2020 International Conference
The Nile and Grand Ethiopian Renaissance Dam (GERD): Science, Conflict Resolution and Cooperation

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Water security is an asset to all nations of the world

Nearly 800 million people in 40 countries receive most of their daily water supplies from sources outside of their borders.

Several countries—notably, Egypt, Pakistan, Bangladesh, Niger and others—receive more than 75 per cent of their water from sources outside their borders

Three billion people in 145 countries live in Transboundary Basins

90% of the world's population lives in countries that share basins.

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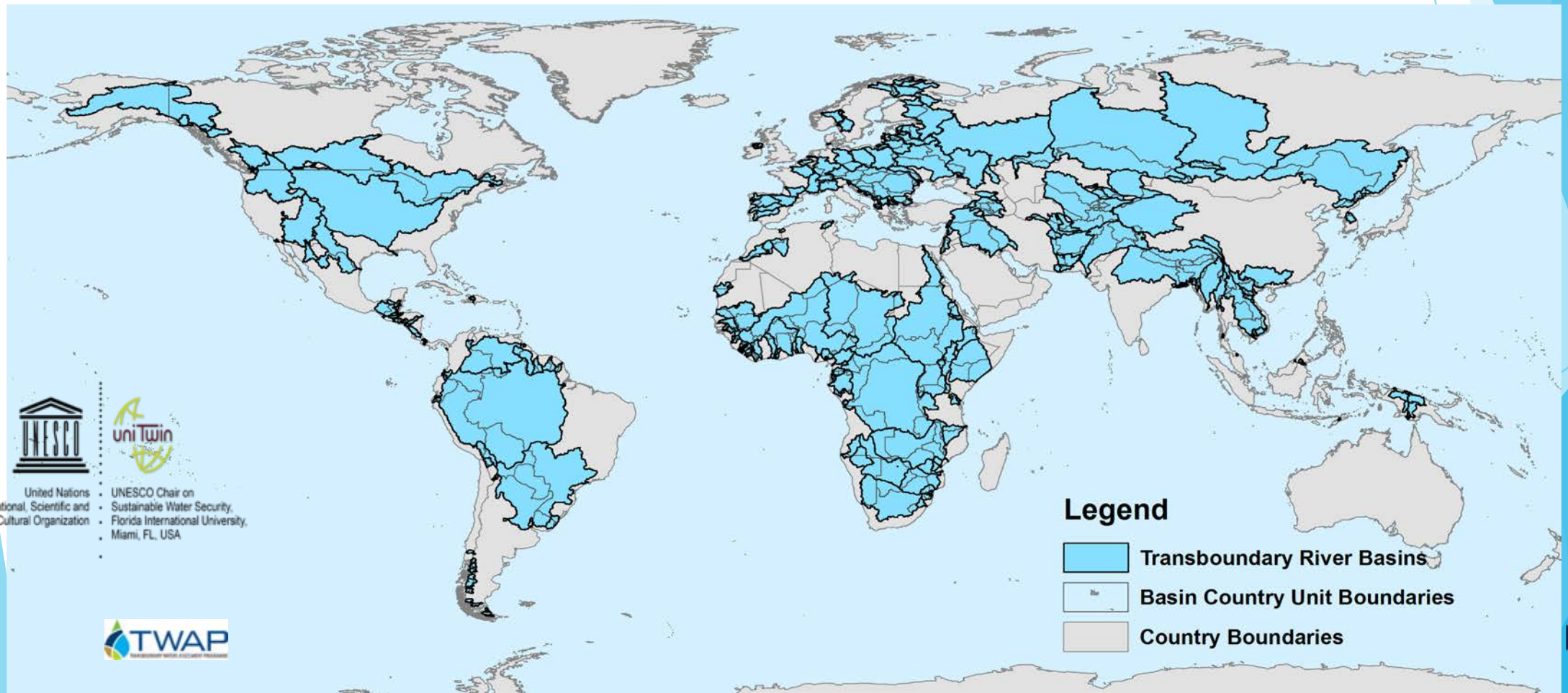
Facts and Figures

