Project -5-

HYDRO-ENERGETIC, HYDRO-URBAN, AND HYDRO-AGRICULTURAL SYSTEMIZATION OF LAKE VICTORIA IN UGANDA AND TANZANIA
(Without the Construction of Dams and Reservoirs)

NEW HYDRO-ENERGY SCHEME GENERATES OVER E=35 GWH, PRODUCING 7 TIMES MORE ENERGY AND AT HALF THE COST OF EXISTING PROJECTS.

office@waterwaysengineers.com
bealbac@gmail.com

VISION.

- **The Infinite Field of Africa.**
- **With plenty of water and sunlight, it is the future of Europe.**
- **Africa needs studies and comprehensive, all-inclusive projects.**
- **Africa is an entire precious diamond. But it is unknown, unstudied, and unused.**
- **Modest WE projects serve Africa's prosperity.**

THE PROBLEMS.*

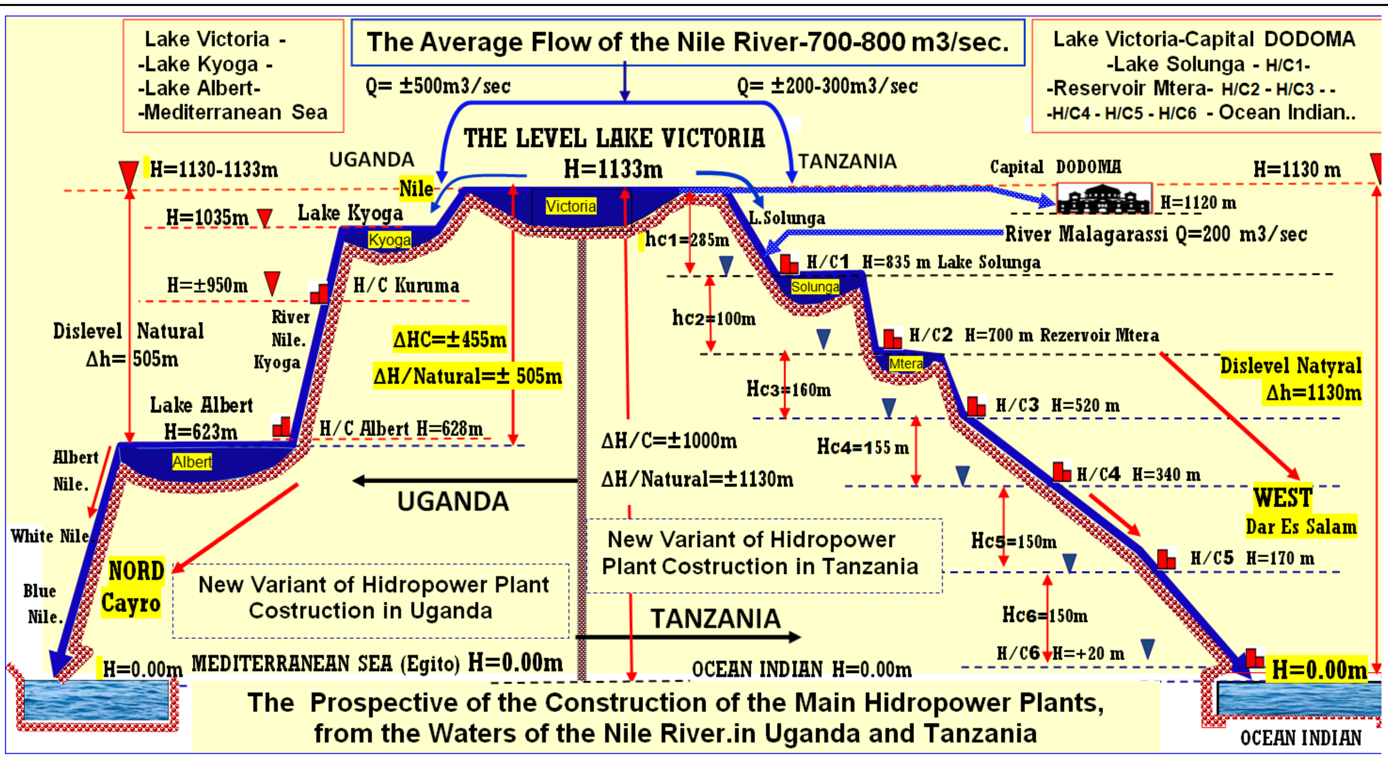
1. **Water Engineers** have studied the terrain and water resources of Equatorial Africa, specifically in Uganda, Tanzania, and the DRC (Democratic Republic of the Congo). From this study, two conclusions were drawn:
2. **First:.**Africa is an extremely vast plain, often described as an endless field from East to West and from North to South (3000-5000 km), with a slope of I = max 0.5m/100m or 5m/km. The terrain is suitable for agricultural production, capable of yielding up to three crops per year, and is also highly suitable for the construction of railways.
3. **Second:** Africa has an abundance of water at high altitudes. At an elevation of 1133-1135m lies Lake Victoria. Surface area: 68,870 km^2, Lake length L=337 km, Width=240 km, Average depth h=81m,Water volume V=2750 km^3, Annual discharge V=700-800 m^3/sec.The catchment basin area Sb=238,900 km^2.
