

NILE BASIN INITIATIVE

HYDROPOWER DEVELOPMENT IN THE NILE BASIN



by

David Ngula

**Lead Specialist, Regional Power Trade Project, Nile
Basin Initiative**

For

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Basin**

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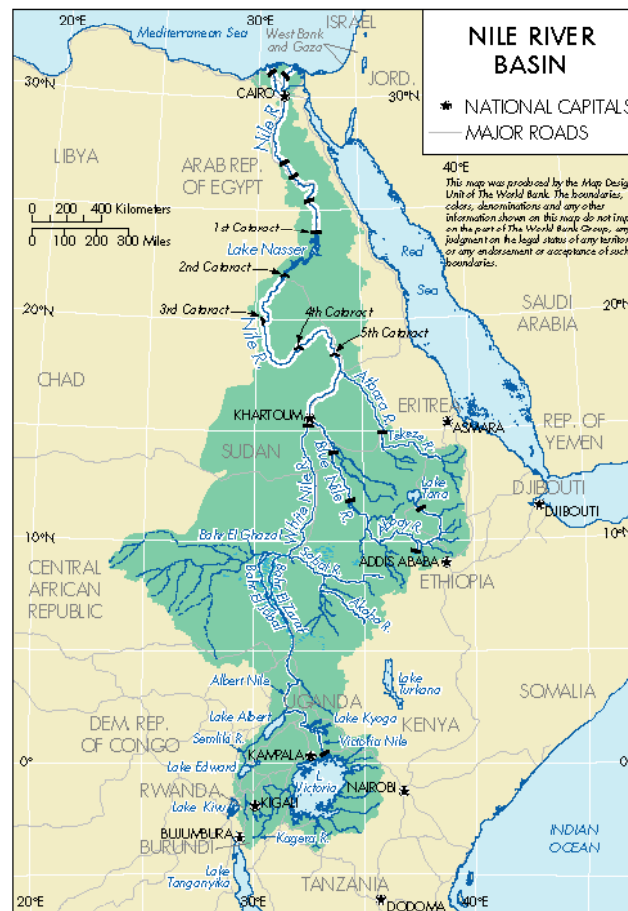
OVERVIEW



- 1. NILE BASIN ATTRIBUTES**
- 2. THE NILE BASIN INITIATIVE AND ITS INSTITUTIONS**
- 3. POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES**
- 4. HYDROPOWER IN THE NILE BASIN COUNTRIES**
- 5. NBI'S APPROACH TO HYDROPOWER DEVELOPMENT**
- 6. PROBLEMS AND CHALLENGES IN HYDROPOWER**
- 7. INTERVENTIONS AND RECOMMENDATIONS**
- 8. RESEARCH IN HYDROPOWER IN THE NILE BASIN**

The Nile Basin

- ◆ Burundi
- ◆ D.R. Congo
- ◆ Egypt
- ◆ Eritrea
- ◆ Ethiopia
- ◆ Kenya
- ◆ Rwanda
- ◆ Sudan
- ◆ Tanzania
- ◆ Uganda



Characteristics

- ◆ Population 300 million
- ◆ Poverty,
- ◆ Rapidly growing Population – stress on land
- ◆ Env. Degradation,

Opportunities

*For win-win Cooperative development
(food production, energy, transport, industrial growth, environment Conservation,...)*

Nile Basin Initiative (NBI)



- Following intensive dialogue, NBI was formally established on February, 1999
- It is a transitional institutional arrangements
- The NBI brings all Nile Basin countries to work together to develop the resources of the Nile Basin for the benefit of all.
- Provides a platform for co-operation and for building working relationships between the riparian countries
- It is a mechanism to begin implementation of the

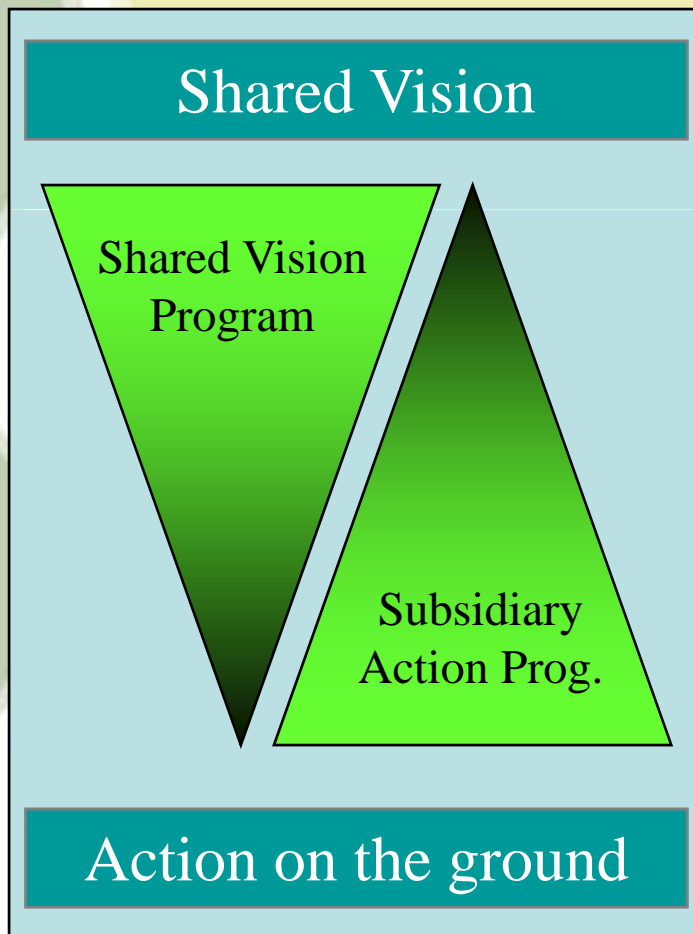
“shared vision”
through an agreed
“Strategic Action Program”

