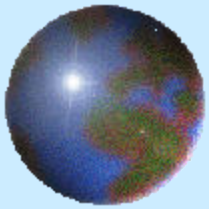


The Grand Ethiopian Renaissance Dam:
Challenges and Opportunities

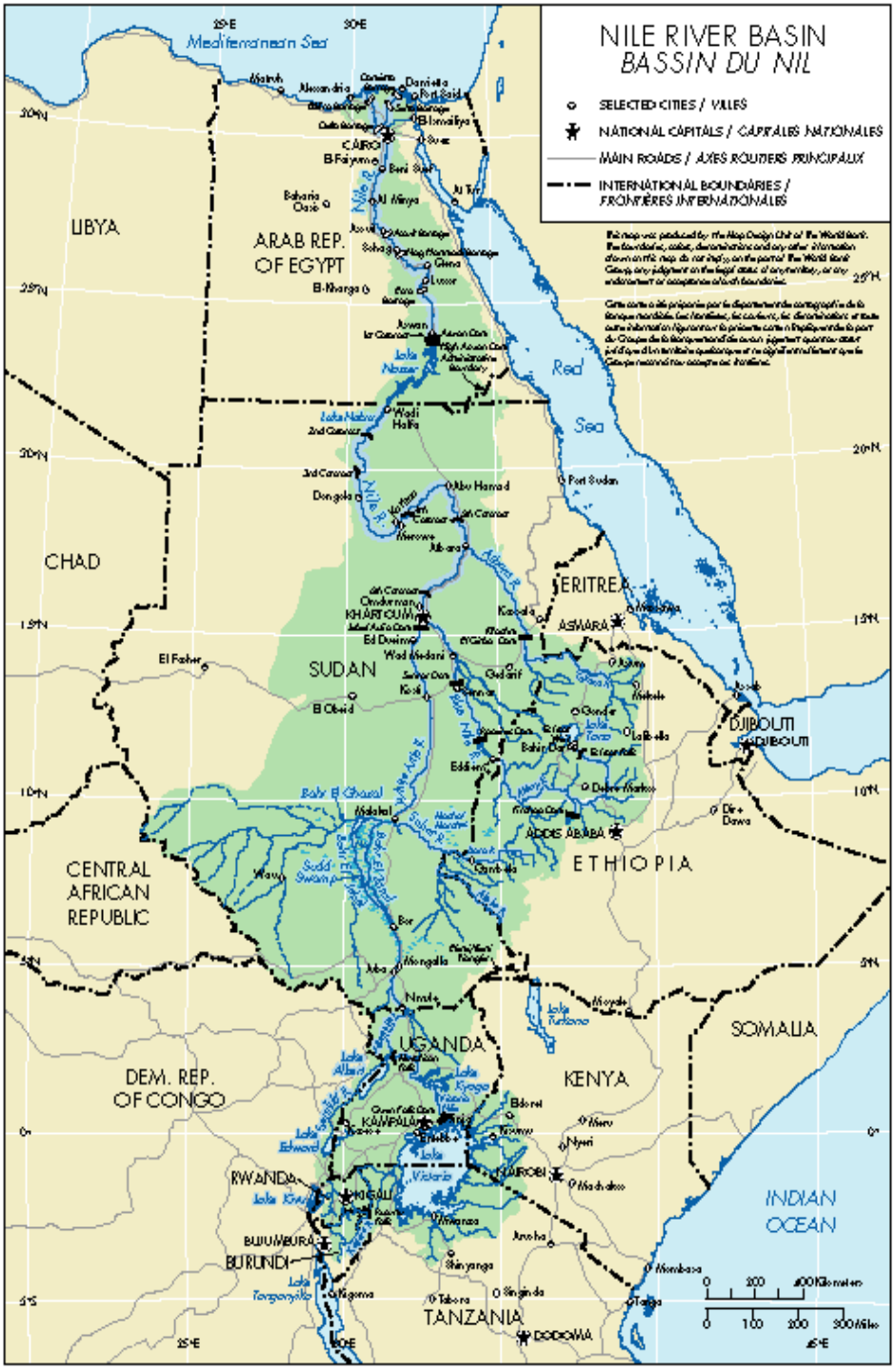
S. Salman

May 28, 2015

Structure of the Presentation

- Political Geography of the Nile
- The Nile Basin Initiative (NBI)
- The Nile Basin Cooperative Framework Agreement (CFA)
- The Grand Ethiopian Renaissance Dam (GERD)
- Conclusion