4. Tanzania owns 49% of Lake Victoria's surface water area but does not utilize its waters. It supplies electricity to 77% of the population,while 50-66% of the population has access to drinking water.
5. Uganda owns 45% of Lake Victoria's surface water area and utilizes around 15-20% of the water, primarily for electricity generation. It supplies electricity to 57% of the population, while 79% of the population has access to drinking water.
6. From Lake Victoria flows the Victoria Nile at an elevation of h=1133-1135m, and after Lake Albert (h=625m) begins the White Nile It joins the Blue Nile to form the Nile River, which flows through Cairo (Egypt) and empties into the Mediterranean Sea.The Nile (L=6650 km), the longest river in the world, is a vast, green, and fertile river.
7. The master plan for hydroelectric power production from the Victoria Nile, developed by the Ugandan government, is lacking. The plan relies on classic schemes for building dams and hydroelectric plants along the irregular riverbeds of the Victoria Nile and Kyoga Nile, which flow through Uganda from Lake Victoria (h = 1135m) to Lake Albert (h = 625m). The study does not fully exploit the entire elevation difference between Lake Victoria and Lake Albert **(h = 510m) for electricity generation due to topographical variations in the Nile Riverbed.**
8. At an elevation of h = 768m is the large Lake Tanganyika, which discharges V = ±200 m^3/sec into the Lukuga River but is not used for electricity generation or agricultural land. The discharges from Lake Tanganyika flow into the Congo River, which has an average flow rate of V = 47,000 m^3/sec, showing that there is an abundance of water and no need for discharges from Lake Tanganyika.