The Shared Vision

“To achieve sustainable socio-economic development through equitable utilization of, and benefit from, the common Nile Basin water resources.”



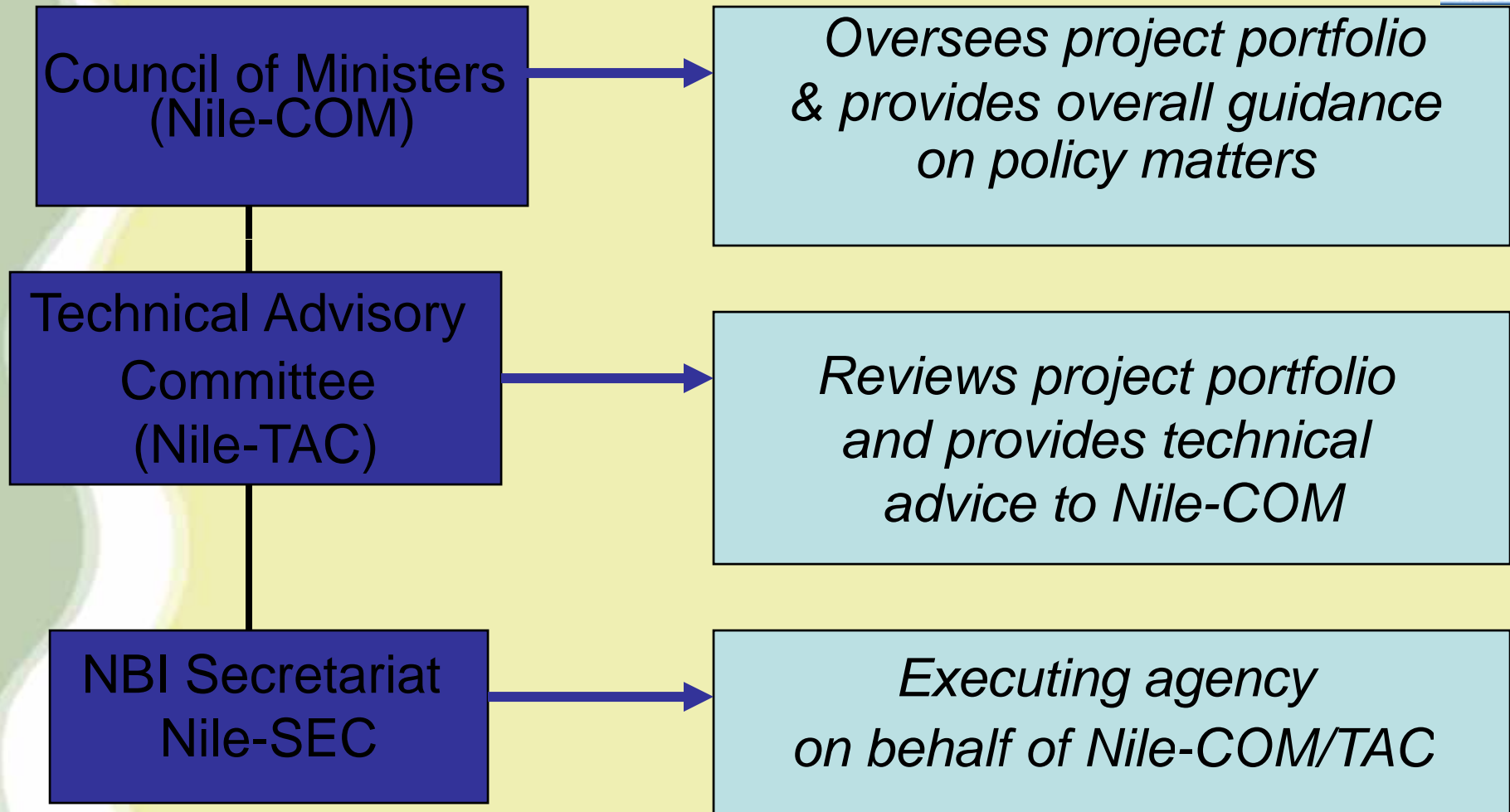
Strategic Action Program for the Nile Basin



Main Tasks

- © Create an enabling environment for cooperative investments and action on the ground, within a basin-wide framework.
- © Promote Shared Vision through a limited, but effective, set of sub-regional activities and projects.

