Sudd also plays key role in livelihoods strategies of local communities (5 groups use the Sudd), including pastoral communities in Sudan, therefore cross boundary social benefits. Sudd is also a Ramsar Site, so international importance recognised. The assessment would also create opportunities to develop capacity, and improve resources in South Sudan through the use of local specialists and an intern programme. The Sudd also likely to play a key role in terms of ameliorating impacts of climate change in the EN region, therefore regional benefits. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Juba. | | |

| SOUTH SUDAN | ENVIRONMENT | 30-05-2014 |
|---|---|------------|
| Organisation met Persons met Consultant Other participants | Ministry of Environment (MoE) Victor Wurda Lo Tumbe, Director, Project Acting Undersecretary + Ministry staff (see the list of persons met) Email : ywurda@yahoo.com Khalid A. Alansary – Environmental Consultant EN-MSIOA Team | |
| Main purpose of the meeting: <ul style="list-style-type: none"> • <i>Gathering information and documentation on environmental issues</i> • <i>Consultation and discussion on the country environmental status, with focusing on water related issues.</i> <i>Consultation on investment opportunities of regional significant.</i> | | |
| Key information: <ul style="list-style-type: none"> • Jungli wetlands (Sudd wetlands) are one of the hot environmental spots in South Sudan that requires careful management to maintain the natural ecosystem and the associated communities' livelihood, the MoE is presently trying to develop a strategic management plan for Sudd wetland. • MoE denies any kind of draining / canalization project to be undertaken in the Sudd wetland having considered its environmental and socioeconomic importance • The produced wastewater from the oilfield is affecting parts of the Sudd wetlands, though there are ongoing efforts by the oil companies to control the problem • Solid and liquid waste management is very poor in South Sudan; MoE is working on projects to improve this sector. • The Ministry is formed of six (6) general directorates: 1- Directorate of Environmental Management, Pollution & Control 2- Directorate of Environmental Education 3- Directorate of Biodiversity & Wetlands 4- Directorate of Climate Change 5- Directorate of Planning & Sustainable Development 6- Directorate of financial and administration • MoE has been established only three years back - after separation from Sudan - and it is not yet fully taking off. Many administrative and financial challenges are faced by MoE affecting seriously its roles and responsibilities. • Environmental Policy draft is under review by the cabinet. • Many international and regional NGOs are working in collaboration with the MoE; UNEP is funding environmental information centre project that will avail all relevant environmental database in one centre, IGAD is also supporting the Drought Resilience project. JICA has also funded the rehabilitation of Juba Landfill • Since its formation in July 2011, South Sudan has ratified five international environmental treaties; Biodiversity, RAMSAR, IPCC, etc. | | |
| Follow-up activities: <ol style="list-style-type: none"> 1. Draft Strategic Environmental Management Plan for Sudd Wetlands 2. Drought Resilience Study (draft) 3. South Sudan Environmental Status Report 4. Environmental Act 5. Draft Environmental Policy Maps showing the environmental hotspots (national parks, wetland, etc) To be collected by ENTRO focal point in Juba | | |

| SOUTH SUDAN | ENVIRONMENT | 30-05-2014 |
|--|-------------|------------|
| <p>Organisation met</p> <p>Persons met Ministry of Wildlife Lt. General Charles Yosam Acire acireyosam@yahoo.com</p> <p>Consultant Tony, Fady and Khalid</p> <p>Other participants -</p> | | |
| <p>Main purpose of the meeting: Collect and gather information on wildlife in South Sudan</p> | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Investment conference was held in Juba on 4 and 5th December 2013. Each ministry was required to prepare a report. Full copy of the conference documents would be available from the Ministry of Investment and Commerce; • Key document is the South Sudan Investment Plan; • 6 National Parks in South Sudan. The aim is to establish more in the future; • Most visitors come to the Fuller Falls on the Nile, to the south of Juba near the border with Uganda; • A number of international NGOs are working with the government in South Sudan to look at the issue of conservation; • South Sudan has one of the biggest herds of antelope in the world, the white eared cob, over 1 million that migrate across the Sudd wetlands each year. <p>Key issues</p> <ul style="list-style-type: none"> • Conservation projects must benefit local communities; • Opportunities for cross frontier conservation areas and parks; • Lack of resources and capacity. | | |
| <p>Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Juba including South Sudan Investment Plan.</p> | | |