CONCLUSIONS OF THE STUDY.

1. **Water Resources and Land in Equatorial Africa**: The analysis shows that Uganda does not utilize the water of the Nile River for energy production through the Nile River cascade within its territory. The total available difference is H=510m, but the dams and hydroelectric plants built do not utilize nearly 120m of this potential.
2. **Use of Nile River Water**: The water of the Nile River is not used for agricultural needs or urban and municipal purposes. Geographically, the Nile River is located in the eastern part of Uganda, far from urbanized areas or regions.
3. **Assessment of Tanzania**: Similarly, Tanzania does not utilize any water from Lake Victoria for electricity production, nor for agricultural, urban, or municipal needs.
4. **Proposed Project**: Our project envisions a new hydro-energy and hydro-urban scheme for Uganda and Tanzania, aiming to fully systematize water and land between Lake Victoria and Lake Tanganyika. This project includes the organization of land and urban areas to improve water access in Uganda and Tanzania through the construction of canals and other infrastructure.

OBJECTIVES OF WATER ENGINEERING PROJECTS (WE)

1. **New Hydro-Energy Scheme**: WE projects have designed a new hydro-energy scheme to utilize the water from Lake Victoria for electricity production for Uganda and Tanzania.
2. **Improvement of Efficiency and Reduction of Costs**: This new hydro-energy scheme is expected to generate 5-7 times more energy at half the cost of existing projects. The project also includes organizing the water network for irrigation, potable water supply, and urban services.
3. **Main Concepts of the Project**: The basic concept is that the water of Lake Victoria should be utilized primarily by Uganda, Tanzania, and Kenya. This plan is in line with the Turkish GAP project model, which serves as an example.



office@waterwaysengineers.com........................ bealbac@gmail.com

*

WATER ALLOCATION FROM LAKE VICTORIA*

1. Water Allocation for Uganda**: A maximum water volume of V=500 m^3/sec will be allocated to Uganda from Lake Victoria. This means that 500 m^3/sec will flow through the new channel of the Nile River, and not the entire current flow of the Nile.
2. Water Allocation for Tanzania**: A maximum water volume of V=250 m^3/sec will be allocated to Tanzania from Lake Victoria. This means that 250 m^3/sec will flow through the new Lake Victoria–Lake Solunga canal.
3. **MAINTENANCE OF NILE RIVER FLOW**:** For the original Nile River bed, 50 m^3/sec of water will be released, plus water from tributaries or corresponding basins. Lake Victoria and Lake Kyoga span a distance L=420 km across Uganda, from Lake Victoria (elevation 1,135m) to Lake Albert (elevation 625m), with a height difference Dh=510m (1,135-625). After Lake Albert, the flow of the Nile continues into Sudan.

UGANDA'S COMPLEX HYDROENERGY PROJECT

1. Geography and Water Supply**: Uganda has a land area S=236,040 km^2, of which 36,330 km^2 or 17.4% is covered with water. The project envisions the full diversion of the Victoria Nile and Kyoga Nile rivers from the shortest route from Kampala (the capital), near Lake Victoria, to Hoima and Butiaba, reaching Lake Albert, covering K=210 km. A hydroelectric power station will be built in Hoima with a drop height h=320m, and another in Butiaba with a drop height h=135-160m, achieving a total height utilization H=455-480m, or 90-95% of the total height of the Nile River cascade in Uganda Dh=510m.

2. Electricity Production**: This project aims to generate more than E=20-24 GWh, which is five times more than the electricity production forecasted by Uganda's state study. The diverted Nile River will pass through Uganda's more urban and agricultural areas, including Mbig, Muhende, Lowero,Hoima, Kobale, and Kibonga. The new riverbed will have a low slope, making it navigable, improving the environment, assisting agriculture, and providing drinking water to several regions.

3. Construction Approach**: The diversion of the Nile will be implemented without interrupting energy production or other activities along the existing riverbed. The project will use the most suitable non-productive land, and the hydroelectric stations will be built with diversion canals, eliminating the need for dams or reservoirs.

TANZANIA'S COMPLEX HYDROENERGY PROJECT*

1. The project envisions that Tanzania will utilize 250 m^3/sec of water from Lake Victoria. This water, along with the Malagarasi River and water from corresponding basins, will be processed in a new hydro-energy scheme and released into the Indian Ocean, using a height difference Dh=1000m.

2. Geography and Capital Development:** Tanzania established its capital, Dodoma, in the central part of the country at an elevation h=1120m in 1973, replacing Dar es Salaam. Lake Victoria, situated at an elevation H=1135m, is 15 meters higher than the capital Dodoma.

3. Proposed Water Route:** The project involves building a navigable channel connecting Lake Victoria to Dodoma, spanning a distance L=480-520 km with a slope I=0.03/km (height difference H=1135-1120). This channel will regulate the environment and meet urban and communal needs in Dodoma.

***Sulunga Lake and Hydroelectric Power*:**

1. About 80 km west of Dodoma, there is a large depression or lake, Sulunga, situated at an elevation of H=825m. A hydroelectric power station, H/C1,will be built at H=835m,with a drop height h=285m and a flow rate Q=±300 m³/sec.This will combine water from Lake Victoria (Q=250 m³/sec) and the Malagarasi River (Q=50-100 m³/sec).