NBI Structure



Subsidiary Action Programs (SAPs)

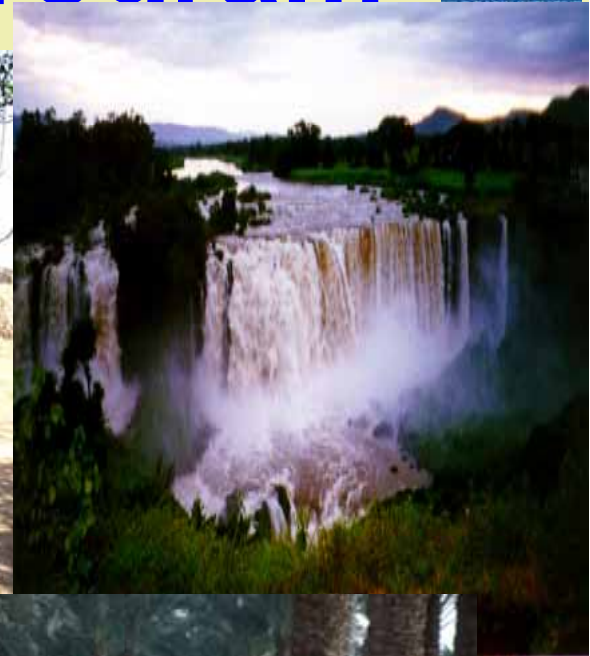


- *The objective of the SAPs is to translate the Shared Vision into action, realizing transboundary development opportunities within the agreed basin wide framework.*
- *SAP is aimed at the delivery of actual development projects involving two or more countries*
- *To date the riparian countries have formed two SAPs at sub-basin level – in the Eastern Nile and the Nile Equatorial Lakes regions.*

The Eastern Nile Subsidiary Action Program



- ◆ Egypt
- ◆ Ethiopia
- ◆ Sudan



The Technical regional
Office (ENTRO) Established
in
Addis Ababa, Ethiopia, June
2002