-263 transboundary river basins (60% of global fresh water flow)
- transboundary lake or river basins cover half of land surface
- 30 countries lie entirely within international basins

(UNECE/UNESCO 2015)



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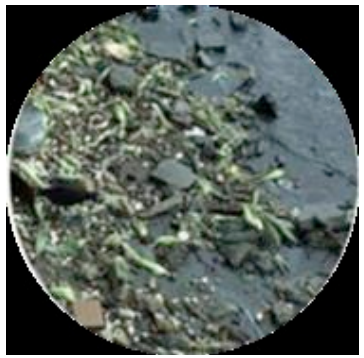

Water Security

Water security is defined as **the capacity of a population to safeguard access to adequate quantities of water of acceptable quality for sustaining human and ecosystem health on a watershed basis, and to ensure efficient protection of life and property against water related hazards -- floods, landslides, land subsidence,) and droughts.**

UNESCO, 2012

Water Security

The capacity of a population to safeguard sustainable access to adequate quantities and acceptable quality of water for sustaining livelihoods, human wellbeing, and socio-economic development, for ensuring protection against waterborne pollution and water related disasters, and for preserving ecosystems in a climate of peace and political stability

UN-WATER, 2013

Water Security

- Quantity
- Quality
- Security Per-se
  (safeguarding)

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Water Security

Attaining Water Security at the basin scale is the journey to self reliance

Need to Address Cross-Cutting Impacts to Achieve Water Security Objectives

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Water: a vital resource

Water Security: a key challenge for the 21st century

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Water Security Challenges in Transboundary Basins

- Going beyond water quality and quantity to include safeguarding the resource
- Defining the sustainability of a water security scheme
- What elements / characteristics/ conditions are key to sustainability ?
- Where, when and how to measure these key elements?
- Identifying and defining actors.

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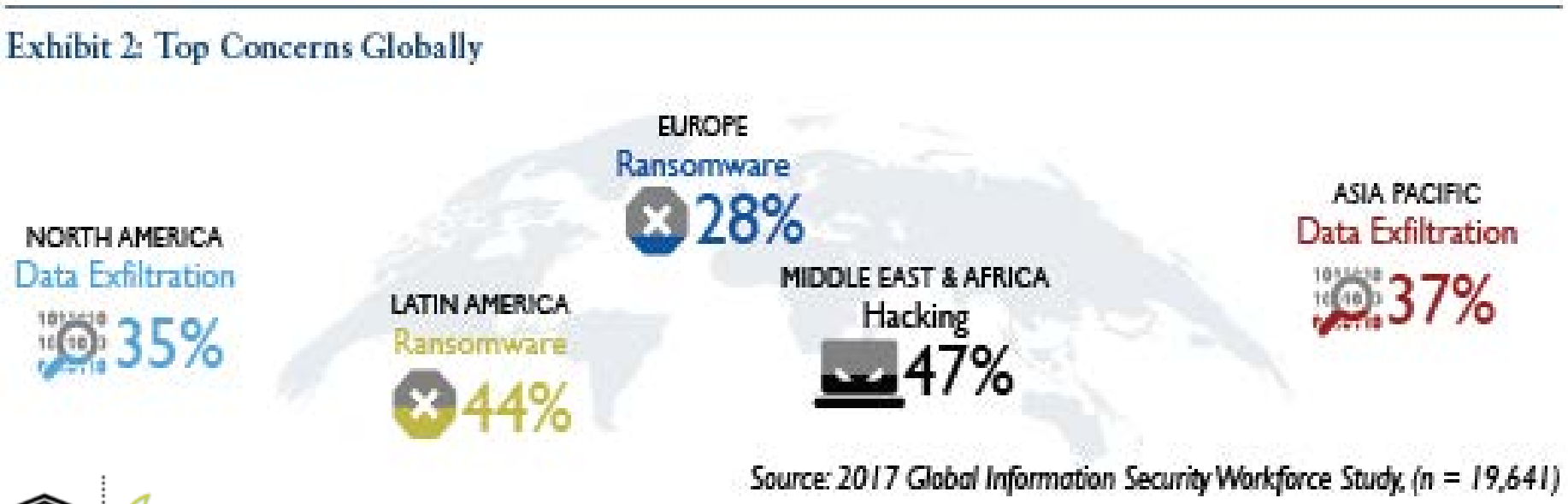
Security *per-se*: Safeguarding Water