| SOUTH SUDAN | NAVIGATION | 29-05-2014 |
|---|------------------------------------|------------|
| Organisation met | | |
| Persons met | Ministry of River Transport | |
| | Mr Abudu Lako | |
| Consultant | Tony, Fady and Khalid | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on river transport in South Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • 5 states in South Sudan are located along the White Nile; • 7 large commercial ports located on the White Nile, including Port at Juba. Ports are located north of Juba; • Ports are operated by government; • Boats on the river are operated by the private sector; • At local village level canoes are used to visit family and friends and transport goods and produce across the Nile River; • No dedicated passenger boats, people that use the river for transport us the barges; • Navigation studies have been undertaken funded by ADB; • A strategic plan for the entire transport sector has been developed; • No legislation in place to manage river transport. <p>Key issues</p> <ul style="list-style-type: none"> • Siltation of river that requires dredging, especially in the section near Juba; • Water hyacinth clogs river and navigation channels, especially in the Sudd; • Water hyacinth also impacts on fishing and the river ecosystem; • Lack of radio communication between river boats, especially large barges; • Barro-Akobo-Sobat Basin, potential for navigation on the Sobat River. No road infrastructure in this area so the river has potential to play an important communication role. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Juba. | | |

| SOUTH SUDAN | AGRICULTURE | 27-05-2014 |
|---|---|------------|
| Organisation met | | |
| Irrigation Dept. Ministry of Water Resources | | |
| Persons met | <ol style="list-style-type: none"> 1. Eng. Jiben Jeremiah, Director for Irrigation and Drainage email :jackleenjiben@yahoo.co.uk 2. Makuac Ador Malek, expert; Phone 0927 366060 3. Garang Yong Deng email: garangyo53@yahoo.com | |
| Consultant | Ayalew NIGUSSIE | |
| Other participants | - | |
| Main purpose of the meeting: <i>Gathering information and documentation on the irrigation Sector, (present situation and planned developments)</i> | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed. • Current status of the existing irrigation schemes (Aweil and Renk) were discussed, but not much information is available, • Currently country master plan for Agriculture and irrigation is under preparation by JICA. Planned for completion by the end of June 2015. Till then the existing potential, future plan and priorities for irrigation development are not known, • Documents related to Agriculture and water policies and country programs are collected together with Draft Inception Report of the Irrigation Master. • Existing challenges and opportunities in the irrigation sector were discussed. | | |
| Follow-up activities: Consultant to ensure in due course that any reference documents are received. | | |

