

Transboundary dimensions of
Dam Safety & Coordination:
Is cooperation possible?

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Dam Safety & Coordination

What is the state of the affairs?

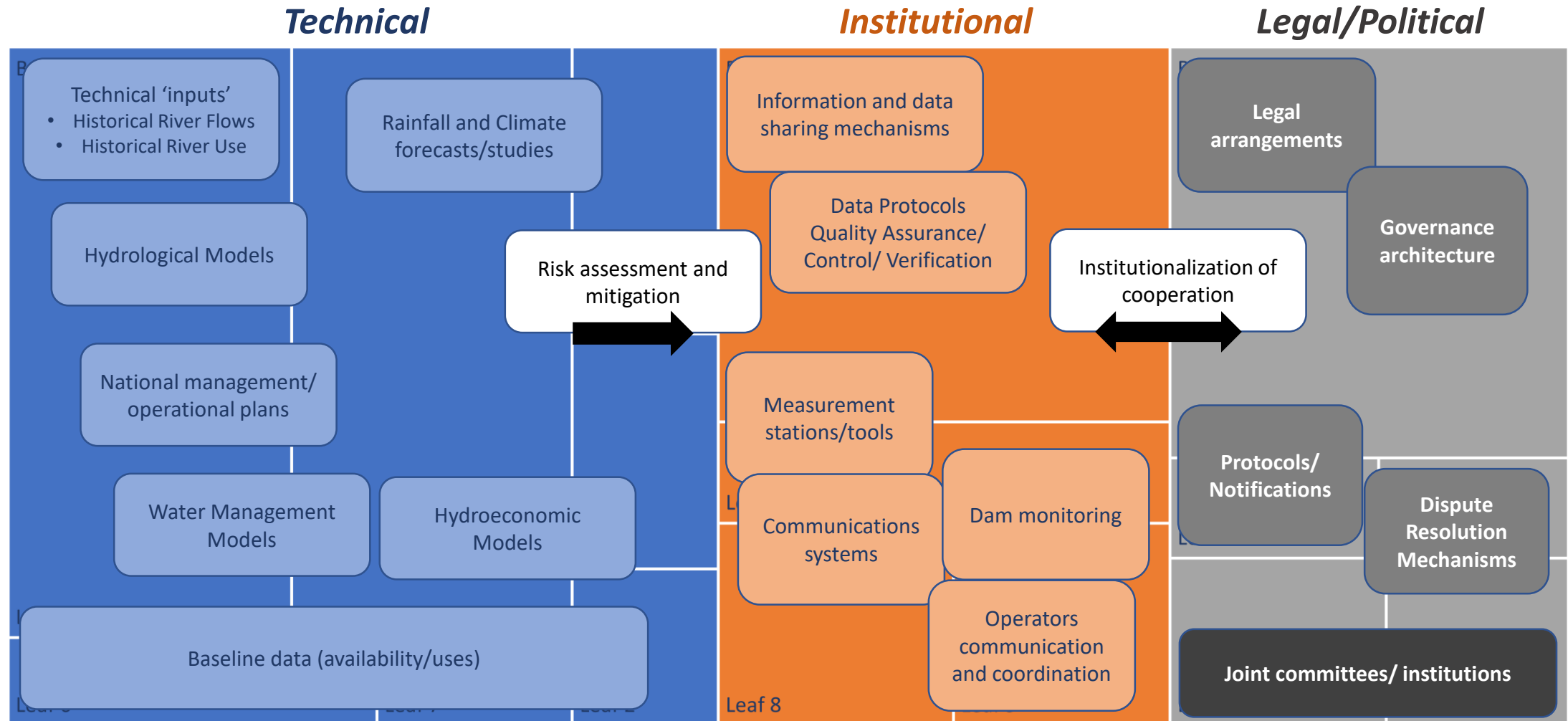
- Single dam or Multiple dams in same river system
- Different purposes/uses/allocations
- Different countries
- Size matters!