Political Geography of the Nile Basin



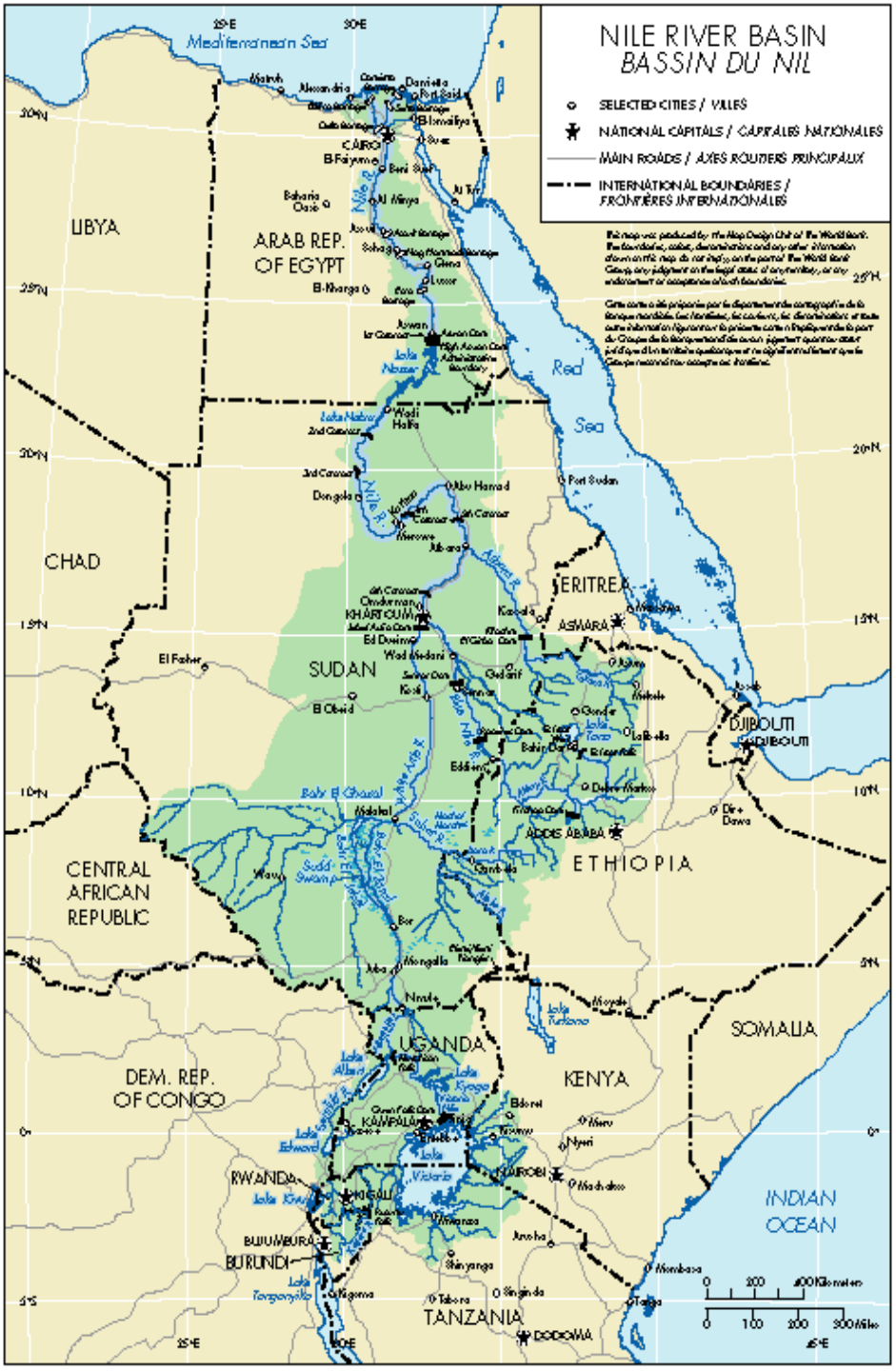
The Nile Basin

- World's longest river (6,650 km);
- 2nd largest lake; Largest swamps
- Oldest and largest dams
- Oldest and most controversial treaties
- Cradle of Ancient civilizations
- 250 m people (300 m by 2025)
- 10% of the African Continent
- Ethnic, religious and linguistic diversity

- **Shared by 11 countries**

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

- **Region of Extremes**
  - Poverty: 9 of 15 poorest in world
  - High variability & climate change
  - Landscape vulnerability
  - Conflict: 10 countries since 1994
  - Flow pattern of Blue & White Nile



The Nile Basin

- **Small Flow System-wide (~ 84 bcm/yr)**
  2% Amazon; 6% Congo;
  12% Yangtze; 17% Niger;
  25% Zambezi

- **Very Limited Infrastructure….**
  - 10% HEP potential developed
  - 15% population with electricity
  - < 10% irrigable land irrigated
    (excluding Egypt & Sudan)

