GRAND ETHIOPIAN RENAISSANCE DAM

CONSULATE GENERAL OF ETHIOPIA
LOS ANGELES

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GRAND ETHIOPIAN RENAISSANCE HYDROPOWER DAM PROJECT AND ITS SIGNIFICANCE

On April 2nd 2011, at Guba in the Beneshangul Gumuz Regional state of Ethiopia, H.E. Prime Minister Meles Zenawi formally launched the largest engineering project ever attempted in Ethiopia – the Grand Ethiopian Renaissance Hydropower Dam of Project (GERHDP) over the River Abbai (Blue Nile).

A succession of Ethiopian leaders have either sought to assert their right to an equitable share of the Nille waters or to carry out various projects in different parts of the country, but the launching of the Grand Ethiopian Renaissance Dam is of particular importance. Its sheer size and cost stand out. The reservoir of the dam will be twice as large as Lake Tana. It will generate more than 5250 megawatts of power. The estimated cost is around 80 billion Birr.

Equally, its special importance emanates from the enormous symbolic value it holds. The Nile has been an object of fascination to Ethiopians and a source of popular art and myth for centuries.

It is also highly symbolic that the project is being launched as Ethiopia is making strenuous and successful efforts to caste off its image as a famine-ridden nation. The sense of euphoria in the country is only too palpable.

At the same time in a larger sense, the reaction of the people speaks volumes about their dedication and commitment to rid the country of poverty. Ethiopians are very aware that the country has been forced to foot the bills for all the hydroelectric projects built so far, largely because international organizations have been reluctant to assist due to pressure from other countries. The Renaissance Dam has been no exception. Its cost will be totally covered by the Government and people of Ethiopia. The outpouring of public support is an expression of defiance against these pressures and a clear testament that nothing will deter the nation from such an ambitious and rewarding project.

It has been an impressive display of patriotism and single-mindedness that has surpassed the government's wildest expectations. Thousands have bought bonds, and many have gone beyond this to contribute significant amounts of their earnings to the cause of the Renaissance Dam. Civil servants, farmers, businessmen, military personnel, students, even prison inmates, and Ethiopians of all religious background, have offered their support in mass. The whole nation has spoken together in a striking testament to the great significance Ethiopians attach to the project.

The decision to build the Grand Ethiopian Renaissance Dam is a central element in the country's ambitious Growth and Transformation Plan for the transformation of the economy through sustainable provision of cheap power. It will help mobilize the necessary resources to unlock economic development by exporting power to the neighboring countries, and demonstrate the Government's commitment to strengthen cooperation and equitable utilization by all the riparian Nile states, and the benefits that will accrue to all.

Ethiopia hopes the downstream countries will fully appreciate the benefits they will gain. The reaction has been largely encouraging with officials and politicians speaking in terms of co-operation and dialogue. As Prime Minister Meles has indicated, Sudan and Egypt have much to gain from co-owning the project. The benefits will be mutual.

The message that this project sends is very clear. There can be no turning back from the grandest of all projects, namely to pull Ethiopia out of the quagmire of poverty. Equally, this will create opportunities for all those who have been reluctant to participate in the past, to think again and

become involved in this monument to peoples of Ethiopia, and to the their lasting commitment to the eradiation of poverty in Ethiopia and to the world of cooperation among the countries of the Nile Basin and the Horn of Africa.

PREPARATION FOR THE REALIZATION OF THE GERHDP

Ethiopia has long been interested in exploring the possibilities of building a dam on Lake Tana. For example, in 1927 Ethiopia reached an agreement with J.G white Engineering Corporation of New York, for a number of engineers and experts to visit Lake Tana and study the feasibility of building a dam at the source of Blue Nile.

The U.S Bureau of Reclamation also carried out substantial work, including a survey of the Blue Nile Basin (1956 – 1964). It proposed four potential hydropower sites for the river with a proposed capacity three times that of the Aswan High Dam. The current site is one of those noted at the time. In 1962, a German engineering team also carried out further studies of the waters of the Abbai.