A growing challenge at the global level - Cybersecurity



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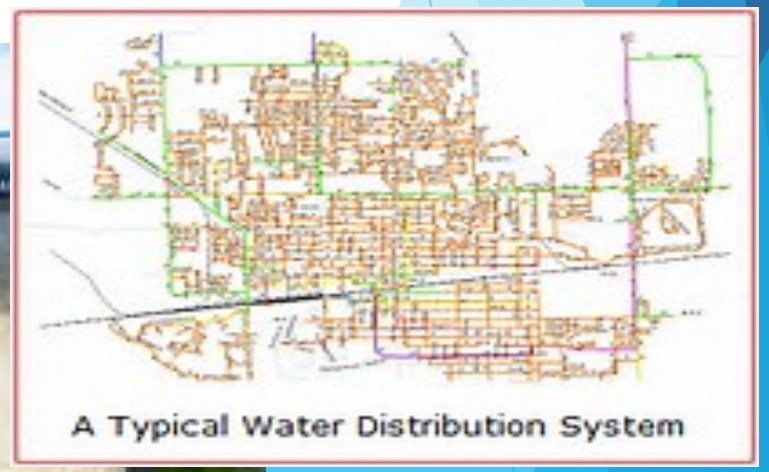
Mayor Challenges of Safeguarding Water - Water Security *Per-se*

Operation Processes

Infrastructure



Water Quality

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Water Quality

Most important challenges for transboundary basins:

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Water Quantity – Challenges / Opportunities

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Water Scarcity in Transboundary Basins

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Water Scarcity Value	Water Scarcity Level	Remark
<100%	Low	The water allotted for sustaining ecological services is untouched
100–150	Moderate	The water assigned for preserving ecological services is slightly not met
150–200	Significant	The water allocated for conserving ecological services is violated considerably
>200	Severe	The water apportioned for maintaining ecological services is significantly disturbed

Results:

Season	Number of people (in millions) facing low, moderate, significant and severe water scarcity per season			
	Low water scarcity	Moderate water scarcity	Significant water scarcity	Severe water Scarcity
January-February-March	1,147.32	11.67	222.09	1,137.64
April-May-June	1,494.52	562.86	192.83	268.51
July-August-September	2,047.77	23.08	50.47	397.40
October-November-December	1,638.08	454.17	43.19	383.28