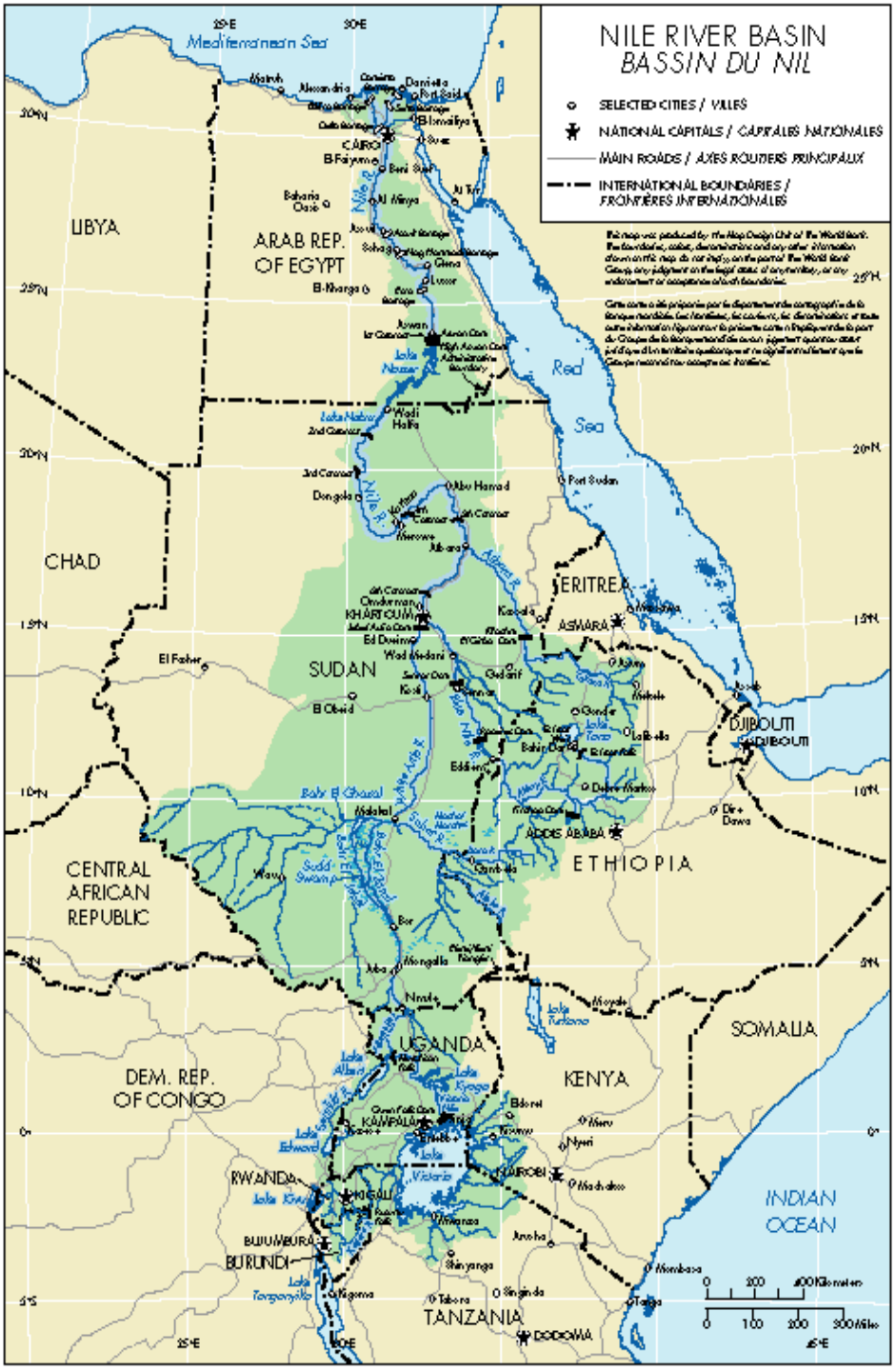
Other Characteristics of Variability of Nile Basin

➔ Ethiopia: tributaries contribute 86-95% flow at Aswan

➔ Egypt: minimal rain & no flow additions
90% of population on 5% of Nile land
Uses about 86% of Nile waters

➔High equatorial flows lost in Sudd, about 66%; White Nile contributes 14%

➔ Sudan and South Sudan: 65% basin
Now about 45%, 20%
Confluence of major tributaries



The Nile Basin

- Challenges
- -Limited flow of 84 BCM- Aswan
  - - Increasing demands due to population growth,
  - -Current allocation of Nile waters
  - -Climate change and environmental degradation
  - -Major differences over the Nile Basin Cooperative Framework Agreement (CFA)
  - - Unilateral Development Plans - dams
  - -The Ethiopian Grand Renaissance Dam (GERD)

Contribution of Each of the Nile Main Tributaries

River	Flow (BCM)	Percentage
Blue Nile	50	59%
White Nile	11.5	14%
Sobat	11.5	14%
Atbara	11	13%
Total	84	100

Basin Area in Each Country

Country	Country Area	NB Area	% of the Basin	% of the Country
Sudan	2506000	1933300	63.66	77.15
Ethiopia	1104000	356900	11.75	32.33
Egypt	1001000	277500	9.14	27.72
Uganda	241000	238900	7.87	99.13
Tanzania	945000	120300	3.96	12.73
Kenya	580000	50900	1.68	8.78
Congo	2345000	21700	0.71	0.93
Rwanda	26000	20800	0.68	80.00
Burundi	28000	13000	0.43	46.43
Eritrea	118000	3500	0.12	2.97
Total Area	8894000	3036800	100	

