

# Project Nile:

## *Improved Hydrometeorological Information for the Countries of the Nile Basin*

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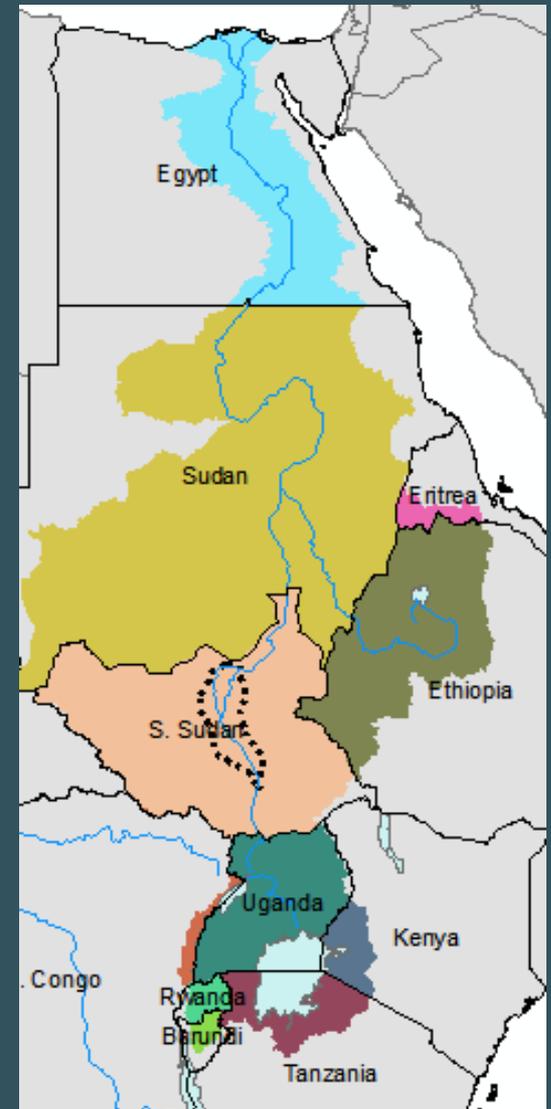
Operational Partners:

USAID, World Bank, Nile Basin Initiative



# Problem Statement

- 11 countries
- ~200 million people, 50% below the poverty line
- Large seasonal and interannual climate variability
- Increasing water consumption
- Unilateral development
- No water sharing agreement
- No consensus on river hydrology



# Opportunity

- Shared analysis and capacity building can promote cooperation
- The **Nile Basin Initiative (NBI)** has a mandate to provide a Knowledge Portal for all riparian States