| SOUTH SUDAN | HYDROPOWER | 29-05-2014 |
|--|--|------------|
| Organisation met | | |
| Ministry of Electricity, Dams, Irrigation & Water Resources | | |
| Persons met | Eng. Tom Remis – D/G. Engineering & Grid operation Phone: +211 956807850 Email: tomremis2000@yahoo.com | |
| Consultant | Dr. Fatma Moustafa- Hydropower Specialist Phone: +201001590125 Email: fatmostafa@hotmail.com | |
| Other participants | <p>MEDIWR: Mr. Thomas Jang Kan- Deputy Director for Water Resources Management (MEDIWR), ENSAPT Team Member, Focal point of MSIOA Project. Tel: + 211956944432 Email: thomasjang95@yahoo.com, jang.kan2013@gmail.com</p> <p>Mr. Evans Wudo- Senior Engineer (MEDIWR) Mr. George Adrako - Senior Engineer (MEDIWR)</p> <p>MSIOA: Mr. Fady Hamade, Team Leader Mr. Tom Barbour, Social and Environmental expert Mr. Khalid Ahmed, Environmental Expert</p> <p>ENTRO: Mr. Jackson Elisoma, project Coordinator for Baro-Akobo- Sobat Project</p> | |
| Main purpose of the meeting: | | |
| Gathering information and documentation on Electricity projects (hydropower resources, transmission system, regional electrical interconnection, regulation, institutions etc) for the present and planned South Sudan power system. | | |
| Key information: | | |
| <p>a. Mr. Fady Highlighted the objective of consultant’s visit to South Sudan: The Multi Sector Investment Opportunity Assessment (MISOA) is one of ENTRO's projects aiming to identify and prioritize water related investments projects that promote sustainable economic growth for the region. Among other sectors involved in the project is the Electricity and Energy sector.</p> <p>A Team of Experts has been assigned by ENTRO to carry out the consultancy services during the second half of year 2014. Consultancy Tasks include: 1) review and update of Data, 2) Document Regional Power Context, 3) Develop Knowledge Base on Potential Projects of regional significance? 4) Power Analysis in an MSIOA Context. It is expected by the completion of the project to explore regional investment</p> | | |

opportunities in hydropower development and regional interconnection projects.

- b. Mr. Tom Remis acknowledged the project and expressed the readiness of South Sudan to cooperate.
- c. Dr. Fatma Moustafa asked about the current situation of electricity in South Sudan
- d. Mr. Tomas informed the team with the following:

Current Electricity capacity in South Sudan is about 30 MW while the population is about 10 Million inhabitants. Only 1% of the populations have access to electricity. Only three states of the 10 States of the Republic of South Sudan have electricity. All existing generating units are Diesel using expensive fuel. A Feasibility Study has been done in 2009 by the consultant SMEC identified four big hydropower resources in South Sudan those are:

- Grand Foula of capacity 900 to 1000 MW and estimated required investment 1.5 B\$
- Bedden of capacity 540 MW and estimated required investment 1.4 B\$.
- Shokuli of capacity 400 MW
- Lakki of capacity 210 MW.

Lack of finance is behind the delay of implementation.

A project for 40 MW at Foula is under discussion with Norway. This project will supply power to South Sudan through TL of voltage 132 KV. A project is under study to import electricity from Ethiopia through 220 kV TL

Gambella/Malakal/Juba. A study under NELSAP is underway to connect South Sudan to Uganda through 400 kV TL. Call for Bids to construct the Distribution network for Juba on voltage level of 33 kV financed by the AfDB of 25 M\$. Bids are under evaluation.

Two big thermal power plants 250 MW from Tharjath refinery & 500 MW from Palouge refinery were under construction but are delayed because of the war.

Mini hydro projects in Keneti 2 MW and in Sue River 12 MW are under study. There is energy policy and the electricity act is under preparation. Electricity Tariff is 0.75 c/kwh and is sold to consumers for 0.25 c/kwh.

- e. Dr. Fatma presented a Questionnaire for the data required from South Sudan Ministry of Electricity, Dams, Irrigation and Water Resources related to the future expansion plan for the electricity system.

- f. Mr. Tom Remis provided the team with the followings:

- Power Point presentation on Potential of RE of South Sudan
- Executive Summary of Pre-FS for Bahr El Jabal Hydropower Project
- A Report on the Development of the Distribution network of Juba prepared by Norwegian consultant NRECA International Ltd.