Contribution of the Malagarasi River:**

2. The project envisions that ±50% of the annual flow from the Malagarasi River (50-100 m³/sec) will be released into Lake Sulunga. The waters from Lake Victoria and the Malagarasi River will be combined and processed together at the hydroelectric power station at Lake Sulunga

3. Mtera Reservoir and Hydroelectric Power:**

4. About 100 km to the east, near the Indian Ocean, Tanzania has constructed the Mtera Reservoir at an elevation of H=700m, along with a small hydroelectric power station. A ±80 km canal will transfer water from Lake Sulunga (±300 m³/sec) to the Mtera Reservoir.

5. Energy Flow at the Mtera Hydroelectric Power Station:**

6. The flow at the Mtera hydroelectric station will be Q=±350 m³/sec, and the small station will be reconstructed to handle flows over Q=30 m³/sec.

7. Hydroelectric Stations After Mtera Reservoir:**

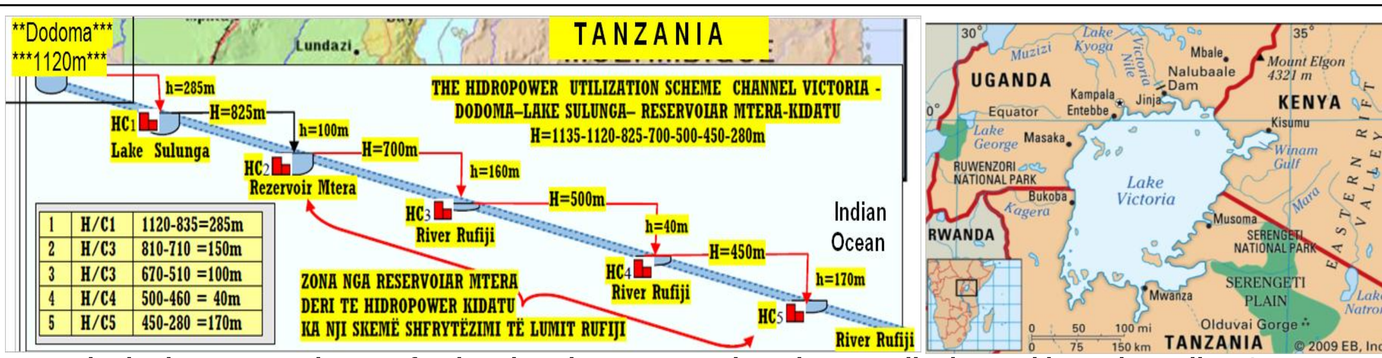
8. After the Mtera Reservoir, several hydroelectric stations will be constructed and refurbished following a stepped system, utilizing water from the Mtera Reservoir and the Rufiji River basin waters.

****TANZANIA'S COMPLEX HYDROENERGY PROJECT (Continued)****

1. Construction and Expansion of Hydroelectric Stations:** The project includes the construction of new hydroelectric stations and the expansion of six existing hydroelectric stations downstream of the Mtera Reservoir, extending to the Indian Ocean coastline (Dar es Salaam). This may involve rebuilding the entire existing hydroenergy scheme of Tanzania downstream of the Mtera Reservoir or a new scheme in the Rufiji River valley. The goal is to fully exploit the height difference from Lake Victoria (H = 1135m) to the Indian Ocean level. The project aims to use the height difference of up to 1000m.

2. Hydroelectric Power Production:** According to classical calculations, the new hydroenergy scheme will produce over 20 billion kWh or 20 GWh per year. This means that with proper water management, Lake Victoria could produce over 35 GWh per year, without the need for building dams or reservoirs.

3. Inclusion of Rufiji River Tributary Waters**: The construction of hydroelectric stations from Lake Sulunga to the Indian Ocean, located in the Rufiji River valley, requires the inclusion of all tributary flows from the Rufiji River to be combined with the water from Lake Victoria coming from Lake Sulunga. All waters will be processed according to the new hydroenergy scheme.



The hydropower scheme of Lake Victoria's waters when they are discharged into the Indian Ocean.