# Partners / End Users

## Original:

- The Nile Basin Initiative (NBI)
- USAID
- The World Bank

## Follow-on:

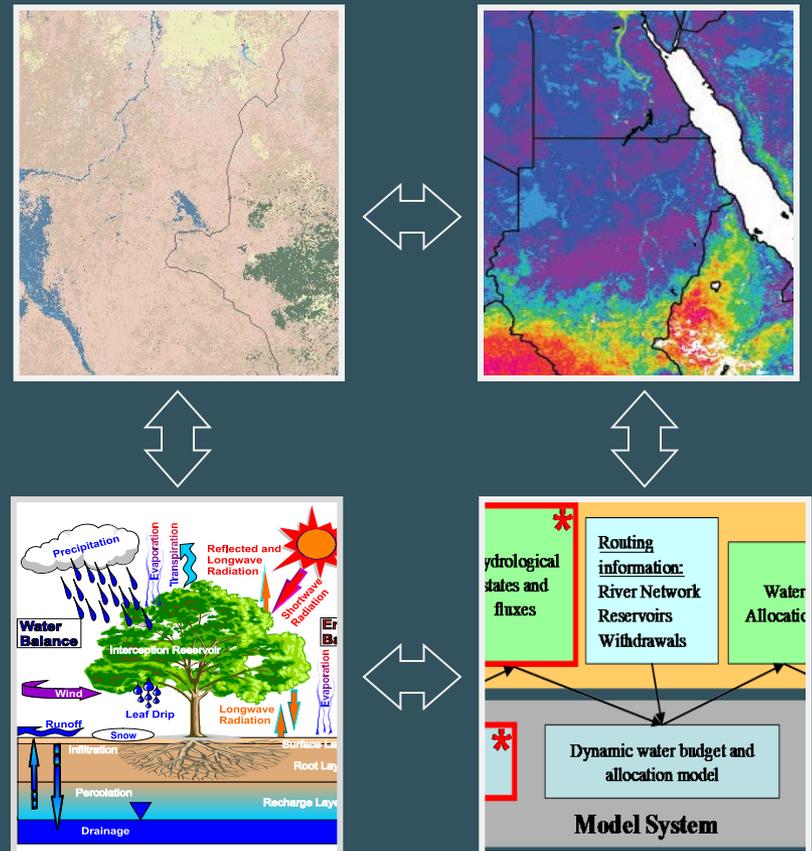
- UNESCO
- USDA-FAS
- Ethiopian EPA & NMA
- Sudanese MIWR
- Addis Ababa Univ. & Debre Markos Univ.

# Project Approach

Goal: improved hydrometeorological information for research, planning, and water management

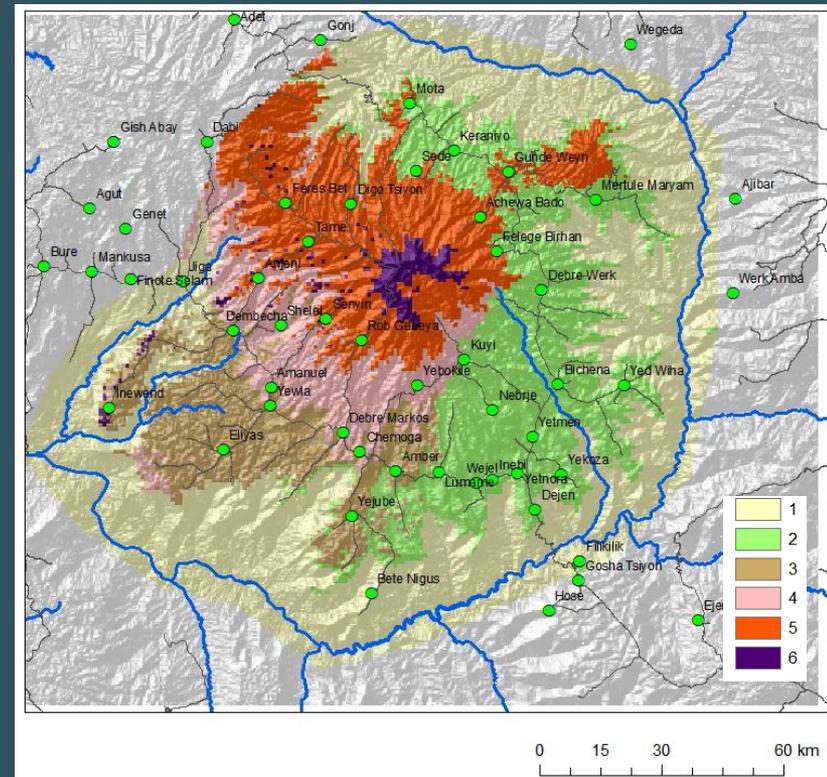
## Components:

1. Land cover mapping and simulation
2. Satellite-derived evapotranspiration
3. Basin-wide land data assimilation system
4. Integration to Decision Support