Other states in the region also endorsed these ideas. In 2008 the Eastern Nile Power Trade Studies carried out prefeasibility studies at three sites in the Abbai Gorge under the auspices of the Nile Basin Initiative/Eastern Nile Subsidiary Action Program (NBI/ENSAP) in which Egypt had been taking an active part. These studies confirmed the suitability of the present site along with others for hydropower generation and for the promotion of interregional trade in power supplies.

The same year, in December, the Egyptian Minister of Investment sent a letter to the world Bank, under the auspices of NBI/ENSAP and on behalf of the three NBI/ Eastern Nile countries (Egypt, Ethiopia, and the Sudan) requesting World Bank assistance in mobilizing donors to finance the first regional project, the anchor of which would be large-scale hydropower infrastructural development in the Abbai Gorge.

That year the World Bank commissioned an independent scoping study, in which Egypt took active part. This confirmed the feasibility of a multi-purpose anchor hydropower infrastructure in the Gorge and the possibility of multiple win-win benefits to all three countries.

The gorge of the Blue Nile favors the construction of dams to generate power. The findings of these and other studies reveal that the Blue Nile has a power potential of 10,000MW. Ethiopia in fact could not only satisfy most of its own needs but also export electricity to the Sudan and Egypt, as well as the Arabian Peninsula.

According to the experts, the amount of water available to the downstream riparian states would not be affected. Even if Ethiopia drew significant quantities of water, Egypt and the Sudan would still benefit from the construction of the reservoirs in Ethiopia.

Why has Ethiopia not utilized this development potential in the past? The reason is partly because its agriculture is largely rain fed, and partly because the political strife that others helped to instigate forced it to divert scarce resources from development into security and defense. More recently Ethiopia has devised policies and strategies to allow for more development in agriculture and power sectors. One element of this is the Grand Ethiopian Renaissance Hydropower Dam Project.

The project falls within the far-reaching framework of exploitation and management of the resources of the Blue Nile for energy production and irrigation. The entire scheme for the river covers the construction of five plants, the last of which will be the largest and most

important. The feasibility study for the project was developed and updated in light of developments over the previous 3 decades.

The first and second site surveys were carried out in October 2009 and July to August 2010 respectively by Studio Petroangeli. The surveys involved verifying correspondence of the site with the main morphological, geological and environmental data acquired from remote sensing techniques and existing documents. Other elements covered water levels, a preliminary topographic survey, and access routes to the main structures of the project, surface geology and rock sampling as well as a geo-seismic survey.

An up-dated Master Plan for the management and exploitation of the water resources of the Blue Nile was presented on 7 June 2010.

This was followed on 16 November by presentation of the basic design for the project. This consists of a main report, annexes of drawings, topography and geological reports, hydrological and environmental studies, and cost and economic analyses which include hydraulic and stability calculations.

The environmental and social studies carried out were submitted to the respective authorities for review and approval. The downstream impact analysis now being studied is based on previous studies.

According to the implementation program, the first two units will start generation within 44 months, in August 2014. The project will be totally completed in July 2017.

In order to implement such a large project an effective governance structure has been devised. The National Steering Team of the Growth and Transformation Plan (GTP), the Ministry of Water and Energy and other involved regulatory bodies will follow the project closely and ensure its smooth implementation. The management board and team of Ethiopian Electric Power Corporation (EEPCO) will be directly involved in following up implementation on a regular basis.

An effective project management unit has been put in place with properly recruited and reputable staff with knowledge of the background of the project.

BENEFITS OF THE DAM

The objectives of the project are to generate electric power with installed capacity of 5,250MW, with an annual energy production of 15,130 GWH/year, and balance the demand/ supply difference that the country has been facing as a result of its expanding development.

Ethiopia cannot meet its Millennium Development Goals (MDGs) if its energy supplies are constrained. It cannot sustain the economic growth necessary for poverty reduction.