Riparians' Stakes and Interests

	Stake	Position	Interest	
Egypt	v.high	'acquired rights', existing uses, existing agreements	water security, more water	
Ethiopia	v.high	'absolute sovereignty', equity	hydropower, irrigation, investment	
Sudan	v. High	'acquired rights', existing rights, existing agreements	1959 quota, Blue Nile regulation	
South Sudan	v. High	Need for a share of Nile waters	Hydropower; some irrigation	
Uganda	High	against 1929 agreement; equity	hydropower, some irrigation	
Burundi	medium	against existing agreements; equity	hydropower, investment	
Kenya	medium	against 1929 agreement; equity	some irrigation, investment	
Rwanda	medium	against existing agreements; equity	hydropower, agric, investment	
Tanzania	medium	against 1929 agreement; equity	some irrigation, water transfer, investment	
DRC	low	Congo 20x Nile flow	regional stature, connectivity	
Eritrea	low	observer	Some irrigation, boundaries	

The Nile Basin Initiative (NBI)

The NBI

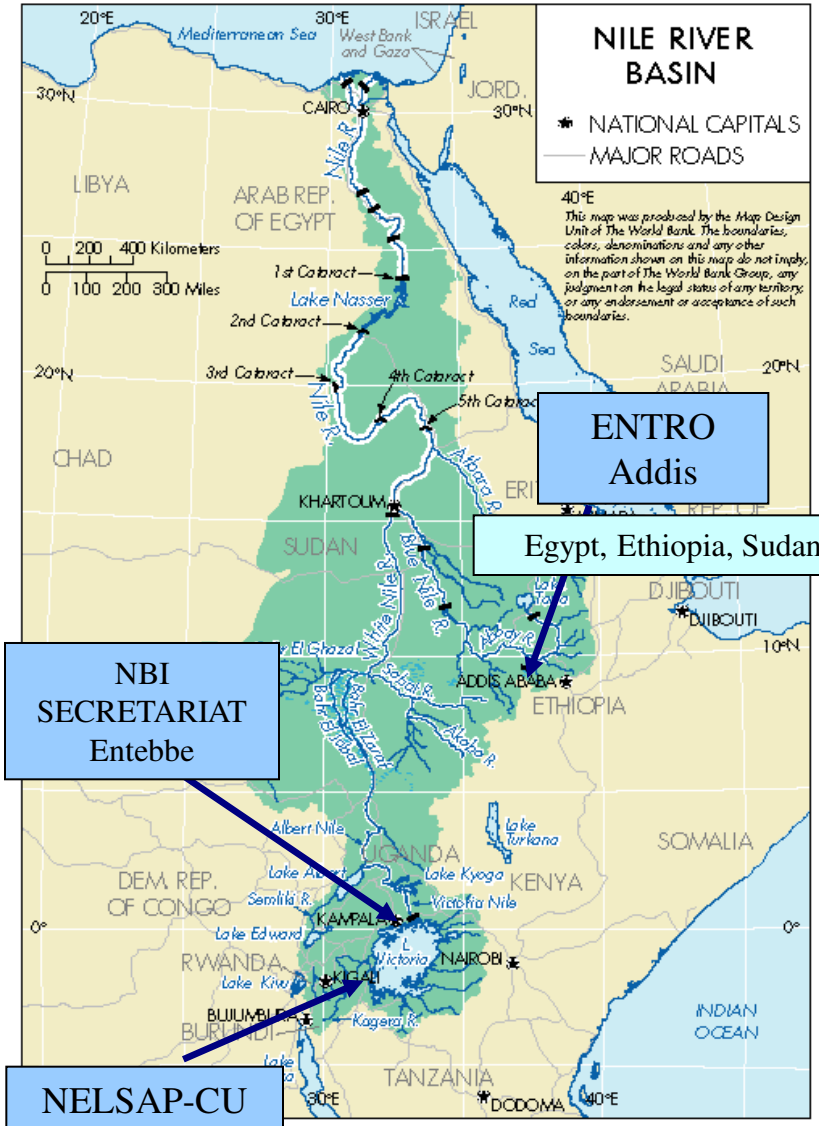
- Born Officially on February 22, 1999 in Dar-es-salaam, Tanzania
- Ministers of Water Resources of Nine riparian countries signed Minutes of the meeting establishing NBI
- Vision – "to achieve sustainable socio-economic development through equitable utilization of, and benefit from, the common Nile Basin water resources."
  - Recognition of the rights of all states on Nile
- Task – to prepare an inclusive treaty

NBI Institutional Set-Up

NILE Council of Ministers
Nile-COM

Nile Technical Advisory Committee
Nile-TAC

NBI Secretariat
Nile-SEC



ENTRO
Addis

Egypt, Ethiopia, Sudan

NBI
SECRETARIAT
Entebbe

NELSAP-CU
Kigali

Burundi, DR Congo, Egypt, Kenya, Rwanda, Sudan, Tanzania, Uganda

Possible Areas for Cooperation

- Ethiopia Huge hydro-power potential
  - 45,000 megawatts; 30,000 from the Nile
  - Not water consuming
- Sudan, South Sudan huge agricultural lands
- Lake Victoria fish wealth
- Egypt industrial capabilities
- South Sudan swamps as a source for more water for the Nile
- Water harvesting in upper Nile countries
- Yet unilateral development plans is the norm