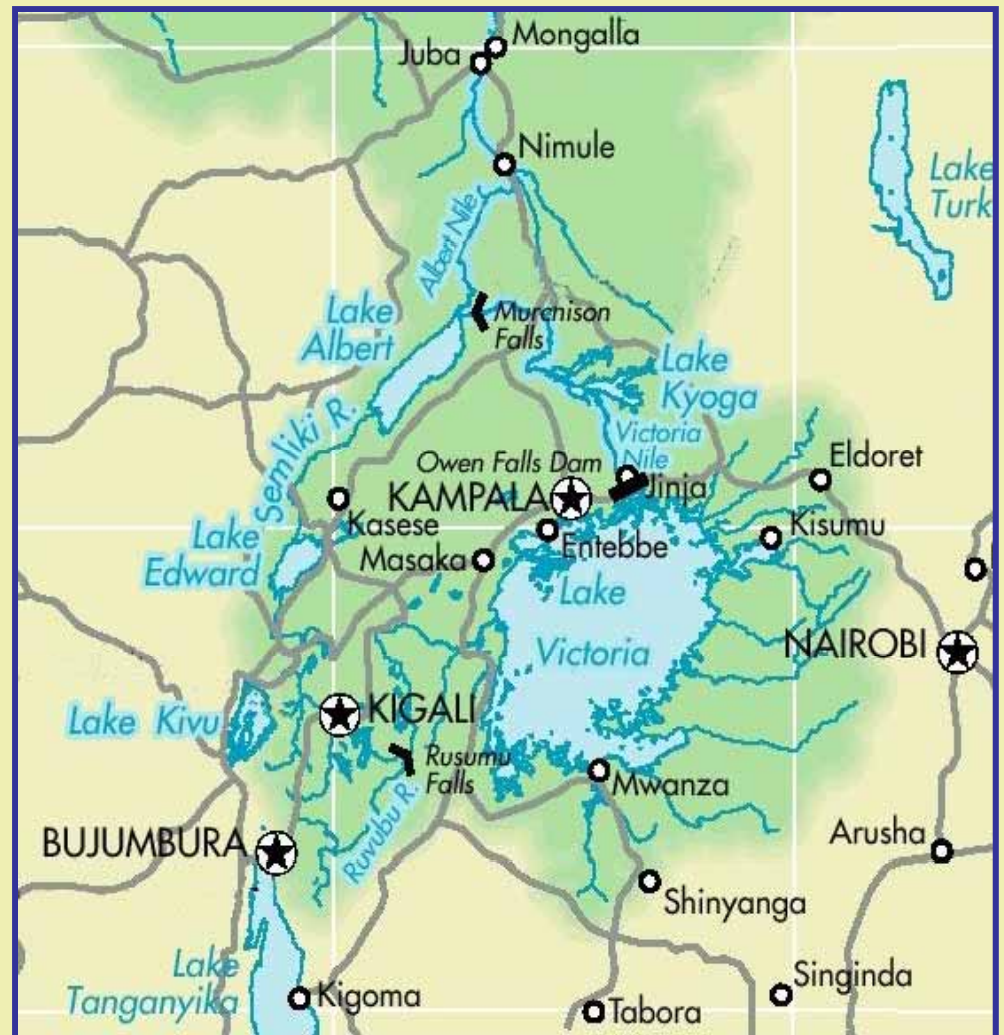


Nile Equatorial Lakes Region Subsidiary Action Program



Burundi	Rwanda
DRC	Sudan
Egypt	Tanzania
Kenya	Uganda

The Coordination Unit
NEL-CU established Dec
2001 In Entebbe
relocated to
Kigali-Rwanda (Jan /04)



WATER RESOURCES PLANNING AND MANAGEMENT PROJECT



**DESIGNED TO ENHANCE
ANALYTICAL CAPACITY FOR A
BASINWIDE PERSPECTIVE TO
SUPPORT THE DEVELOPMENT,
MANAGEMENT AND PROTECTION
OF THE NILE RIVER BASIN WATER
RESOURCES**

Regional Power Trade Project (RPTP)



AIMS TO FACILITATE THE DEVELOPMENT OF REGIONAL POWER MARKETS AMONG THE TEN NILE BASIN COUNTRIES AND BUILD ANALYTICAL CAPACITY TO MANAGE THE NILE BASIN RESOURCES IN KEEPING WITH THE VISION ARTICULATED BY THE NILE RIPARIANS

THE TWO PROJECT COMPONENTS:

1)THE ESTABLISHMENT OF CONDUCIVE ENVIRONMENT TO SUPPORT CONTINUED DISCOURSE AND PROMOTE POWER TRADE AMONG NILE BASIN COUNTRIES AND

2)THE COMPREHENSIVE BASIN-WIDE ANALYSIS OF POWER DEVELOPMENT OPTIONS AND TRADE OPPORTUNITIES IN THE REGION.

POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES



ENERGY & POWER SECTOR - GENERAL

- **TREATMENT OF POWER SECTOR - NOT BE CONFINED TO THE BOUNDARIES OF THE NILE BASIN SINCE POWER GENERATION SOURCES LOCATED BOTH WITHIN AND OUTSIDE THE BASIN COULD BE SUPPLYING ELECTRICITY TO DEMAND CENTRES LOCATED EITHER WITHIN OR OUTSIDE THE BASIN**
- **REALISTIC TO LOOK AT THE POWER SECTOR IN THE PERSPECTIVE OF THE COUNTRIES IN THEIR ENTIRETY.**
- **CHEAP AND RELIABLE SUPPLY OF ELECTRICITY IS A CRITICAL INPUT FOR ECONOMIC GROWTH, EMPLOYMENT GENERATION AND POVERTY ALLEVIATION**

POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES(Cont'd)



Country	Area (1,000 km ²)	Population (millions)	GDP per capita (\$)	Access to electricity (%)	Losses (%)	Average Tariff USc/Kwh
Burundi	28	8	115	3	18	
DR Congo	2,350	69	103	11.1		
Egypt	1,000	79		99.4		
Eritrea	94	7		32		
Ethiopia	1,222	85	195	15		
Kenya	583	39	502	15	16	
Rwanda	26	11	337		18	20
Sudan	2,506	41		31.4		8.5
Tanzania	945	41	472	14		9
Uganda	241	32	368	16	35	17.4

POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES(Cont'd)