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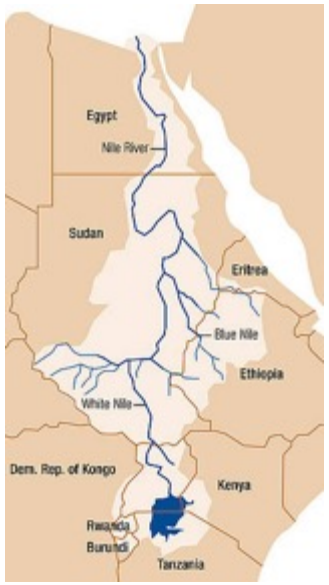
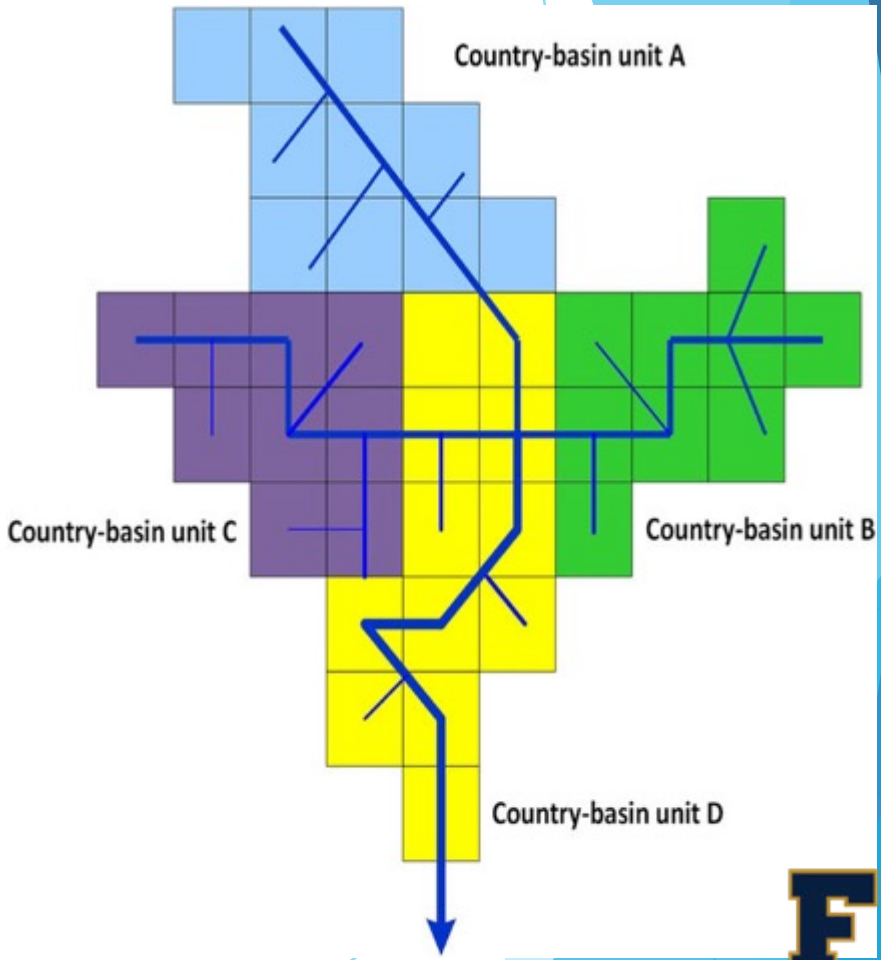
Transboundary Water Scarcity in Basins

(Dagmawi et al, 2018)

- Period: 1996-2005
- Temporal resolution: monthly
- Spatial resolution: country-basin mesh based





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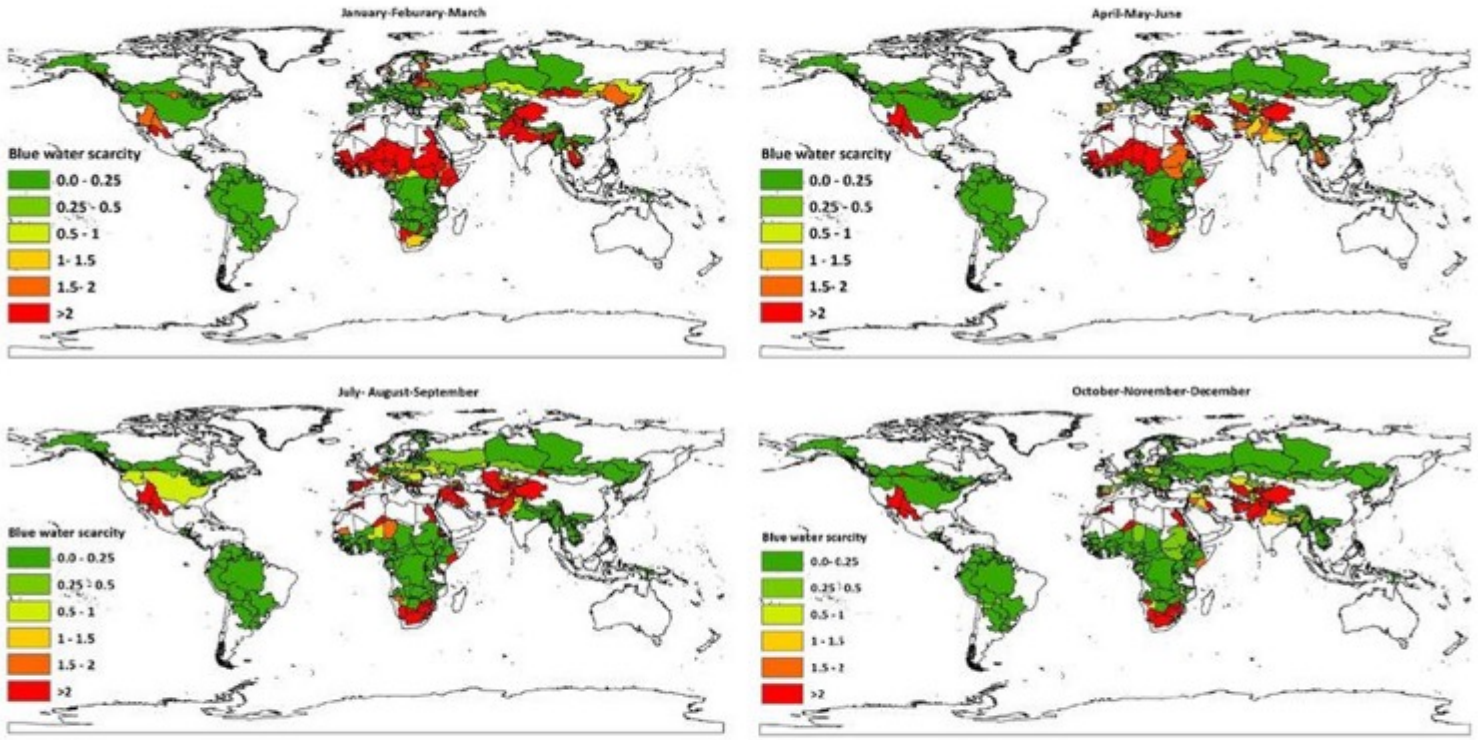
Water scarcity by country basin-unit per season