Going with the Flow

The Nile is already dotted with dams. New projects could help spread the river's wealth of water, but environmentalists fear ecological disaster

EGYPT
POPULATION: 74 MILLION
GDP: $75.1 BILLION

Unlike other Nile states, Egypt has almost fully tapped the hydropower potential of the Nile. Opened in 1971, the 2,100-MW **Aswan High Dam** is currently the biggest on the river. An ambitious irrigation scheme to water some 220,000 hectares of land in the **Toshka Irrigation Scheme** is scheduled for completion by 2017. Further north, a series of barrages, most of them originally built by the British but many since updated, help provide much-needed power to Egypt. When it is completed, the **Salam Canal** will divert water from the Nile to the northern Sinai to make it habitable.

SUDAN
POPULATION: 36 MILLION
GDP: $19.6 BILLION

NORTH

Many of the dams along the White and Blue Niles and the Atbara tributary in Sudan, built between the 1950s and '70s, are now silting up. The 13-MW **Khashm El Girba Dam** has lost almost half of its capacity to siltation, as has the 15-MW **Sennar Dam.** Like the Sennar, the 280-MW **Roseires Dam,** currently Sudan's biggest, was built for irrigation but converted to hydropower production. These dams will soon be dwarfed by the $1.8 billion **Merowe Dam,** which will produce 1,250 MW but will also put acres of agricultural land underwater, displace some 50,000 people, flood a trove of ancient Nubian artifacts and, environmentalists fear, change the local ecosystem forever. A 300-MW dam at **Kajbar** is also being built.

SOUTH

Soon after it crosses the border into Sudan, the White Nile disappears into the **Sudd,** a 130,000-sq-km swamp—the largest in the world. More than half the White Nile's water is lost through evaporation or by being absorbed into thick aquatic vegetation and marshy soil. The **Jonglei Canal,** a joint Sudan-Egypt project to bypass the Sudd and use the water to irrigate thousands of acres of farmland, was begun in 1978 but stalled with the outbreak of civil war in Sudan in 1983. A peace deal signed in late 2004 could eventually restart the ambitious scheme.

UGANDA
POPULATION: 29 MILLION
GDP: $6.8 BILLION

Built by the British in the 1950s and extended in 2000, **Owen Falls Dam** has a 380-MW capacity, but generates much less due to hydraulic bottlenecks that occur when insufficient water gets through to turn all the turbines. Owen Falls will be joined in the next decade by a dam at **Bujagali Falls,** a few kilometers down river. Costing around $300 million, Bujagali will provide 200 MW of power, but will also force the relocation of villagers and flood the Bujagali Falls, a popular tourist site. Ugandan officials also have plans for a 180-MW dam at **Karuma,** as well as other sites along the Nile.

400 miles
400 kilometers

GDP SOURCE: WORLD BANK

ETHIOPIA
POPULATION: 77 MILLION
GDP: $8 BILLION

Tis Abay, a new 73-MW hydro plant just below the Blue Nile Falls, took Ethiopia's paltry national power capacity to 770 MW three years ago; a $224 million, 185-m-tall dam at **Tekeze** on a tributary of the Atbara River being built by the Chinese firm responsible for much of China's Three Gorges Dam will soon add 300 MW more. But it's what comes next that could change Ethiopia and the Nile forever: the Blue Nile alone has the potential to generate some 30,000 MW of power for the nation, and officials have identified more than 100 sites for large-scale hydropower development schemes along the Nile and the country's other rivers. Development will help power the country, but it will also cut the flow of water that reaches Sudan and Egypt, block sediment transfer, and require the relocation of thousands of people.

The Nile Basin Cooperative Framework Agreement (CFA)

Entebbe Agreement

Existing Nile agreements characterize colonial legacy, are viewed as rights in perpetuity by some, contested/abrogated by others; 1902, 1929 & 1959 treaties are central to current concerns of all parties