7- Mr. Tom Remis will reply to the questionnaire through two weeks

Follow-up activities:

1. Dr. Fatma Moustafa to ensure in due course that above reference documents have received.

MINUTES OF MEETINGS: SUDAN

| SUDAN | FINANCES | 02-06-2014 |
|--|----------|------------|
| <p>Organisation met</p> <p style="text-align: center;">International Cooperation Directorate-Ministry of Finance and National Economy</p> | | |
| <p>Persons met</p> <ol style="list-style-type: none"> 1. Omar Mohammed Ahmed, D.G. MoFNE I.C. phone : 0912393570 / email :ohajam@gmail.com 2. Eltayeb Mohamed Ibrahim, MoFNE; email: eltayeb1959@gmail.com 3. Ibtisam Hassan Ali, MoFNE, email: ibthasjadaa@hotline.com ibthasjadaa@hotline.com 4. Abdel Fattah Khairelseed, MoFNE, email: fakhah77@gmail.com | | |
| <p>Consultant Ayalew NIGUSSIE</p> <p>Other participants -</p> | | |
| <p>Main purpose of the meeting: <i>Gathering information and documentation on international cooperation with particular emphasis to the En sub basin</i></p> | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed. • Problems with the existing conditionality for financing of development projects were discussed • Problems with the existence of four different Ministries involved in the agricultural sector without clear roles and responsibilities were discussed, • Suggested and discussed potential investment projects for cooperation include transe boundary projects (Water harvesting/integrated water resources development at the borders), control of the existing harmful floating weed in the river system, navigation, road networks development, marketing development and livestock development. | | |
| <p>Follow-up activities: Consultant to ensure in due course that suggested investment projects are addressed in the study</p> | | |

| SUDAN | WATER MANAGEMENT | 02-06-2014 |
|--|--|------------|
| Organisation met | UNESCO Chair for Water Resources | |
| Persons met | 1. Dr. Kamaleldin Bashar, UNESCO Chair in Water Resources, basharke@hotmail.com, phone : +249912864773 2. Muna M. Musnad, Reasercher ; munamsnad@hotmail.com, 3. Hassan M.Fadal ; hassancadw@yahoo.com | |
| Consultant | Ayalew NIGUSSIE and Yohannes GEBRETSADIK | |
| Other participants | Dr Yesuf (ENTRO) | |
| Main purpose of the meeting: <i>Gathering information and documentation on Research works done and documents available in EN sub basin</i> | | |
| Key information: <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed • Areas of involvement and research activities being conducted by the Institute since its establishment in 1994, were highlighted and discussed, • Major Research areas among others, include: <ul style="list-style-type: none"> ○ Flood risk assessment ○ Water harvesting ○ Water supply and sanitation ○ Indicators for Agriculture/irrigation • Various documents are available related to above and some of them will be sent to the MSIOA Team | | |
| Follow-up activities: Consultant to ensure in due course to collect the above documents | | |

| SUDAN | ENVIRONMENT | 02-06-2014 |
|---|---|------------|
| Organisation met | Ministry of Environment, Forestry & Physical Development | |
| Persons met | Dr. Babiker Abdallah, Undersecretary Email : babiker1958@yahoo.com Mobile: +249912648178 | |
| Consultant | Khalid A. Alansary – Environmental Consultant | |
| Other participants | Fade Hamade – MSIOA Team Leader Tony Barbour- Social Consultant Fatma Moustafa | |
| Main purpose of the meeting: | | |
| <ul style="list-style-type: none"> • <i>Gathering information and documentation on environmental issues</i> • <i>Consultation and discussion on the country environmental status, with focusing on water related issues.</i> • <i>Consultation on investment opportunities that of regional significance</i> | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Sudan is always concerned about the environmental consequences of the upstream developments • JICA, GIZ, AFDB are key partners in the ministry activities. The Ministry and IGAD are currently working on a climate resilience project in the livestock sector at the borders of Sudan, Eritrea and Ethiopia. • Dinder National Park is undergoing a lot of pressure due to pastoral and human activities. • Deforestation, desertification and sand dunes are major environmental concerns in Sudan. Sand dunes is causing major hazard to the Nile morphology at the northern states. • Urban and electronic waste is also among the major environmental concerns • Project Proposed by the Undersecretary for MSIOA: Climate resilience in traditional farming and pastoral activities (livestock insurance, rainwater harvesting techniques, etc). | | |
| Documents collected: | | |
| <ol style="list-style-type: none"> 1- Sudan the Land of Opportunities (Facts & Figures) 2- Sudan Post-Conflict Environmental Assessment Report – UNEP, 2006 3- Environmental Protection Act (2001) 4- Environmental Health Act (2009)- Arabic version | | |
| Follow-up activities: | | |
| <ol style="list-style-type: none"> 1- Climate Change Strategy 2- Biodiversity Strategy 3- Other environmental policies <p>To be collected from the Higher Council of Environment & Natural Resources (HCENR)</p> | | |