- **STATUS OF POWER SECTOR DEVELOPMENT IS REFLECTIVE OF COUNTRY'S RESPECTIVE SOCIAL AND ECONOMIC LEVELS**
- **POWER SECTOR QUITE DIVERSIFIED, BUT IN GENERAL DOES NOT MEET THE TOTAL DEMAND IN POWER**
- **SOURCES OF ENERGY: BIOMASS, HYDROPOWER, HYDROCARBONS, AND GEOTHERMAL RESOURCES**
- **MOSTLY COUNTRY GRIDS WITH ONE INTERCONNECTOR FOR KENYA AND UGANDA ONLY**
- **BURUNDI RWANDA AND DRC-EAST JOINTLY OWNING AND OPERATING POWER GENERATION FACILITY MANAGED BY EGL**
- **CROSS BORDER TRADING LIMITED BETWEEN UGANDA AND TANZANIA, KENYA AND TANZANIA AND RWANDA AND UGANDA.**
- **THE ENERGY RESOURCE ENDOWMENT OF THE REGION IS LARGELY UNDEVELOPED**
- **POTENTIAL TO CREATE SUPPLY FAR IN EXCESS OF ITS CURRENT ENERGY NEEDS**

POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES(Cont'd)



AT NATIONAL LEVEL:

- **COUNTRY CHALLENGED TO ATTAINING SELF SUFFICIENCY IN POWER SUPPLY**
- **THE UTILITIES LACK OF SOUND FINANCES DUE TO POOR FINANCIAL PERFORMANCE, SLOW PACE OF IMPLEMENTATION OF POWER SECTOR DEVELOPMENT PROJECTS, HIGH TARIFFS AND HIGH ELECTRICAL LOSSES**
- **COUNTRIES EXPERIENCING FREQUENT POWER SHORTFALLS DUE TO POOR PLANNING AND IN SOME CASES DUE TO HEAVY DEPENDENCE ON HYDROPOWER, AND THEREFORE VULNERABILITY TO REGIONAL DROUGHTS**
- **COUNTRIES ARE FORCED TO RESORT TO EXPENSIVE GENERATION THROUGH EMERGENCY DIESEL PLANTS**

POWER SECTOR STATUS IN THE NILE BASIN COUNTRIES(Cont'd)



- **COUNTRIES ARE CHALLENGED TO BOOST UP AND DIVERSIFY POWER PRODUCTION IN ORDER TO INCREASE ACCESS, IMPROVE SECURITY AND RELIABILITY OF SUPPLY TO MATCH THE DEMAND IN ELECTRICITY WHICH IS INCREASING RAPIDLY**
- **GROWING ELECTRICITY DEMAND - CORRESPONDING DEVELOPMENT OF POWER GENERATION AND TRANSMISSION INFRASTRUCTURES**
- **SECTORAL REFORMS, EXPANSION OF GENERATING CAPACITY AND IMPROVED TRANSMISSION INFRASTRUCTURE**
- **THE COUNTRIES ARE AWARE OF THE BENEFITS OF INTERCONNECTING THEIR GRIDS INCLUDING ENHANCING THE RELIABILITY OF SUPPLY AND ECONOMIC BENEFITS FROM POWER TRADE**
- **EAPP MASTER PLAN STUDY & THE NBI-RPTP COMPREHENSIVE BASINWIDE STUDY (CBWS) TO FORMULATE MEDIUM AND LONG TERM POWER DEVELOPMENT STRATEGY FOR THE REGION**

Hydropower in the Nile Basin Countries



- **CONSIDERING THE NILE BASIN COUNTRIES IN THEIR ENTIRETY**
- **THE HYDROPOWER POTENTIAL IS ESTIMATED AT 150,000 MEGAWATTS**
- **THE DRC ALONE HAS A POTENTIAL OF 100,000 MW WITH ABOUT 40,000 CONCENTRATED AT THE INGA COMPLEX IN THE RIVER CONGO**
- **ETHIOPIA HAS A HYDROPOWER POTENTIAL OF 45,000 MW**
- **THESE COUNTRIES IN THEIR ENTIRETY HAVE SO FAR DEVELOPED ABOUT 11,000 MW OF HYDROPOWER WITH A FURTHER 6800 MW TO BE OBTAINED IN THE NEAR FUTURE**

Hydropower in the Nile Basin Countries



Country	Potential	Installed	Under Construction	Committed
Burundi	1700	-	-	-
DR Congo	100,000	2570	-	-
Egypt	>50000 Gwh	2842	-	-
Ethiopia	45000	1534	2087	3016
Kenya	1422	761	-	63
Rwanda	400	55	43.2	37
Sudan	-	1343	1250	-
Tanzania	4700	561	0	0
Uganda	>2000	>380	310	