Date	Parties	Name of Treaty	Treaty Objective/Content
1891	G.B. Italy	Protocol for spheres of influence in E. Africa	Italy agreed not to construct any works on Atbara that would affect flow into Nile (main concern: irrigation works)
1902	GB Ethiopia	Treaty on Frontiers between Anglo-Egyptian Sudan, Ethiopia, & Eritrea	Ethiopia agrees not to interfere with flow of Nile without consulting Great Britain & Sudan.
1906	GB Congo	Agreement on spheres of influence in E. & C. Africa	Congo agreed not construct any work which would diminish flow into Lake Albert, unless in agreement with Government of Sudan.
1925	GB Italy	Exchange of Notes re. Concessions for Barrage at Lake Tana…	Italy recognized prior hydraulic rights of Egypt & Sudan & agrees not to construct on headwaters of Blue Nile & White Nile & their tributaries works which might modify Nile flow
1929	GB Egypt	Exchange of Notes re. Use of the Waters of the River Nile for irrigation	Egypt claims 'natural & historic rights' in Nile waters; without agreement of Egypt, no measures to be taken on Nile & its tributaries in Sudan or in countries under British administration (Kenya, Tanganyika & Uganda)
1934	GB Belgium	Agreement re. Water Rights between Tanganyika & Rwanda-Burundi	Regulates utilization of boundary waters, notification of projects, water quality & navigation
1949 & 1952	GB Egypt	Exchange of Notes re. Construction of Owen Falls Dam (Uganda)	Uganda to build hydroelectric dam that "did not adversely affect discharges of water passed through"; reconfirms curves agreed in 1929; resident Egyptian engineer at Owen Falls; (1952) Egypt agrees to bear part of cost of dam to raise L. Victoria level for water storage
1959	Egypt Sudan	Agreement for the Full Utilization of the Nile Waters	Parties agree to: allocate of full yield (55.5 bcm/year Egypt; 18.5 bcm/year Sudan); Permanent Joint Technical Commission; have unified view for Nile negotiations with others
1977	Rwanda Tanzania Uganda	Agreement to Establish Kagera River Basin Organization	Establishment of KBO as regional integration and development organization (now defunct)
1993	Egypt Ethiopia	Framework for General Cooperation	Confirm intention to cooperate on Nile Waters & agree to refrain from engaging in any activity that may cause appreciable harm to interests of other
2003	Kenya Uganda Tanzania	Protocol for Sustainable Development of Lake Victoria Basin	Parties agree to cooperate on sustainable development and management of the basin. Establishment of the Lake Victoria Basin Commission

Treaties or Disputes?

- Legacies of Nile colonial treaties
  - 1902 Nile Treaty – Britain and Ethiopia
  - 1929 Nile Treaty – Britain and Egypt
- 1959 Nile Waters Treaty
  - Bilateral Treaty between Egypt and Sudan
  - For full control of the Nile
  - Dividing entire Nile flow between Egypt and Sudan
  - Recognizes other Nile states rights but gives Egypt and Sudan right to allocate such rights

The Nile Basin Cooperative Framework Agreement - CFA

- Negotiations started in 1999
- Based largely on UN watercourses Convention
- Deadlocked in 2009 over three main issues
  - Existing uses and rights of Sudan & Egypt
    - Basically the 1902, 1929 & 1959 treaties
  - Prior notification on projects planned measures
  - Amendment to CFA: consensus or majority

Current Status of the CFA

- Six countries signed the CFA in 2010
  - Ethiopia, Tanzania, Uganda, Kenya, Rwanda and Burundi
  - Vehemently opposed by Egypt and Sudan
  - Ethiopia ratified CFA in June 2013, Rwanda in August 2013, Tanzania in March 2015
  - South Sudan declared it supports CFA, but took no action
  - Democratic Republic of Congo undecided
  - The CFA needs ratification by six countries to enter into force

Signing the CFA in May 2010

Grand Ethiopian Renaissance Dam (GERD)

History and developments of the GERD

- Earlier dams in Ethiopia on the Nile
  - Fincha, Tana Beles, Tekeze
- Announcement made in March 2011
- Construction started in April 2011
  - Egypt was busy with January 2011 revolution
- Lies 20 km from Sudanese borders
- 170 meters in height
- Lake capacity:74 BCM of water
  - Largest Dam in Africa
  - Tenth largest in the world

History and developments of the GERD

- Expected to be completed in 2017
- To generate 6000 megawatts of electricity
  - 16 turbines each 375 megawatts
  - First turbines to operate in December 2015
- Construction by Salini company of Italy
- Chinese building transmission lines
- Europeans providing mechanical equipment
- Cost estimated at 5 billion dollars
- Funding from Ethiopia's own resources and bonds issued to Ethiopians


IRAQ
IRAN
Cairo
Nile
LIBYA
EGYPT
Red Sea
SAUDI ARABIA
CHAD
SUDAN
Khartoum
Blue Nile
ERITREA
YEMEN
Addis Ababa
Grand Millennium Dam
ETHIOPIA
SOUTH SUDAN
White Nile
C.A.R.
SOMALIA
UGANDA
KENYA
CONGO
INDIAN OCEAN
RWANDA
BURUNDI
Lake Victoria
TANZANIA
1,000 km

The GERD January 2014

Egypt and Sudan Reaction

- Egypt opposed vehemently the GERD
  - Decrease of water flow to Egypt
  - Decrease in irrigated area
  - Decrease in electricity at High Dam
- Sudan wavered between opposition and support
  - Finally formally supported the dam on 4th of December 2013 through President himself
  - A major shift away from Egypt, the first since 1959
  - Flurry of diplomatic activities during last 4Y