| SUDAN | AGRICULTURE | 02-06-2014 |
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| Organisation met | UNESCO Chair for Water Resources | |
| Persons met | 1. Dr. Yasir Abbas, phone : +249 912152563 2. Dr Salih Hamad Hamid, Senior WR Planer, shhomer@gmail.com, | |
| Consultant | Ayalew NIGUSSIE | |
| Other participants | - | |
| Main purpose of the meeting: <i>Gathering information regarding the performance of the existing irrigation schemes</i> | | |
| Key information: <ul style="list-style-type: none"> • Highlights of consultant's visit to country were discussed. • Priorities for investment in irrigation were highlighted and discussed. These include: <ul style="list-style-type: none"> ○ New expansion projects ○ Joint Investment Projects ○ Capacity building/training • There are a lot of studies conducted in the past and put on the shelf on improving the performance of the existing irrigation schemes. The major concern now is how to put these studies in to practice. | | |
| Follow-up activities: Consultant to ensure in due course to collect the above studies | | |

| SUDAN | AGRICULTURE | 02-06-2014 |
|--|---|------------|
| Organisation met | Ministry of Agriculture and Irrigation | |
| Persons met | Attendance list taken | |
| Consultant | Tony and project team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on agriculture and irrigation in Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Focus on projects is to address the issue of food security; • Heightening of the Rosieres Dam created an additional 4 BCM of water for use in irrigation; • Priority in terms of projects and developments is to enhance existing irrigation infrastructure and expand where appropriate; • Challenges exist with the management of irrigation schemes, especially when the schemes become much larger. A World Bank Report looks at challenges facing the management of irrigation schemes; • In terms of rural development and livelihood strategies, experience in Sudan has found that it takes 10-15 years for communities to effectively change their livelihood strategies. This has to be taken into account when identifying and designing new projects and investment opportunities; • Provision of extension services and technical support is critical to the success of agriculture linked projects; • Key documents identified included, Country Programme Framework for Sudan 2012-2016 (FAO), Sudan Agriculture Model (Prepared by ENTRO), Improving Livestock Farming and Marketing (Sudan Government); • In terms of livestock the separation of Sudan has created challenges, especially along the livestock routes; • Consultation with the communities has assisted to address some of these challenges. In addition hafirs have been established along livestock routes and village development committees have been established to manage the hafirs. 40% of the revenue from the sale of the water goes to the local community, 40% to maintenance and 20% to the authorities; • The communities use the revenue to build schools, clinics etc. <p>Needs and potential investment opportunities</p> <ul style="list-style-type: none"> • Capacity building and skills development; • Expansion of irrigation projects, including rain-fed mechanised irrigation; • Assessment of climate change impacts on rural communities and pastoralists. | | |
| <p>Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum.</p> | | |