Dams with transboundary nature or relevance

- Technical complexity: it that can be addressed
- Great political complexity: which represents obstacles
- Legal/institutional: challenges but also opportunities

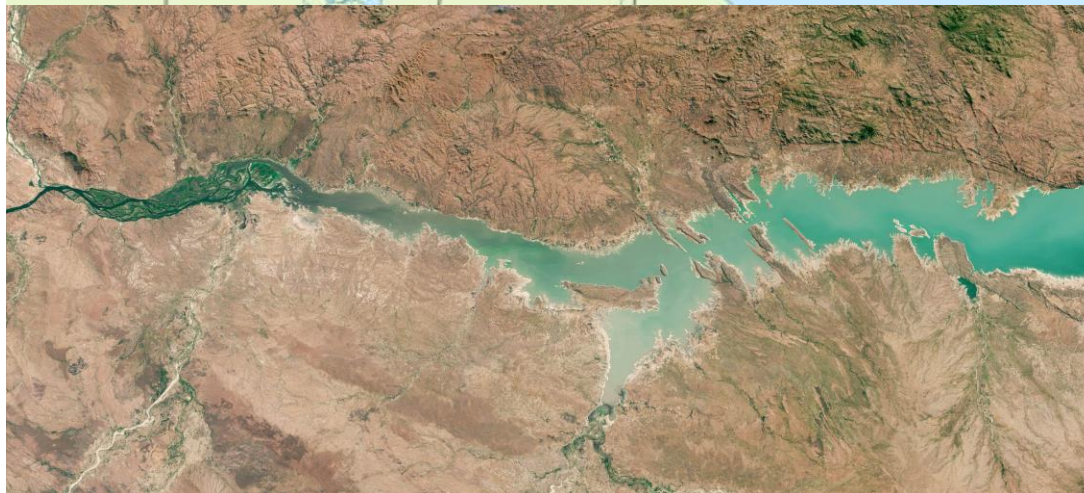
**Coordination/Cooperation
on multiple levels needed**

Cooperation Pillars for infrastructure coordination



this applies to both national and transboundary

Zambezi Basin: bilateral & multilateral approaches



Multiple dams in same river system

Hydropower dams

Kariba Dam (Zimbabwe/Zambia)

Cahora Bassa (Mozambique)

Size matters!

Bilateral arrangements – ZRA

Multilateral arrangements - ZAMCOM

Coordination/Cooperation exists

Zambezi Dams: Coordination main institutions & mechanisms

Bilateral	Multilateral
Legal and institutional	Legal and institutional
1958 Kariba Dam (border dam)	2002-2004: Negotiations for Zambezi River Commission (ZAMCOM) Agreement
1987 Zambezi River Authority (ZRA) Parallel/bilateral legislation/acts +.Power corporation operators	2014: ZAMCOM established as an River Basin Organization (RBO) Note: Zambia (upstream): had reservations, but still an observer
Mandate: Dam Operation, Performance and Maintenance of the Kariba Dam, and any future bilateral infrastructure	Mandate: it provides specialized technical and other support to all basin countries, but not an infrastructure implementing agency
Main tools: Safety Monitoring; Measuring strategic stations; Information collection and sharing (timely) >>> Responses to crisis in extreme cases	Main tools: River Information System /Hydromet; Emergency Preparedness Plan / Disaster risk management; Decision Support System; Climate Change Monitoring
Critical issues	Critical issues
Critical Dam Safety issues (from 2008) Rehabilitation Project (2015)	Dam cascade / coordination at basin level (countries/operators) High risk: Cahora Bassa Dam security (1974) and recurrent extreme floods
Droughts/Floods Risks (2008-2014; 2016-2020)	Coordination between existing and future/planned projects
Impacts in downstream Cahora Bassa Dam – what cooperation possible?	Policy and legislation harmonization at basin-level
Key considerations	Key considerations
Hydropower/Economic impacts of Dams operation (for countries and the region, as high % of regional SADC power pool)	Basin-wide approach still limited
Development of new dams upstream (ZAR mandate also)	ZRA-ZAMCOM relations are strong and commendable

Nile Basin: bilateral, trilateral & multilateral approaches



Multiple Dams (in all NileS)

Two large-scale dams + some medium/small scale

Hydropower & Irrigation uses: HAD (main user), Roseires, Merowe

Game-changer: Grand Ethiopian Renaissance Dam (GERD) since 2011

Size matters!