# Accomplishments: Land Cover Analysis

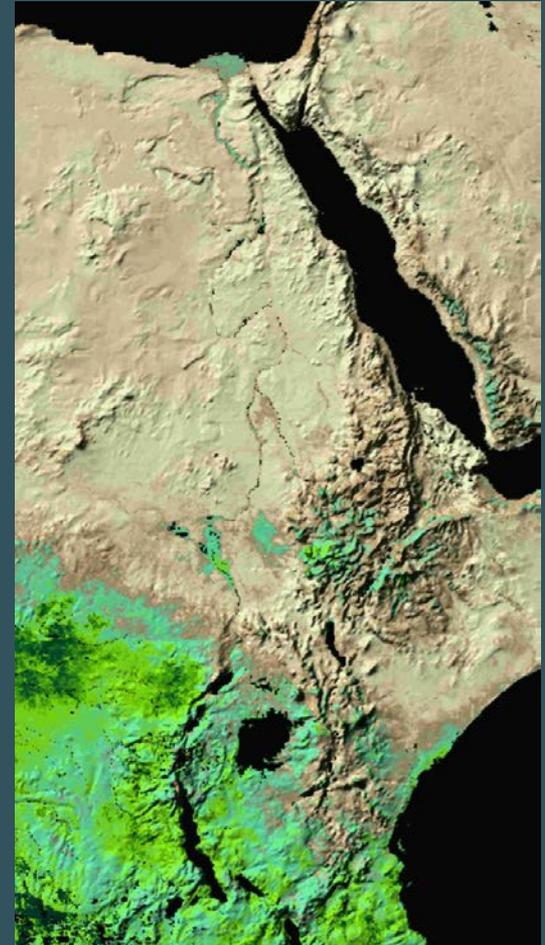
- Basin-wide MODIS-derived **irrigation** maps
- Multi-temporal Landsat **classification** for headwaters regions
- Multivariate **agroecosystem analysis** for vulnerability assessment\*



\*Simane B, BF Zaitchik and M Ozdogan (2013) Agroecosystem analysis of the Choke Mountain watersheds, Ethiopia. Sustainability 5(2): 592-616; doi:10.3390/su5020592

# Accomplishments: Satellite-derived ET

- 3-km resolution daily surface flux estimates from **ALEXI**
- Multiple rounds of **algorithm improvement**, facilitated by project partners
- Independent **comparison** with LDAS and other ET products\*



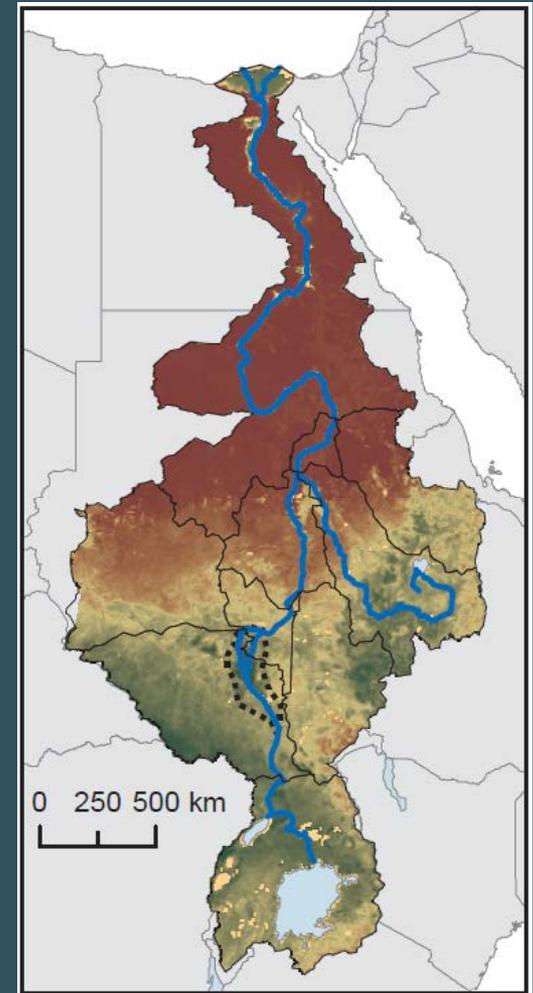
\*Yilmaz, MT, MC Anderson, BF Zaitchik, CR Hain, WT Crow, M Ozdogan, JA Chun, and JP Evans (2014) Comparison of prognostic and diagnostic surface flux modeling approaches over the Nile River basin. *Water Res. Res.* 50: 386–408.