From: Mapping Monthly Water Scarcity in Global Transboundary Basins at Country-Basin Mesh Based Spatial Resolution



Quarterly averaged monthly blue water scarcity at country-basin unit spatial resolution. Period: 1996–2005. Blue water scarcity at country-basin mesh spatial resolution is defined as the ratio of the blue water footprint to the available blue water within each sub-basin. These maps were generated with ArcGIS 10.2 for desktop (http://www.esri.com/sofware/arcgis).

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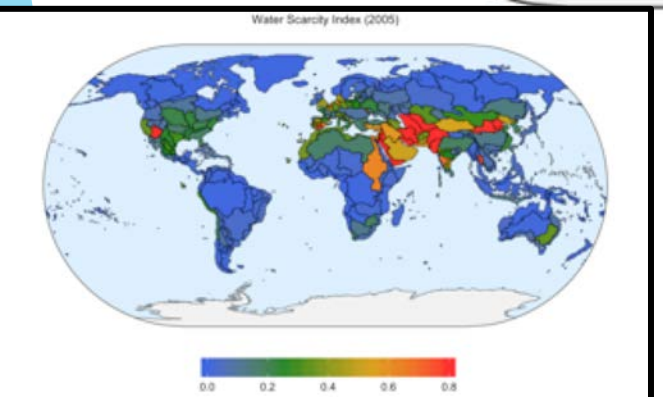
Water Scarcity Index Change