It cannot reverse the alarming land degradation and soil erosion, often caused by deforestation in the search for fuel and for charcoal production. It cannot stop poor and desperate households from cutting trees without providing an alternative-in other words an affordable cheap energy supply.
This is also critical to ease the literally back-breaking burden on women and promote gender equality. It is the women in rural areas who bear the burden of travelling tens of kilometers to collect firewood daily.

On the wider level, the project will also enhance other areas, including navigation on the river, tourism and fisheries as well as improve the climate of the area. It will create numerous job opportunities and improve local livelihoods. Clean and renewable energy at cheaper prices will be made available to the region.

The dam will be located in an area in which there are no significant human settlements or economic activities. In fact, the project will have positive environmental and social impact, and involve minimal social and environmental costs.

The reservoir does not entail any significant consumption or withdrawal of water which might affect downstream (DS) countries. Indeed, on the contrary, there are multiple benefits which will accrue to DS states.

Reservoir filling can be carried out in consultation with DS countries to ensure coordination with existing DS operations. The design is flexible enough to allow reservoir impoundment without significantly affecting DS operations.

Other benefits include water conservation. The GERHDP will minimize the evaporation loss from dams located in less favorable downstream desert settings. A total of close to 19 billion cubic meters (BCM) of water evaporators from the Aswan High Dam and other dams in Sudan (of this evaporation from Aswan alone amounts to 14.3 BCM) annually. Evaporation at the Jebel Aulia dam in Sudan amounts to 3.5 BCM annually from 1.75 BCM storage capacity. By contrast evaporation loss from the full development of the GERHDP is likely to be no more than 0.4 BCM.

In fact, the development of GERHDP will encourage the decommissioning of wasteful dams like Jebel Aulia and reduce the operating level of the Aswan High Dam, and other dams in Sudan. The result will be saving of over 6 BCM of water for the Nile system annually.

Another plus will be in sediment management. Most of the dams in Sudan are suffering from silting with the effect they have lost over 50% of their live storage capacities. Downstream hydraulic infrastructures, especially when complemented by integrated watershed management, would benefit from the construction of the GERHDP. The amount of sediment reaching dams and water conveyance structures in Sudan and Egypt will start to be reduced as soon as the first impoundment starts.

The project will have a major impact on mitigation of drought and on flood management. A number of important studies indicated that semi-arid and arid countries to be more affected by climate change than temperate countries. A recent study commissioned by the Eastern Nile Technical Regional Office, for example, concluded that water infrastructure development, including reservoir construction was one of the five pillars identified to adapt or mitigate extreme hydrological events, including the alteration of droughts and flooding, most likely to be caused by climate change.

As for navigation, the GERHDP will allow for regulated and sustainable minimum flow levels in the dry season. This will mean reliable downstream navigation will be possible.

Sustainable and regulated flow will also allow for increased agricultural production, ensuring reliable all season supply to DS irrigation schemes, thus, reducing harvest losses caused by water shortages during critical growing periods.

Regarding energy and power production, GERHDP will allow underperforming DS hydropower schemes to perform more effectively as there will be more reliable sediment free, and regular availability of water. Indeed, this will make the building of new dams redundant. Increased power availability for the entire system will also enhance regional power trading among the three countries, Ethiopia, Sudan and Egypt.

Even further, this regional integration, expanded trade and cooperation will also provide for encouraging the building of confidence and lay the cornerstone for mutually beneficial and diversified trade and investment among these three states.

EXPECTATIONS

The reaction of the peoples of Ethiopia to the project speaks a lot about their dedication and commitment to carry through the campaign to rid the country of poverty. Clearly the project is the largest infrastructural project ever undertaken by Ethiopians. Ethiopians are fully aware of the fact that the country has been forced to foot the bills of hydroelectric project it has so far managed to build mainly because most international financiers are reluctant to go ahead with these projects due to pressure from other countries. The Renaissance Dam is not an exception and its cost will be totally covered by the Ethiopian Government.