THE CONNECTION BETWEEN LAKE VICTORIA AND LAKE TANGANYIKA:

1. **The project also proposes the connection of Lake Victoria with Lake Tanganyika through Lake Sagara, creating a navigable route.**This is technically and topographically feasible; however, the canal is **1710 km long**,making it excessively long with no economic or environmental interest.It would have high maintenance costs and significant annual evaporation,up to Av=2 m^3/m^2*.
2. **Integration of Smaller Lakes:** As part of the water management system, the project plans to channel water from the smaller Mweru and Vantipa lakes into Lake Tanganyika. Currently, excess water from these lakes flows into the Luvua River, which then passes it into the Congo River.
3. **Complex Hydro-Energy and Hydro-Urban Systems:** The water and land management projects, through water canals and energy production without the need for dams or reservoirs, would generate seven times more electricity at half the cost compared to existing studies and projects.
4. **At the Leipzig Fair in 2019, we presented a portion of our projects, explaining to senior representatives of the African Development Bank the terrain of the African lowlands and the abundant water resources at higher altitudes.** They admitted that they were unaware of these resources. They approved the concepts of our comprehensive studies, concluding that investments in limited projects within a country were inaccurate. Lake Victoria and other African waters transcend national borders. Initially, a collaboration was launched, but unknown forces hindered the Hydro-Urban, Hydro-Energy, and Hydro-Agricultural project for the waters of Lake Victoria………………………………

Autors.

WATERWAYS ENGINEERS

MARITIME WATERS AND HUMAN SOCIETY:
THE NECESSITY FOR THE DEVELOPMENT OF MARITIME ROAD INFRASTRUCTURE

1. **The benefits to human society from maritime waters are immeasurable.**
2. **Studies, designs, and financing for maritime road construction are insignificant.**
3. Everything comes from maritime waters: rain, breeze, wind, storms, clouds, the environment, transport, trade, marine products, tourism, coastal enjoyment, desalinated water, oil, gas, etc.
4. Since 1869 (Suez Canal) and 1914 (Panama Canal), no new maritime road has been built.
5. The Middle East and Central Asia are the centers of natural resources and population density, while the Persian Gulf is the center of infrastructure gravity.
6. Traveling from the Mediterranean Sea to the Persian Gulf via the sea route (L=6250 km) is four times longer and passes through three seas and three choke points compared to the Mesopotamian Canal (L=1500 km).
7. The transit tax for the Suez Canal (193.2 km) reaches $2000-2500/km, or 25% of the travel cost to the Persian Gulf. Similar costs apply in Singapore.
8. The security cost for travel from the Suez Canal to the Persian Gulf amounts to $410 million/day.
9. A one-day blockage of the Suez canal causes an economic loss of $9.6 billion.
10. Maritime waters cover an area of 361,172,600 km² (70.68%). They belong to everyone, yet no one protects or studies them. Global trade, by weight and volume, achieves 80-90% (12.4 billion tons) via maritime routes. This increases annually by ±250 million tons/year.
11. Currently, 300 million people, or 4% of the population, desalinate up to 20 million m³ of water daily through 20,000 plants. By 2050, one-quarter of the population will turn to the sea to meet their water needs.
12. The scientific publication *Mediterranean–Adriatic: Design of Commercial, Tourist, and Fishing Ports* and the *Eagle of Adriatic Port* project, awarded by *World Finance* among the top 100 projects in 2009 (as featured in *World Finance*, November-December 2009 and January-February 2010 editions), motivated us to study and present projects for global maritime infrastructure.
13. From our studies, we concluded that maritime routes represent the most underdeveloped infrastructure in the global economy. There are no concrete projects or proposals, and UNCLOS laws are insufficient.
14. **For the first time,three projects are presented,with all technical calculation phases completed.**
15. **The Mesopotamian Canal, Bypassing or Replacing the Strait of Hormuz, and Sea-Land-Sea Ship Transit imply a new geography of maritime routes and a new movement in the global transport system. Summarized and expanded information is provided below.**

Autors