Water Scarcity in Nile Basin 2050 and 2100

2050

2100

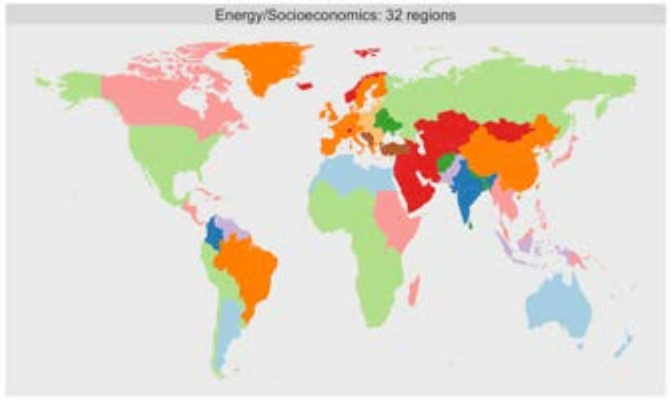


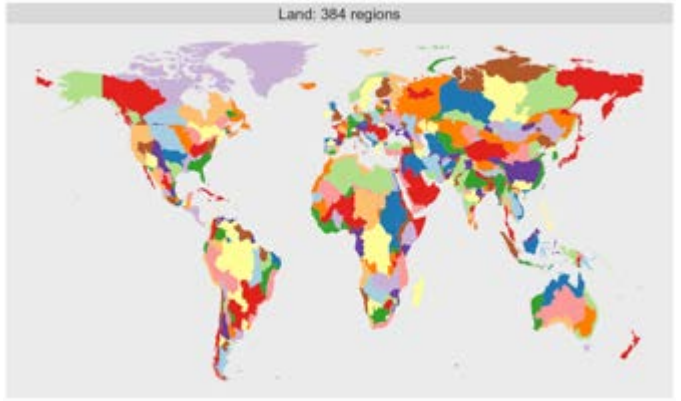
-0.10 -0.05 0.00 0.05 0.10

_F. Miralles, 2020

The Global Change Assessment Model (GCAM)

- The GCAM es a Integrated Global Assessment ***Model***
- The GCAM relates the Economy, Energy, Land, Water, **and** Climate systems