EGY-SUD Bilateral Agreement (volumetric allocations)

No legal/institutional basin-wide agreement adopted (yet)

Multilateral technical cooperation – 20 years under the NBI

**Coordination/Cooperation
is still limited and extremely complex**

Bilateral (Egypt/Sudan)	Multilateral (Nile Basin)
Legal and institutional	Legal and institutional
1959 Nile Waters Agreement + Permanent Technical Joint Committee (PTJC)	1999: Nile Basin Initiative (NBI) 1997-2010: Negotiations for a basin-wide legal Framework Agreement
Cascade of Dams 1971 High Aswan Dam 1970s Roseires Dam ++ 1997 Toshhka Canal/Project 2009 Merowe Dam	Mandate: promote socio-economic development through the management <u>and development</u> of the shared Nile water resources High Expectation: to increase investment in hydraulic infrastructures, in particular in upstream countries
Mandate/Functions - Management and operation of dams - Water allocations (per country + evapotranspiration) - Dam safety issues are not directly tackled	20 Years of Knowledge and Strategic Tools DSS, Hydromet, Strategic Analysis, Early Warning Systems, ... *** Dam Safety Programme; Reservoirs Operations and Coordination
Critical issues	Critical issues
Full allocation of all Nile water resources (basin closure)	Upstream countries claim the right to use and develop the Nile waters
High intra- and inter-annual climate variability Recurrent floods and droughts every decade	Upstream infrastructures have a large potential to mitigate future Climate Change impacts – IF coordination is in place
2011 Grand Ethiopian Renaissance Dam (GERD) >>>> outside of the bilateral arrangements	GERD: Hydropower dam // But possible Impacts/Risks on operation of downstream dams (Roseires; HAD)
Key considerations	Key considerations
Upstream development is seen as a ‘threat’ to the current arrangements For Egypt: Drought Management Plans is the key issue For Sudan: Floods and Sedimentation control is the key issue	Basin-wide approach has partially failed because of political barriers For upstream riparians: Water infrastructure development is the key issue The Pandora Box: potential Water Re-Allocations negotiations



Nile Dams: Coordination main institutions & mechanisms

**DAMSAFETY:
COORDINATED OPERATION OF TRANSBOUNDARY
CASCADE DAMS**

RISKS

Climate extremes

- + Extreme floods
- + Prolonged droughts

Dam failures

- + Loss of lives, properties & services
- + Regional insecurity
- + Environmental damage

Uncoordinated operation

- + Energy underproduction
- + High & low releases
- + Inefficiency of irrigation water use
- + Evaporation loss

ACTION

Adaption strategies

- + Strengthen forecasting system
- + Drought & flood management plans

Dam safety standards

- + Institutional & legal framework
- + Setting construction, operation & safety standards

Regional cooperation

- + Regional optimized planning
- + Setting up basin organization
- + Standardize tools