Egyptian government and opposition discussing GERD June 2013

Benefits & Risks of GERD to Sudan

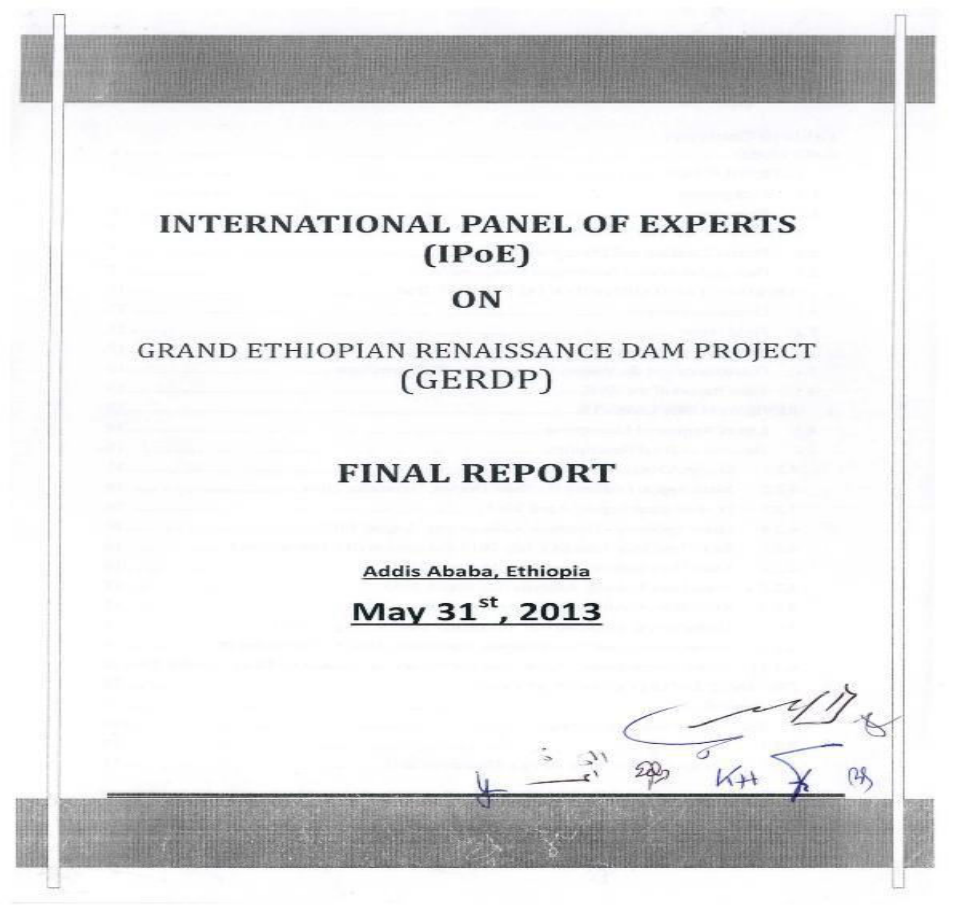
- Benefits of GERD to Sudan:
  - Trapping sediments, stopping floods, regulating flow round year
    - regulation of electricity generation, replenishment of groundwater
  - Cheaper electricity, possible storage for Sudan
- Risks
  - Safety of the dam – only 20 kilometers fro
  - Period in which Lake to be filled
  - Erosion of river banks in Sudan because of decrease in sediments, decrease in fisheries

Location of the GERD

International Panel of Expets

- Ethiopia proposed establishment of international Panel of experts to review possible negative effects of the GERD
  - Two from each Ethiopia, Egypt and Sudan, four from outside Nile basin countries
- Panel established in November 2011
- Submitted Report in May 2013
  - Three days after Ethiopia diverted Blue Nile
- Recommended more in-depth studies
  - Reading of Egypt & Ethiopia of the Report

Report of the International Panel of Experts on the GERD



INTERNATIONAL PANEL OF EXPERTS
(IPoE)

ON

GRAND ETHIOPIAN RENAISSANCE DAM PROJECT
(GERDP)