Hydropower in the Nile Basin Countries



- REGION'S HYDROPOWER POTENTIAL IS QUITE SUBSTANTIAL PARTICULARLY IN THE D.R. CONGO AND ETHIOPIA
- GRAND INGA ABOUT 39,000 MW POTENTIAL COULD SUFFICE THE ELECTRICITY DEMAND IN THE REGION AND BEYOND FOR MANY YEARS
- CURRENT SITUATION – EACH COUNTRY STRIVING TO DEVELOP ITS HYDROPOWER RESOURCES INDEPENDENTLY
- NILE BASIN COUNTRIES ARE CHALLENGED TO JOIN FORCES IN THE EXPLOITATION OF THE VAST HYDROPOWER POTENTIAL
- EXAMPLE - BURUNDI, RWANDA AND DRCONGO WHO HAVE JOINTLY BUILT HYDROPOWER PLANT ON THE RUZIZI
- HYDROPOWER PROJECTS PREPARED AND DESIGNED BASED ON SOUND CONSIDERATION OF ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES
- HYDROPOWER IS RENEWABLE ENERGY SOURCE AND WITH MUCH LESS GREENHOUSE GAS EMISSIONS THAT THERMAL PLANTS
- THE CAPITAL-INTENSIVE ATTRIBUTE OF HYDROELECTRICITY GENERATION IS USUALLY OFFSET BY THE REASONABLY LOW OPERATIONAL COSTS

Hydropower in the Nile Basin Countries

SMALL/MINI HYDRO DEVELOPMENT:

HAPPEN TO BE QUITE FAVORABLE MEANS OF RURAL POWER SUPPLY IF THEY ARE WITHIN THE LOCALITY OF RURAL COMMUNITY.

THE NILE BASIN COUNTRIES:

- RECOGNIZE THAT IMPROVED ENERGY SUPPLY IN THE RURAL AREAS WILL CONTRIBUTE SIGNIFICANTLY IN IMPROVEMENT OF THE LIVELIHOODS OF THE RURAL POPULATION AND THE ATTAINMENT OF SUSTAINABLE ECONOMIC GROWTH
- PUT GREAT EMPHASIS TOWARDS THE DEVELOPMENT OF SMALL/MINI HYDROPOWER ESPECIALLY TO SERVE RURAL AREAS NOT REACHED BY THE NATIONAL GRID
- MOST HAVE IN PLACE ENERGY POLICIES AND STRATEGIES ON RURAL ELECTRIFICATION INCLUDING SMALL/MINI HYDROS
- INSTITUTIONALIZED BY THE CREATION OF UNITS, IN SOME CASES AUTONOMOUS ONES, TO PROMOTE AND FACILITATE IMPROVED ACCESS TO SUSTAINABLE MODERN ENERGY SERVICES IN THE RURAL AREAS
- **SOME BARRIERS** INCLUDING THE LACK OF ACCESS TO APPROPRIATE TECHNOLOGIES AND FUNDING LIMITATIONS



NBI'S APPROACH TO HYDROPOWER DEVELOPMENT



- **HYDROPOWER DEVELOPMENT -PRINCIPLES OF INTEGRATED WATER RESOURCES MANAGEMENT WHICH CALL FOR COORDINATED APPROACH FOR SUSTAINABLE DEVELOPMENT TAKING FULL COGNIZANCE OF ALL SECTORAL REQUIREMENTS TO OPTIMIZE MULTIPLE USES FOR THE BENEFIT OF ALL RIPARIANS**
- **MOST IMPORTANT WATER USERS: IRRIGATED AGRICULTURE, FISHERIES, THE ENVIRONMENT, AND WATER SUPPLY**
- **INCREASED PRESSURE - RIPARIAN STATES TO MANAGE SHARED WATER IN A MORE SUSTAINABLE AND EQUITABLE MANNER**
- **THE APPROPRIATE APPROACH OF THE NBI AND ITS PROGRAMS IS TO DESIGN HYDROPOWER SCHEMES WITH FULL CONSIDERATION OF THE MULTI-PURPOSE USE OF THE WATER RESOURCE**

NBI'S APPROACH TO HYDROPOWER DEVELOPMENT



- **DEVELOP A MATCHING TRANSMISSION INFRASTRUCTURE TO EVACUATE THE ELECTRICITY LOAD CENTRES IN THE REGION**
- **ENSAP AND NELSAP HAVE COMPLETED SEVERAL STUDIES ON TRANSMISSION INTERCONNECTIONS AND HYDROPOWER PROJECTS IN THEIR RESPECTIVE SUB-REGIONS**
- **THE EASTERN AFRICA REGION IS IN THE PROCESS OF ESTABLISHING A REGIONAL MARKET TO PROMOTE REGIONAL POWER TRADE**
- **NBI WITH ITS PROGRAMS AND PROJECTS HAS FORMULATED A NUMBER OF TOOLS, TEMPLATES, FRAMEWORKS AND GUIDES TO BE APPLIED IN THE DEVELOPMENT PROCESS OF THE REGION'S RESOURCES TO ENSURE SUSTAINABILITY OF OUTCOMES**