# Accomplishments: Land Data Assimilation System

- Custom land cover maps and **irrigation routines**
- **5-km** resolution retrospective simulations 1982-2014
- Application to drought\*, agriculture\*\* and water balance analysis

\*Anderson WB , BF Zaitchik, CR Hain, MC Anderson, MT Yilmaz, J Mecikalski, and L Schultz (2012) Towards an integrated soil moisture drought monitor for East Africa. HESS16: 2893-2913

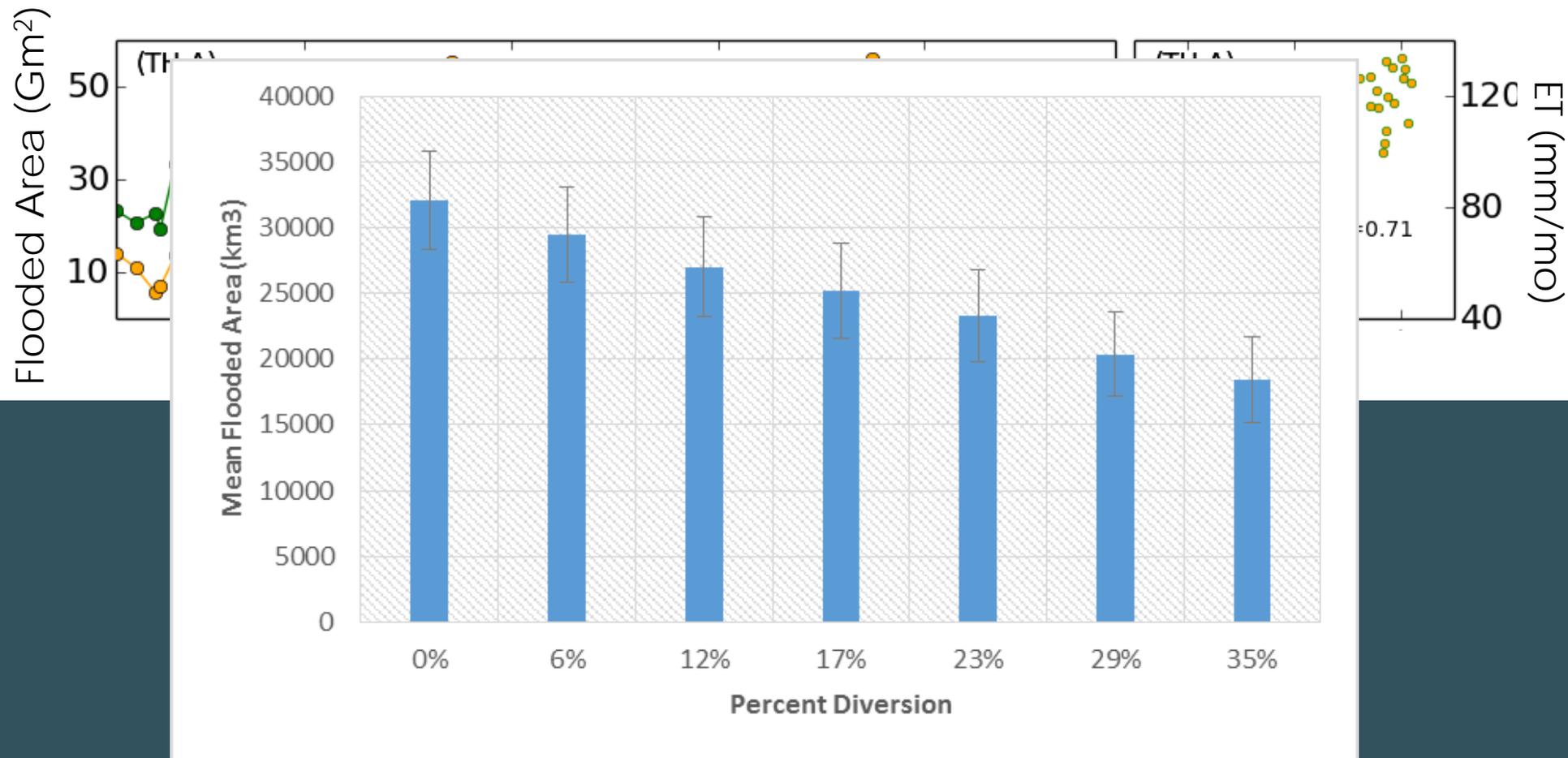
\*\*Foltz J, J Gars, M Özdoğan, B Simane and B Zaitchik (2013) Weather and Welfare in Ethiopia, In 2013 Annual Meeting, August 4-6, 2013, Washington, DC, No. 150298, Agric. & Applied Economics Association.