| SUDAN | ENVIRONMENT | 02-06-2014 |
|---|-------------|------------|
| <p>Organisation met</p> <p>Persons met High Council for the Environment Dr Adil Mohammed and Rehab Abd El Megeed (rehab499@hotmail.com)</p> <p>Consultant Tony, Fady and Khalid</p> <p>Other participants -</p> | | |
| <p>Main purpose of the meeting: Collect and gather information on water related issues in Sudan</p> | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Council plays a co-ordinating role and headed up by the Minister of Environment; • Council is the focal point for international treaties and agreements; • Functions include review of EIAs and issuing of certificates of approval for projects; • Government departments are also subject to environmental legislation and have to undertake EIAs for their projects; • Before identifying new projects the MSIOAs should identify projects that have been selected by ENTRO/NBI in the past, which ones have been implemented and also the lessons learnt from these projects; • Biggest challenges facing the environment are posed by the petroleum sector. Threats include loss of biodiversity, pollution of ground and surface water, impact on livelihoods and movement of livestock and wildlife; • Key concerns include high use of water by irrigation schemes; • Impact of expansion of rain-fed mechanised irrigation schemes in the Dinder /Rahad River area on the Dinder National Park and also the livelihoods of pastoralists; • There is a need for effective monitoring and evaluation programmes; • Key documents identified include, NBI-Nile Trans-Boundary Environmental Action Plan, Post Conflict Environmental Report (UNEP website), National Climate Change Adaptation Plan (in final draft, request for a copy should be made through ENTRO). <p>Needs and potential investment opportunities</p> <ul style="list-style-type: none"> • Capacity building and skills development; • Assessment of climate change impacts on rural communities and pastoralists; • Development and implementation of an effective Monitoring and Evaluation Programme for projects and programmes. | | |
| <p>Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum, including NBI-Nile Trans-Boundary Environmental Action Plan, Post Conflict Environmental Report (UNEP website), National Climate Change Adaptation Plan.</p> | | |

| SUDAN | AGRICULTURE | 01-06-2014 |
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| Organisation met | Dam Implementation Unit | |
| Persons met | Attendance list taken | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on water related developments in Sudan | | |
| Key information: | | |
| <ul style="list-style-type: none"> • The MSIOA should also manage expectations, and in doing so be realistic; • The focus of development in Sudan is linked to agriculture, specifically irrigation; • In terms of Sudan's policy, the first priority is food security, the second is generate revenue from cash crops; • Local water supply scheme (hafirs) being developed in Sudan. Very effective, have built 240 hafirs, each hafir supports 3000-4000 pastoralists. Has resulted in improvement of health of pastoralists and their livestock, reduced conflict with farmers, etc. | | |
| Potential investment opportunities | | |
| <ul style="list-style-type: none"> • Repair and up-grade existing irrigation schemes; • Capacity and skills development; • Look at incorporating hafir program into projects, such as the Dinder – Rahad project. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum; | | |

| SUDAN | ENVIRONMENT | 02-06-2014 |
|--|---------------------------------|------------|
| Organisation met | Ministry of Environment | |
| Persons met | Attendance list taken | |
| Consultant | Tony, Fady, Dr Fatma and Khalid | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on environmental issues in Sudan | | |
| <ul style="list-style-type: none"> • Key information: • For Sudan most of the environmental issues have regional implications, specifically the impacts associated with up-stream developments on the Blue and White Nile; • 2001 Environmental Act is the key environmental act in Sudan; • The Higher Council of the Environment oversee EIAs etc.; • Sudan is part of the Panel for Climate Change and also part of the Arab Group on Climate Change; • Biodiversity impacts are linked to people and livestock pressure; • Pressure on the Dinder National Park from farmers and pastoralists (10 villages are located in the Dinder wetland area and pressure from rain-fed mechanised agriculture); • Ministry of Agriculture have information on pastoralists; • Mercury pollution from gold mining is an issue; • Desertification is an issue, linked to climate change and people pressure; • New rain-fed mechanised agriculture areas are required to maintain 10% of area as a conservation area. For normal irrigation the area is 5%. If this is not set aside the state does not provide funding, so an effective management tool. <p>Potential investment opportunities</p> <ul style="list-style-type: none"> • Project linked to Dinder/Rahad catchment focusing on livelihoods of pastoralists, trans-boundary park concept etc.; • Capacity and skills development. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum. | | |