BENEFITS

Flood & drought control

- + Reliable water supply
- + Resilient economies

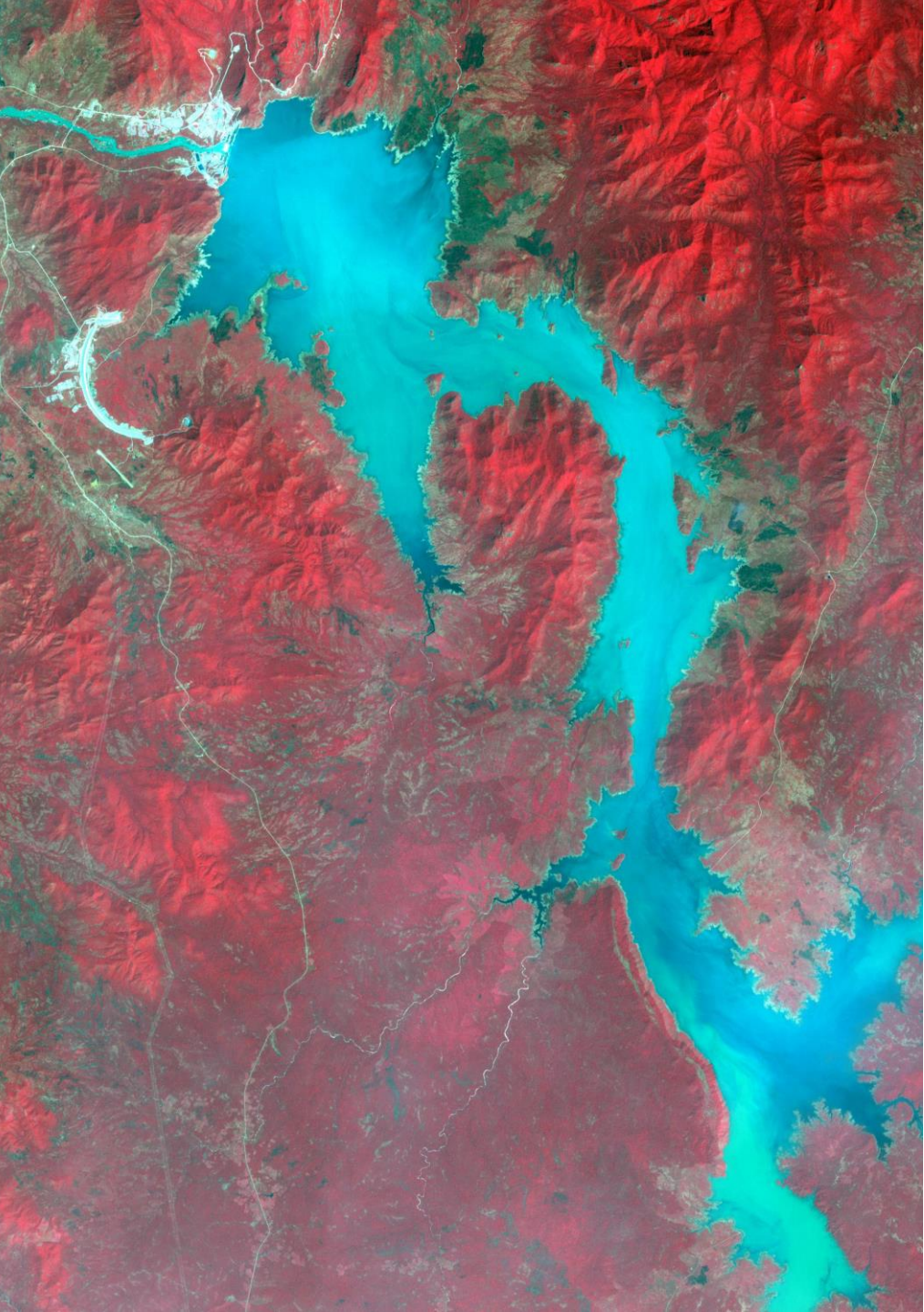
Functional safety

- + Safety of downstream lives, property & environment
- + Regional security
- + Sustained economic services

Maximized returns

- + Energy uplift
- + Irrigation expansion
- + Improved navigation
- + Sustained environmental flow