FINAL REPORT

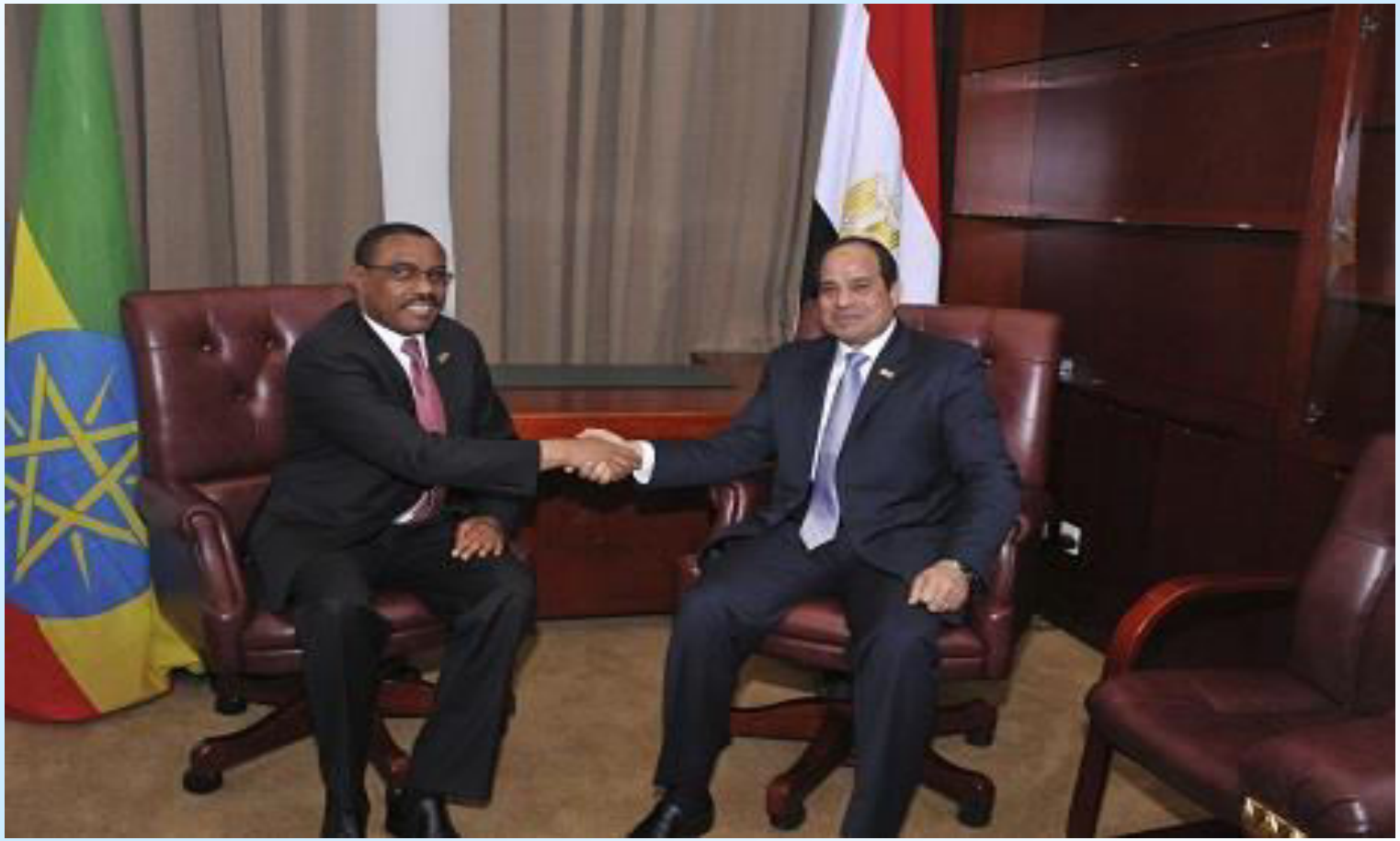
Addis Ababa, Ethiopia

May 31st, 2013

International Panel of Experts

- Egypt demanded halt in construction of dam
  - Studies to be done by international experts
- Ethiopia refused halting construction
  - Panel did not ask for that – its mandate
  - Agreed to undertake studies by three parties
- Tripartite meetings in Nov, Dec 2013, January, August, September, October, 2014
- Breakthrough in 4th and 5th, 2014 meetings
  - Egypt dropped demand for halt of construction
  - 2 studies to be undertaken by international firm

Sisi and Halie Mariam in Malabo, Equatorial Guinea, June 26, 2014



March 23, 2015 Agreement on GERD

- DoP on the GERD Signed by three leaders in Khartoum on March 23, 2015
- Consists of 10 points, 6 on international water law:
  - Cooperation;
  - Obligation not to cause harm;
  - Principle of equitable & reasonable utilization;
  - Exchange of data and information;
  - Sovereignty, territorial integrity;
  - Peaceful resolution of disputes

March 23, 2015 Agreement on GERD

- Consists of 10 points, 4 on the GERD
  - Principle of development, regional integration and sustainability – acceptance of GERD
  - Cooperation on management of the GERD
    - Agree on rules for first filling of reservoir
    - Agree on rules for annual operation of GERD
  - Priority for electricity sale to Egypt and Sudan
  - Principle of Dam safety
- Agreement is a major breakthrough
  - First trilateral agreement; between 3 main riparians; on major & difficult dispute

Signing the GERD Agreement, Khartoum March 23, 2015

Signing the GERD Agreement, Khartoum March 23, 2015

Conclusion

- Nile is a river of limited flow resulting in
  - Increasing competition and disputes
  - Unilateral development plans - dams
- Existing treaties have led to
  - monopoly of Nile waters by Egypt & Sudan
  - disputes & grievances
    - source for conflict instead of route for cooperation
- Major power shifts in the Nile Basin
  - CFA as an ”African Peaceful Spring”
  - GERD sign of the leveling of the playing fields

Conclusion

- Large areas for possible cooperation
  - Ethiopia hydropower, Sudan irrigable lands, Lake Victoria fisheries, South Sudan swamps, Egypt industrial capabilities
- Cooperation is the only way for optimal utilization of shared watercourses
- GERD should have been a jointly owned and operated project by three countries
  - Yet resolution of dispute is major achievement
  - DoP Can and should form the basis for serious & constructive basin-wide cooperation


Thank You
salmanmasalman@gmail.com
www.salmanmasalman.org