| SUDAN | HYDROPOWER | 01-06-2014 |
|---|--|------------|
| Organisation met | Ministry of Water Resources and Electricity | |
| Persons met | Attendance list collected | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on water and electricity sector in Sudan | | |
| Key information: | | |
| <ul style="list-style-type: none"> • Need to avoid possible duplication with JMP 1, is there a linkage between this study and JMP 1; • During JMP a number of projects were identified, these projects need to be listed as part of the MSIOA project; • JMP focussed on the Blue Nile, the MSIOA focus is on the entire EN basin; • Due to sanctions against Sudan it is difficult to access funding for projects. The MSIOA creates a potential opportunity to access funding for projects; • Sudan has a lot of land that is suitable for irrigation and held to address food security in the region; • Ethiopia has potential to generate relatively affordable energy for the region; • Lack of information and advice on how to use fertilisers, pesticides and herbicides properly and safely (high cancer rates among children growing concern, specifically in irrigation scheme areas); • Climate change, the presence of large, well-run irrigation schemes provides food security for impacts associated with climate change and poor rainy seasons; • Climate change will have a bigger impact on rain-fed agriculture; • GERD will improve efficiency of irrigation schemes due to trapping of sediment. 50% of operating costs linked to removing sediments; • Irrigation schemes on the Blue Nile more efficient than those on White Nile due to use of gravity fed irrigation. Pumping required on the White Nile. Focus on projects should therefore be on gravity fed projects; | | |
| Potential investment opportunities | | |
| <ul style="list-style-type: none"> • Integrated catchment management plan for the Dinder/Rahad catchment area, including conservation area, rain-fed mechanised agriculture, opportunities for pastoralists etc.; • Rehabilitation of existing irrigation schemes to improve productivity and reduce water consumption, including capacity building and skills development; • Watershed management projects and programmes, including focus on capacity development and access to resources; • Development of new large irrigation schemes that are gravity fed; • Sudan would like to see a "Package of Projects" identified that create the opportunity for regional co-operation and also create the opportunity for linkages, such as irrigation, water and energy; • Power supply projects that can be linked to other opportunities, such as irrigation and water supply. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum. | | |

| SUDAN | WATER MANAGEMENT | 01-06-2014 |
|--|------------------|------------|
| <p>Organisation met</p> <p>Persons met Ministry of Water Resources and Electricity Prof. Seifeldin H Abdalla seifeldin_eltaim@yahoo.com</p> <p>Consultant Tony, Fady and Khalid</p> <p>Other participants -</p> | | |
| <p>Main purpose of the meeting: Collect and gather information on water and electricity sector in Sudan</p> | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • The plans submitted by Sudan to ENTRO as part of the JMP have not changed. List of these plans, projects should be obtained from ENTRO; • The MSIOA will look at this list and assess potential projects; • Sudan has 25 year plans, so there are no new plans or projects; • Sudan faces challenges in securing finances; • MSIOA should not focus on small projects, but focus should be on large, trans-boundary projects. MSIOA should identify a large, anchor project that maximises benefits of regional cooperation. The focus should be on regional priorities not national needs; • Consultation is required to build consensus and get agreement on projects; • MSIOA also needs to take into account comparative advantages of different countries (Sudan, irrigation, Ethiopia, water supply and hydropower). <p>Potential investment opportunities</p> <ul style="list-style-type: none"> • Projects must promote integration and country cooperation; • Hydropower and interconnections between countries; • GERD; • Watershed management and erosion control; • Capacity and skills development; • Institutional development and capacity. | | |
| <p>Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum;</p> | | |