NBI CASES-RUSUMO FALLS



TO PROVIDE MULTI-PURPOSE USE OF WATER AND ENERGY RESOURCES WITH INVESTMENT IN SUSTAINABLE LIVELIHOODS IN THE PROJECT AREA. THE PROJECT'S THREE COMPONENTS ARE (1) HYDROELECTRIC POWER GENERATION & MULTI-PURPOSE DEVELOPMENT (2) POWER TRANSMISSION LINES & DISTRIBUTION AND (3) INSTITUTIONAL ARRANGEMENTS

STATUS: FEASIBILITY STAGE

NBI CASES- COMPREHENSIVE BASINWIDE STUDY



ANALYZE THE STATUS OF POWER SUPPLY, INTERCONNECTIVITY, DEMAND AND TRADE OPPORTUNITIES IN THE REGION IN THE CONTEXT OF MULTIPURPOSE WATER RESOURCE DEVELOPMENT AND SHALL INCLUDE PROPOSALS ON INVESTMENT AND FUNDING ARRANGEMENTS AND A DETAILED IMPLEMENTATION PLAN COVERING A 35 YEAR TIME HORIZON TO TRANSLATE THE STUDY INTO CONCRETE ACTIONS AT SUB-BASIN AND BASIN LEVELS

STATUS: STUDY (MAR'10 –DEC '11) ONGOING

NILE BASIN HYDROPOWER: PROBLEMS /CHALLENGES



- **DESPITE THE REGION'S ENDOWMENT WITH ENORMOUS HYDROPOWER POTENTIAL, ONLY A SMALL FRACTION HAS BEEN EXPLOITED**
- **THERE ARE MAJOR TECHNICAL, FINANCIAL AND ENVIRONMENTAL CHALLENGES TO BE ADDRESSED FOR THE DEVELOPMENT OF THIS RESOURCE BASE**
- **ENERGY SECURITY AND ACCESS CHALLENGES ARE THE MAIN ISSUES TO ADDRESS FOR THE ATTAINMENT OF THE MILLENNIUM DEVELOPMENT GOALS (MDGS)**
- **THE LEVEL OF ACCESS TO ELECTRICITY IS VERY LOW, WITH THE MAJORITY OF THE RURAL POPULATION RELYING ON TRADITIONAL BIOMASS ENERGY SOURCES**
- **DUE TO THE SMALL NATIONAL ENERGY MARKET, THE POWER SECTOR DEVELOPMENT PLANNING WILL TEND TO SCREEN OUT SOME ATTRACTIVE HYDROPOWER PROJECTS WHICH COULD HAVE OTHERWISE BEEN OF PRIORITY AND HUGE BENEFIT REGIONALLY**
- **HIGH CAPITAL COSTS FOR HYDROPOWER SCHEMES POSE A BARRIER TO THE DEVELOPMENT OF THIS RESOURCE, ESPECIALLY IN THE COUNTRIES WHERE FINANCIAL RESOURCES ARE SCARCE**

NILE BASIN HYDROPOWER: PROBLEMS /CHALLENGES



- **LACK OF PUBLIC FINANCE FOR POWER DEVELOPMENT BOTH AT GOVERNMENTS LEVEL AND FROM THE DEVELOPMENT PARTNERS**
- **LIMITED ATTRACTION AND INTEREST FROM PRIVATE FINANCIERS AND INVESTORS AS WELL IN HYDROPOWER DEVELOPMENT DUE TO THE ASSOCIATED TECHNICAL, ECONOMIC, COMMERCIAL, ENVIRONMENTAL AND SOCIAL RISKS**
- **RISKS INCLUDE**
 - **HYDROLOGICAL UNCERTAINTIES**
 - **HUGE CAPITAL INVESTMENTS WHICH OFTEN REQUIRE LONG GESTATION PERIODS**
 - **POSSIBLE COST OVERRUNS AND TIME SLIPPAGE**
- **VERY STRINGENT MEASURES REQUIRED TO ADDRESS ENVIRONMENTAL AND SOCIAL ISSUES**
- **LARGE HYDROPOWER SCHEMES ARE ASSOCIATED WITH FLOODING OF AREAS - UNDESIRABLE RELOCATION & RESETTLEMENT;LOSS OF FAUNA AND FLORA**

NILE BASIN HYDROPOWER INTERVENTIONS/RECOMMENDATIONS



- **HYDROPOWER HAS A GREAT ROLE TO PLAY IN SOLVING THE REGION'S ENERGY/POWER SECURITY AND ACCESS ISSUES, AN OUTSTANDING ISSUE TO ADDRESS IN TERMS OF THE DEVELOPMENTAL AGENDA OF THE REGION FOR THE ATTAINMENT OF THE MILLENNIUM DEVELOPMENT GOALS (MDGS).**
- **PURSUE REGIONAL COOPERATIVE APPROACH THAT WOULD SEE VAST HYDROPOWER POTENTIALS IN SOME OF THE COUNTRIES DEVELOPED FOR SUPPLY OF ELECTRICITY TO THE COUNTRIES IN THE REGION AND BEYOND.**
- **DEVELOPMENT OF MAJOR HYDROPOWER SCHEMES TARGETING REGIONAL LOADS WOULD REDUCE COST OF ELECTRIC POWER AND PROVIDE A SUSTAINABLE SOURCE OF ELECTRICITY, IN TURN, STIMULATING INDUSTRIAL DEVELOPMENTS AND HELP REDUCE POVERTY.**