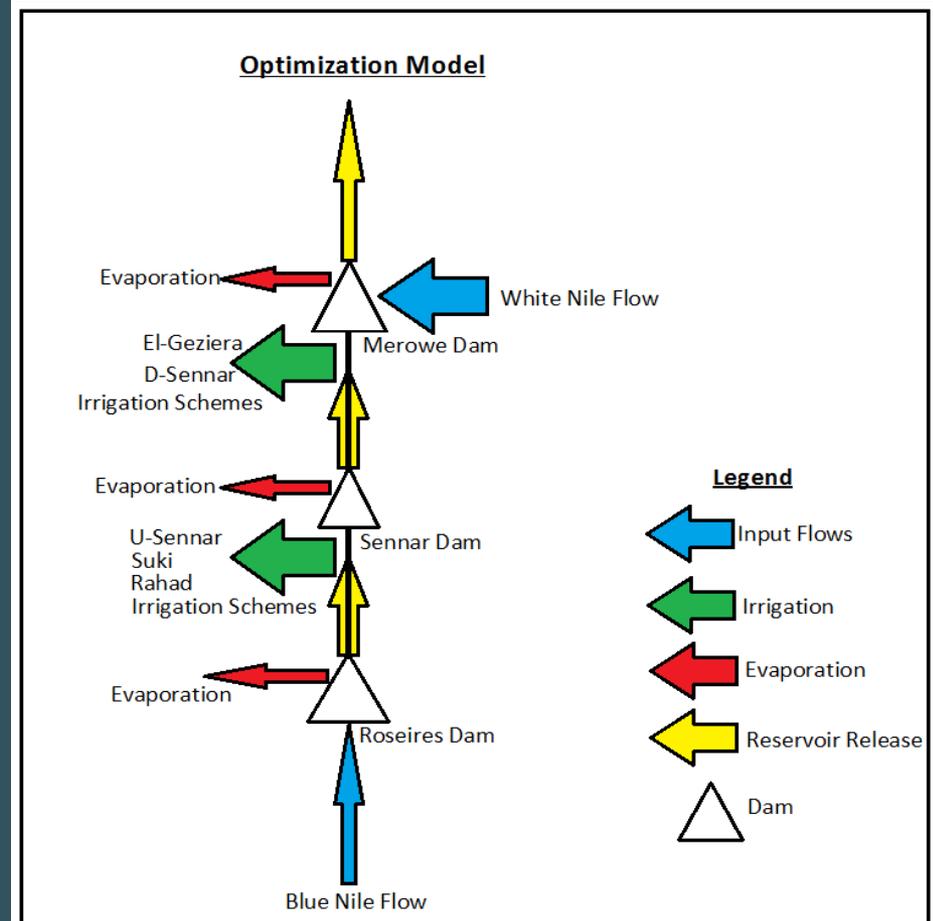
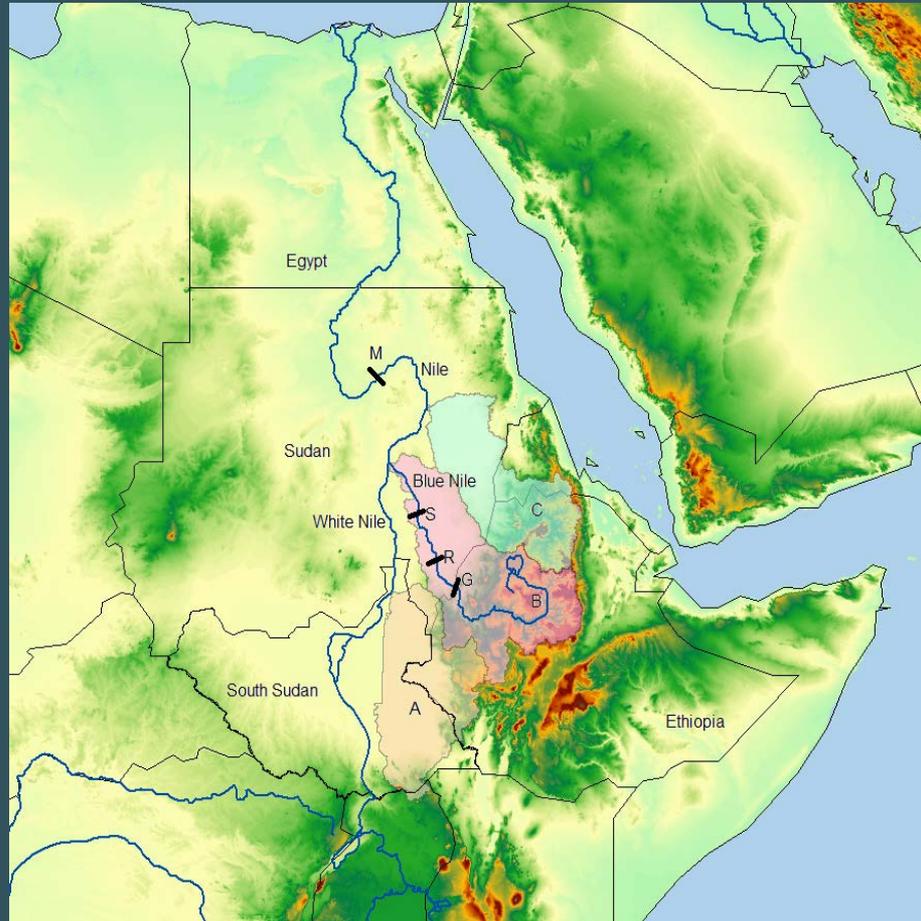
# Collaborative Applications: Sudd water balance



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# Collaborative Applications: Hydroeconomic Development



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Moderate Ag Profit

High Ag Profit

Scenario	Irrigation	Hydropower	Irrigation	Hydropower
High Rain	↑	↑	↑	↑
Low Rain	↓	↑	↓	↓
Upstream Dam	↓	↑	↑	↓
Dam + power agreement	↑	↓	↑	↓

Satti S, BF Zaitchik, and S Siddiqui (2014) The question of Sudan: a hydroeconomic optimization model for the Sudanese Nile. Hydrol. & Earth System Sci. Disc. 11:11565–11603

# Transition

- **Land cover mapping:**
  - Trainings provided to NBI-ENTRO, NBI-HQ, and NBI-NELSAP.
- **ALEXI:**
  - Data products and training provided to NBI-ENTRO, NBI-NELSAP and NBI-HQ
  - Maps included in the NBI Water Resource Atlas
- **LDAS:**
  - Trainings in post-processing and application provided to NBI-ENTRO, NBI-HQ, and NBI-NELSAP
  - Output included in NBI Water Resource Atlas
  - Operational transition still under discussion

# Lessons (still being) Learned

- National **vs.** International
- Operational **vs.** Academic
- Institutional stability **vs.** stabilizing institutions

**THANK YOU**