| SUDAN | TRANSPORT | 02-06-2014 |
|--|------------------------------|------------|
| Organisation met | Ministry of Transport | |
| Persons met | Attendance list taken | |
| Consultant | Tony, Fady and Khalid | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on water related issues in Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Main focus is on in-land river transport. The White, Blue and Main Nile are the major transport routes; • The development of the road and railway network over the last 10-15 years has reduced the role of river navigation, especially along the Main Nile to the north of Khartoum; • However, there is potential to use the river to transport material, such as cement from the cement factories to the north to Khartoum; • Five ferries used to operate along the section of the Main Nile to the north of Khartoum. The role of these ferries has been replaced by the construction of bridges over the Main Nile. 5 bridges have been built in the last 6-8 years. • Inland navigation authority was established in 1980; • There is limited river transport infrastructure on the Blue Nile; • Studies are currently being undertaken to look at potential for navigation on the Blue Nile. However, these studies have not taken into account the impact of GERD (positive and negative); • The department indicated that they had statistics on the volume of material and number of passengers transported by river per annum; • In terms of the flow of materials to the south, the majority of the materials flow from Sudan to South Sudan. Very little material is transported from South Sudan to Sudan via the river; • There are two passenger boats that operate along the Main Nile. These boats can accommodate 600 passengers each. <p>Needs and potential investment opportunities</p> <ul style="list-style-type: none"> • Need to up-date navigation studies to include information from GERD | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum. | | |

| SUDAN | HYDROPOWER | 01-06-2014 |
|---|--|------------|
| Organisation met | Ministry of Water Resources and Electricity | |
| Persons met | Attendance list collected | |
| Consultant | Tony and Project Team | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on water and electricity sector in Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • Maximising efficient use of water, especially from seasonal rivers with catchments in Ethiopia, such as the Dinder and Rahad Rivers; • Food security, development and energy; • Community based watershed management programmes; • Grand Ethiopian Renaissance Dam (GERD) and cascade development on the Blue Nile is a key issue, specifically with regard to downstream impact. GERD and cascade development require more detailed studies; • Expansion of irrigation schemes (hard investment) and development of best practices (soft investment, such as water conservation, selection of right crops etc.); • Ground water pollution of aquifers, such as the Numbian Sandstone; <p>Potential investment opportunities</p> <ul style="list-style-type: none"> • GERD and cascade development. Hard investment in projects, but also soft investment in studies to assess impacts and benefits; • Expansion of electricity network; • Expand and improve efficiency of irrigation schemes. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum; | | |

| SUDAN | Water Management | 02-06-2014 |
|--|--|------------|
| Organisation met | Water Research Division, University of Khartoum | |
| Persons met | Dr Gamaledin Murtada, Dr Khamaledin Bashar, Dr Jamal and Fatima Taha fatoon.taha@gmail.com, fatima.taha@uofk.ed | |
| Consultant | Tony and Fady | |
| Other participants | - | |
| Main purpose of the meeting: Collect and gather information on water related issues in Sudan | | |
| <p>Key information:</p> <ul style="list-style-type: none"> • New centre established in 2012 within the faculty of Engineering; • Does research and offers post graduate study opportunities, MSc's and PhD's.; • One of the PhD's is looking at the impact of GERD; • Fatma Taha is looking at issue of trans-boundary water management, and potential opportunities for co-operation; • The research unit held a conference in March 2014. Fatma will provide copies of proceedings; • The MSIOA situational analysis should be focussed at a strategic, high level; • Fatima Taha gave presentation on opportunities and constraints in Sudan for investments (copy provided to the team); • Dr Jama provided presentation on mineral and mining potential of Sudan (copy provided to the team); • Water related issues associated with mining include pollution and supply issues; • Potential for transporting material via the Nile River is large and has not be fully developed; • Water supply for human consumption is an issue. 45 % of the population in Sudan do not have access to clean water; • 90 % of population use pit latrines, only 10% have access to flush toilets; • Up-grading sanitation in Sudan will place pressure on water supplies; • Water supply and sanitation are key issue in Sudan, especially in large centres, such as Khartoum. <p>Potential investment opportunities</p> <ul style="list-style-type: none"> • Transportation along the Nile; • Expansion of irrigation schemes, including rain-fed mechanised irrigation; • Water supply and sanitation related projects; • Water harvesting; • Education, training and capacity building in field of water resource management and engineering. | | |
| Follow-up activities: Collect reports and documents. Key documents to be collected by the ENTRO representative in Khartoum. | | |