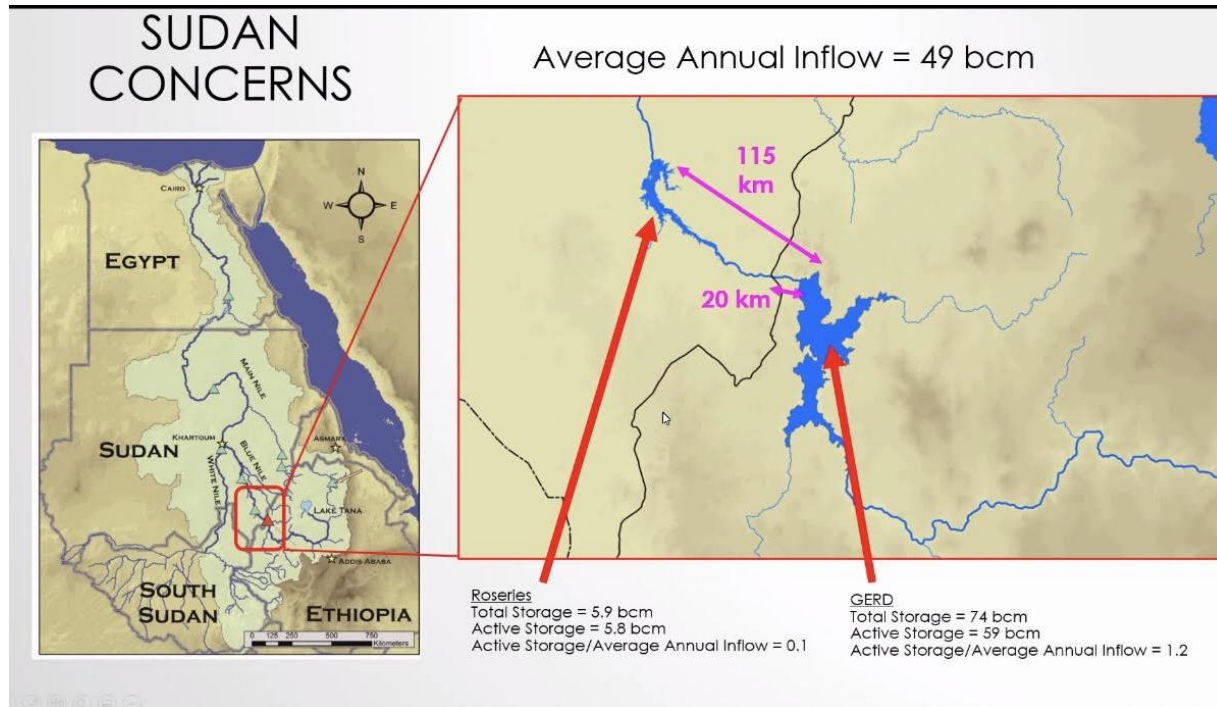




**Grand Ethiopia
Renaissance Dam (GERD)
Reservoir, 2021**



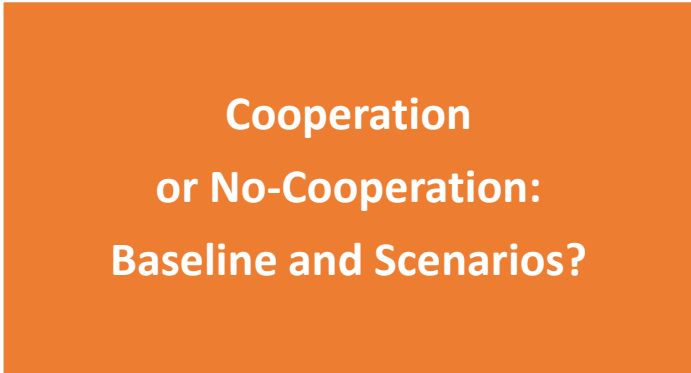
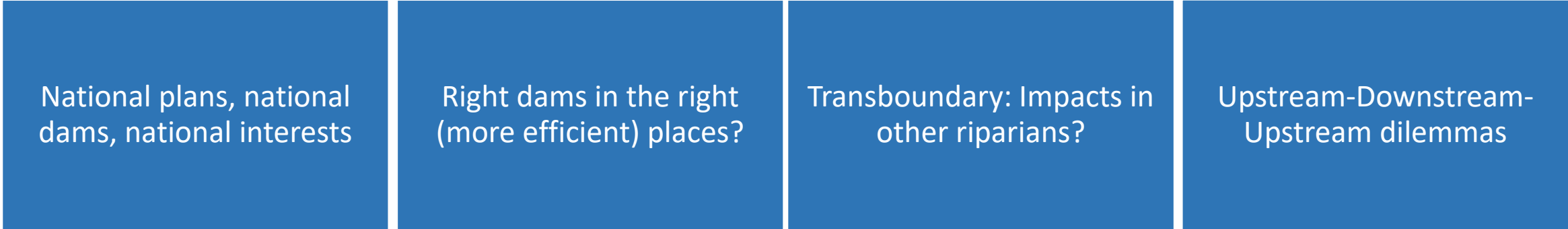
GERD & downstream dams: Main bottlenecks



- Dams Safety (mainly for Sudan)
- Dam Coordination issues (tri and/or bi?)
- Technical solutions for water releases Exist
- No legal arrangement / No guidelines agreed
- No institutional setting
- Construction/Filling continues

**Major issues (with or without agreement):
Regular Data-Sharing and Monitoring**

Transboundary dams: Major controversial issues



Thanks for your attention