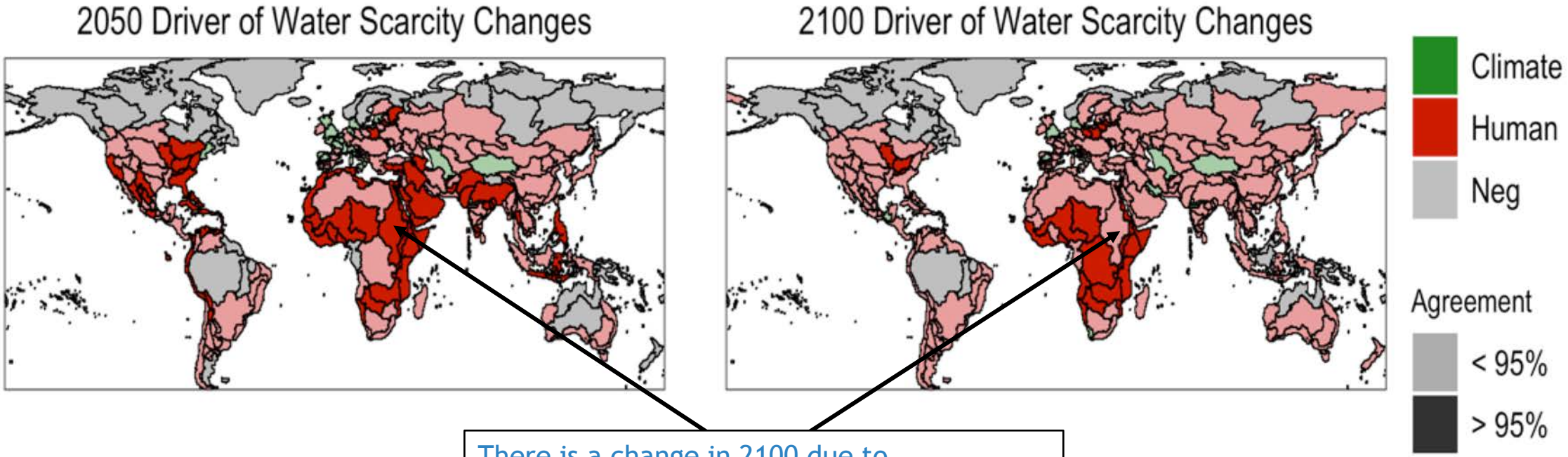




F. Miralles, 2020

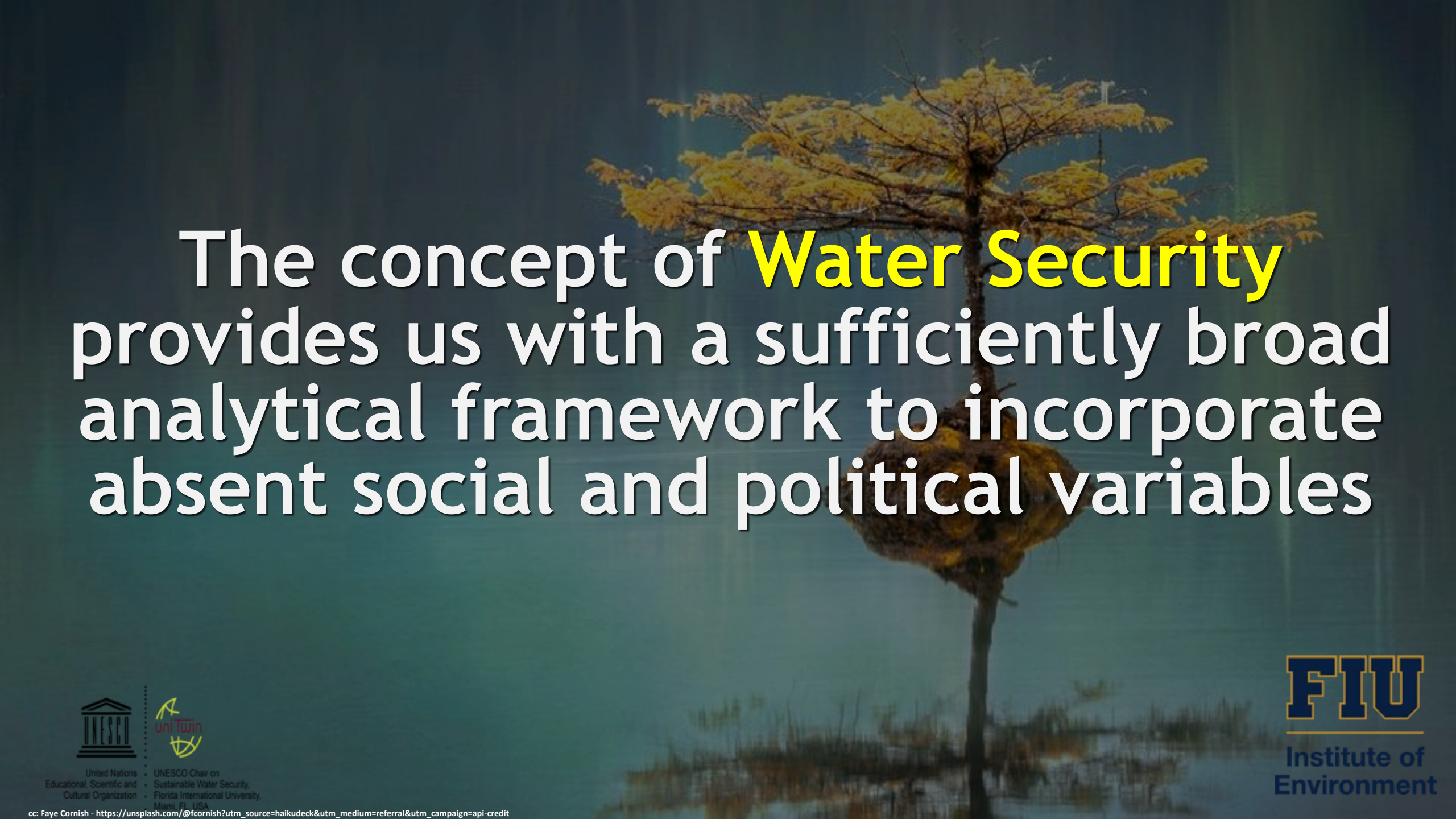
Human activities dominate the change in water scarcity worldwide, with the exception of Central Europe

On average, in 2100, 76% of the main river basins will attribute to human activities its major significant changes in water scarcity



There is a change in 2100 due to socioeconomic drivers

F. Miralles, 2020



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Water security is a huge challenge that we can only achieve if we are able to visualize new ways of managing water.

WATER SECURITY

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Thank you

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