The outpouring of the public's support is thus defiance against any such pressure and a clear statement that nothing whatsoever shall deter the nation from embarking on such an ambitious but potentially rewarding project.

So far the participation of the public has been exceptionally encouraging. In Addis Ababa alone, it is expected that more than 7 billion birr, or roughly 9 per cent of the cost of the project will be collected. With the participation in large numbers by hundreds of thousands of farmers who are now making extra-money as a result of successful rural development program, the amount of money that is exacted from this scheme is going to be very significant.

But the purchase of bonds goes far beyond the government's plan to finance the construction of the Renaissance Dam. In fact the most important reason why this scheme was launched in the first place is to encourage Ethiopians to save money-a very important element of the Growth and Transformation Plan. Without strengthening a culture of saving, whatever gains are made as the result of the GTP will only be ephemeral.

Therefore, ensuring the successful transformation of Ethiopia into a Middle Income economy in a few years-an important aspect of ensuring Ethiopia's renaissance – will necessarily require that people save part of what they earn thereby ensuring the sustainability of the economic growth. It is altogether fitting and proper that such a huge task of transforming the society should start with an equally huge project of far reaching economic, social as well as symbolic significance to Ethiopians.

The renaissance Dam has helped mobilize millions of Ethiopians in a euphoric campaign to buy bonds clearly demonstrates that even before completion, the project is initiating millions into a culture of saving without which the transformation of the nation cannot be achieved. In that sense, the Renaissance Dam has already shown promise that it will indeed remain true to its name.

All Ethiopian diplomatic missions are mobilized and the engagement of the Ethiopian Diaspora started to help raise funds. They will be able to play a major role in raising interest in the purchase of Government bonds, and in encouraging support for a project which offers so much for the sustainable development of the country.

TECHNICAL FEATURES OF THE DAM

The GERHDP project is located approximately 750 km northwest of Addis Ababa on the Abbai River, in the Beneshangul Gumuz National Regional State of Ethiopia.

The works will mainly consist of a Roller Compacted Concrete (RCC) dam, two powerhouses, a gated spillway and a rock-fill saddle dam.

The main dam which will have a volume of approximately 10MCM, a length of 1780 meters and height of 145 meters, will be a RCC gravity

dam, divided in three sections: right bank, central section and left bank.

The central section will be used as a stepped spillway. This will create a reservoir that covers, at full supply level, an area of 1,680 sq. km and hold a volume of 63 Billion cubic Meter (BCM) of water. The normal and minimum operating water levels will be 640 and 590 meters above sea level respectively, and the reservoir volume at minimum operating level is to be 12 BCM.

The two powerhouses will be at the downstream of the main dams: one on the right bank and the other on the left bank. They will accommodate 10 and 5 Francis Turbine Units respectively, with a total installed generating capacity of 5,250MW.

The reservoir level will be controlled through three spillways, designed to cater for a probable maximum flood (PMF) of 19,370cu mt/s.

The saddle dam, with a maximum height of 60m and approximate volume of 17 MCM will have a curved axis and a length of approximately 4,800 meters. The cross section will include an impervious asphalt core with the relevant upstream and downstream transition. The dam body is to be made of material obtained from the spillway excavation, whilst selected rip-rap will constitute the slope protection. A wave protection wall will be placed on the 4m wide crest.

A 500KV double bus-bar switchyard will be set up about 1.4 km downstream of the main dam. The switchyard will include incoming bays from the transformer feeders at the power plant and the outgoing transmission line bays.

The first major step in the schedule will be the diversion of the river through diversion culverts. This will take place at the beginning of the 2012/2013 dry season. The river will be diverted to enable the construction of the central section of the dam and will be carried out using four culverts constructed in the dam body.

The central section of the dam will be kept lower than the right bank and left bank sections to serve as a spillway and allow for rainy season floods. This arrangement will also allow for the construction of the main dam body to proceed on both river banks during the rainy season.

The aim is to complete construction of the main dam by June 2016.