NILE BASIN HYDROPOWER INTERVENTIONS/RECOMMENDATIONS



- **FOR THE OPTIMAL AND SUSTAINABLE DEVELOPMENT OF THE ENERGY/POWER RESOURCES, IT IS IMPERATIVE THAT THE COUNTRIES PURSUE A MORE REGIONAL INTEGRATION APPROACH, THROUGH WHICH THE COUNTRIES WOULD BENEFIT FROM IMPROVED SECURITY OF SUPPLY, ENHANCED ENVIRONMENTAL QUALITY, WIDER DEPLOYMENT OF RESOURCES AND BETTER ECONOMIC EFFICIENCY.**
- **THE PLANNING OF LARGE HYDROPOWER SCHEMES SHOULD TAKE FULL COGNIZANCE OF IWRM PRINCIPLES INCLUDING THE DETERMINATION OF THE OPTIMAL ALLOCATION OF WATER FOR THE COMPETING USES, USING SAY THE WATER VALUE CONCEPT.**
- **IN ORDER TO ACCORD HYDROPOWER DEVELOPMENT A DESERVING CONSIDERATION, IT IS PROPER TO ESTABLISH, UNDER ONE OF THE EXISTING REGIONAL INSTITUTIONS (NBI, EAPP, EAC) A UNIT TO SPECIFICALLY DEAL WITH HYDROPOWER DEVELOPMENT IN THE REGION.**

NILE BASIN HYDROPOWER INTERVENTIONS/RECOMMENDATIONS



- **IT IS RECOMMENDED TO FORMULATE A REGIONAL HYDROPOWER DEVELOPMENT STRATEGY TO GUIDE THE DEVELOPMENT OF POTENTIAL HYDROPOWER RESOURCES SO AS TO CONTRIBUTE TO MEETING THE PRESENT AND FUTURE DEMAND IN THE REGION**
- **THE STRATEGY TO INCLUDE THE PREPARATION OF GUIDELINES SPECIFIC FOR HYDROPOWER DEVELOPMENT COVERING STUDIES, DESIGN, CONSTRUCTION, OPERATION AND DE-COMMISSIONING STAGES**
- **AN INVENTORY NEED BE CREATED OF THE COMPREHENSIVE HYDROPOWER POTENTIAL OF THE REGION AND A REGIONAL HYDROPOWER DATABASE ESTABLISHED**
- **THE MAJOR IDENTIFIED HYDROPOWER POTENTIAL SCHEMES OF REGIONAL INTEREST NEED TO BE SUBJECTED TO STUDIES TAKING DUE CONSIDERATION OF MULTI-PURPOSE ASPECTS**
- **THE REGIONAL HYDROPOWER STRATEGY SHOULD ALSO ADDRESS THE ISSUE OF FINANCING AND IMPLEMENTATION ARRANGEMENTS AND BUILDING OF THE REQUISITE CAPACITY.**

RESEARCH IN HYDROPOWER IN THE NILE BASIN



- **R&D INITIATIVES – NEW IDEAS AND TECHNOLOGY:**
 - **ESSENTIAL COMPONENT TO SUSTAINING HYDROPOWER ON A PATH OF CONTINUOUS IMPROVEMENT**
 - **NECESSARY TO ENSURE THAT HYDROPOWER MAINTAINS AND ENHANCES ITS CONTRIBUTIONS TO ELECTRIC GENERATION**
 - **HYDRO FACILITIES OPERATE IN HARMONY WITH THE ENVIRONMENT**
- **VARIOUS RESEARCHES HAVE BEEN UNDERTAKEN IN THE HYDROPOWER FIELD BY/IN THE NILE BASIN COUNTRIES**
- **LACK OF REGIONAL INSTITUTIONAL FRAMEWORK FOR SPEARHEADING AND COORDINATION OF HYDRO RESEARCH**
- **INTERESTING RESEARCH TOPICS IN THE HYDROPOWER FIELD ARE INNUMEROUS**
- **THERE ARE MANY AVENUES AND OPPORTUNITIES FOR COLLABORATION WITH ESTABLISHED RESEARCH INSTITUTIONS AND BENEFICIARIES WORLDWIDE**
- **REGIONAL UNIT TASKED AND FACILITATED TO SPEARHEAD & COORDINATE RESEARCH IN HYDROPOWER.**



*Many thanks,
Merci,
Shukran*