Economic and Social Commission for Western Asia

Digitalization in Water sector:
Key to Security in the Realm of Cyber Insecurity
in the Arab Region

WSTA Fifteenth Gulf Water Conference
28-30 April 2024

UNITED NATIONS
الإسكوا
ESCWA

Shared Prosperity **Dignified Life**

Dr. Hammou LAAMRANI
Economic Affairs Officer
Food and Environment Policies section
Climate Change and Natural Resource
Sustainability Cluster
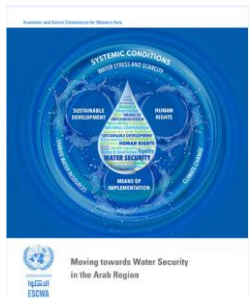ESCWA, Beirut, Lebanon

Table of Content

- ✓ **The context that we know: Growing Scarcity and Insecurity**

- ✓ **Digitalization promise: Fast developing**

- ✓ **Inherent challenges, payoffs and pitfalls**

- ✓ **What countries are doing?**

- ✓ **ESCWA support**

- ✓ **Concluding remarks**

What we know:

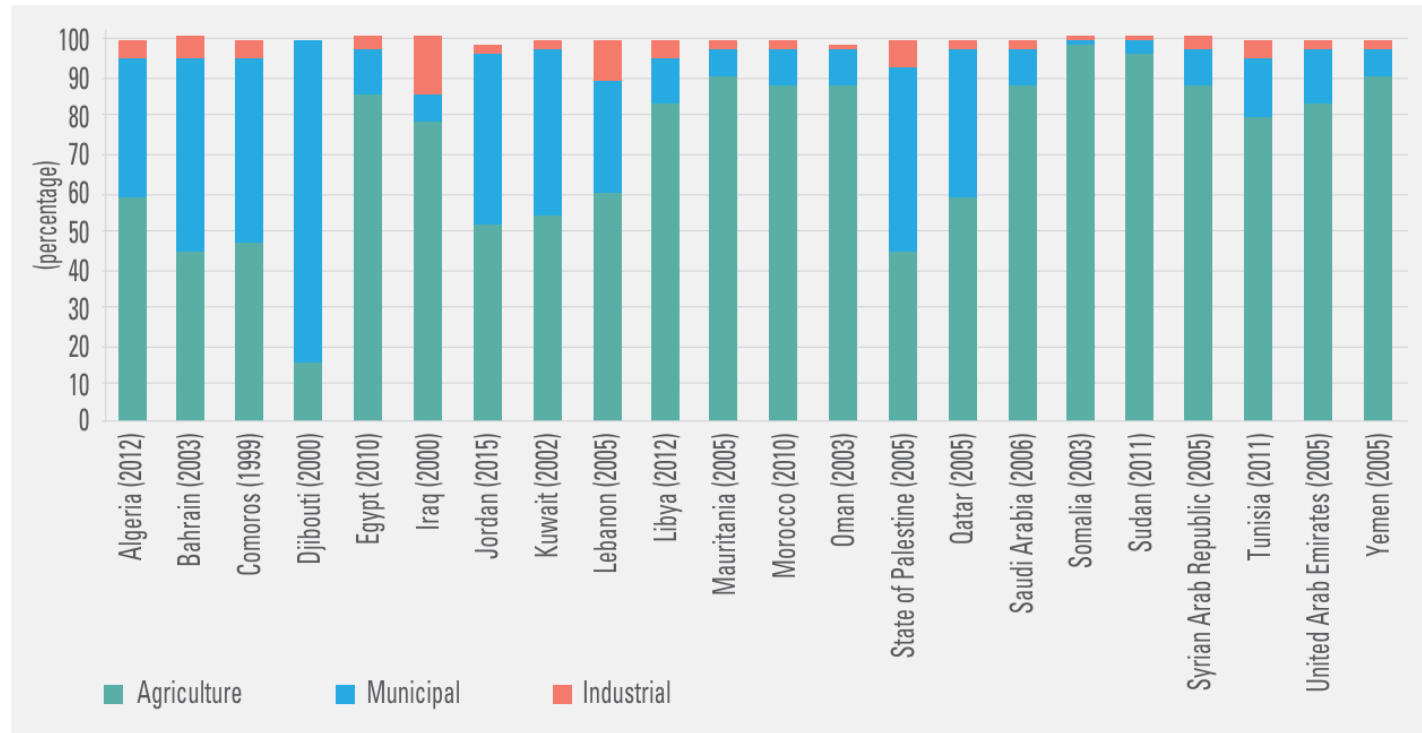Fresh Water Scarcity in the Arab Region
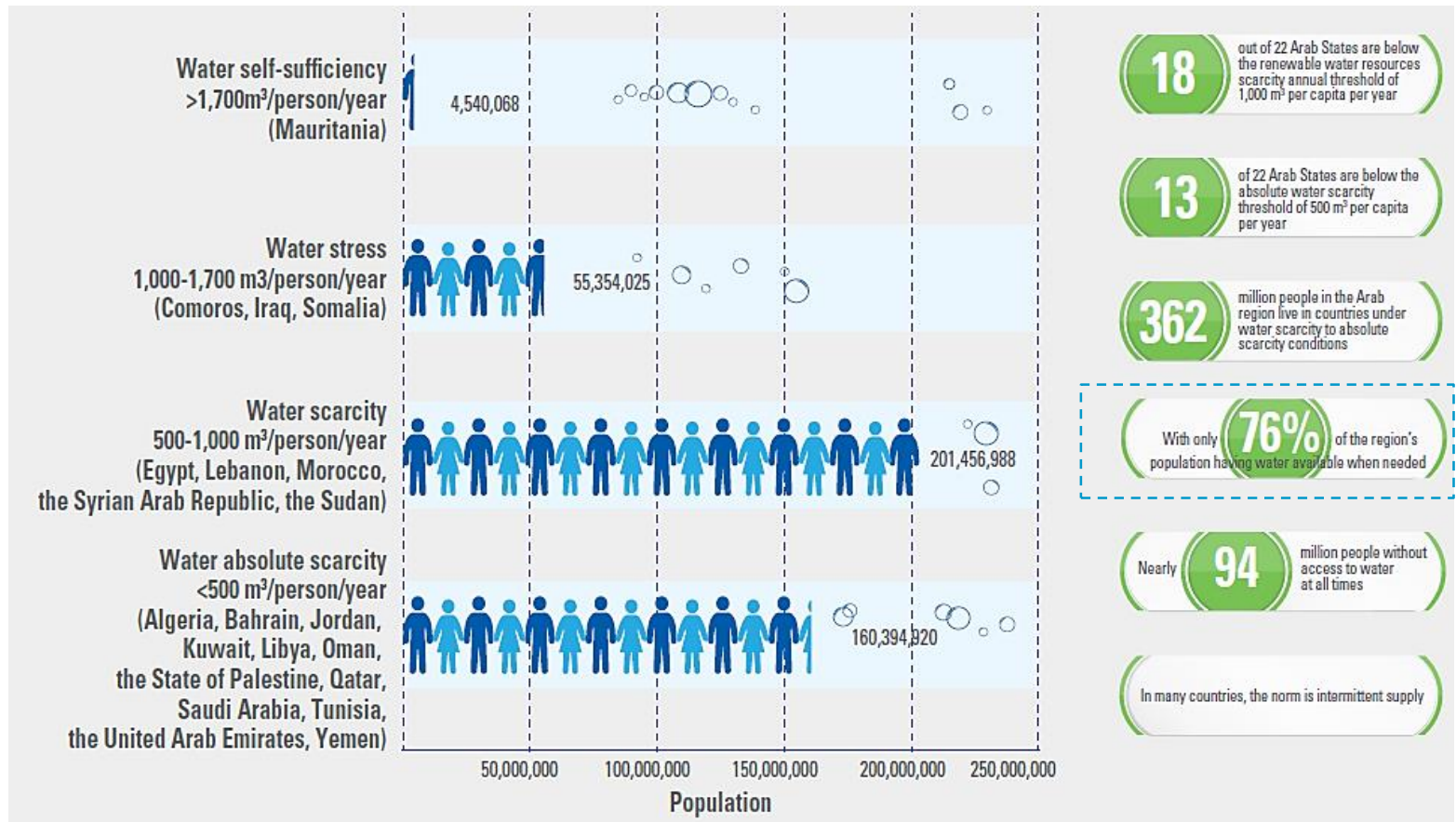
What we know:

Share of Water Withdrawal by Sector (%)

Source: FAO, AQUASTAT database. Available at http://www.fao.org/nr/water/aquastat/main/index.stm (accessed on 17 August 2018).

Note: Together, the three sectors water withdrawal may not add to 100 per cent due to rounding.

Source: https://www.unescwa.org/sites/default/files/pubs/pdf/moving-towards-achieving-water-security-arab-region-english.pdf
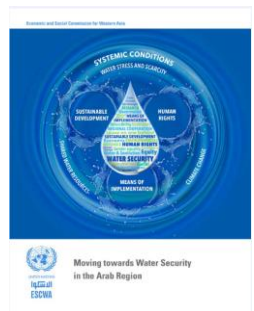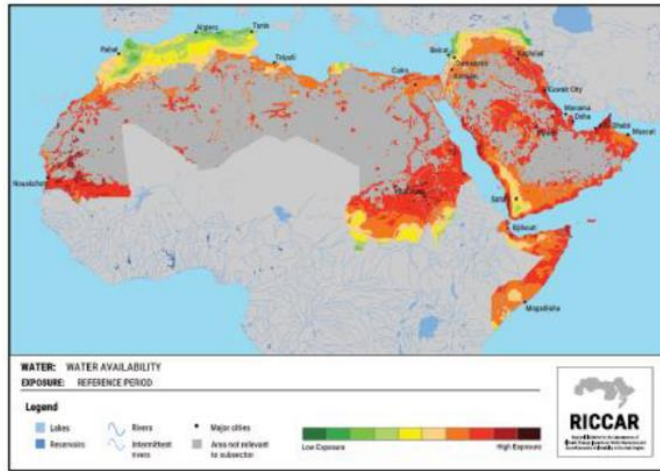
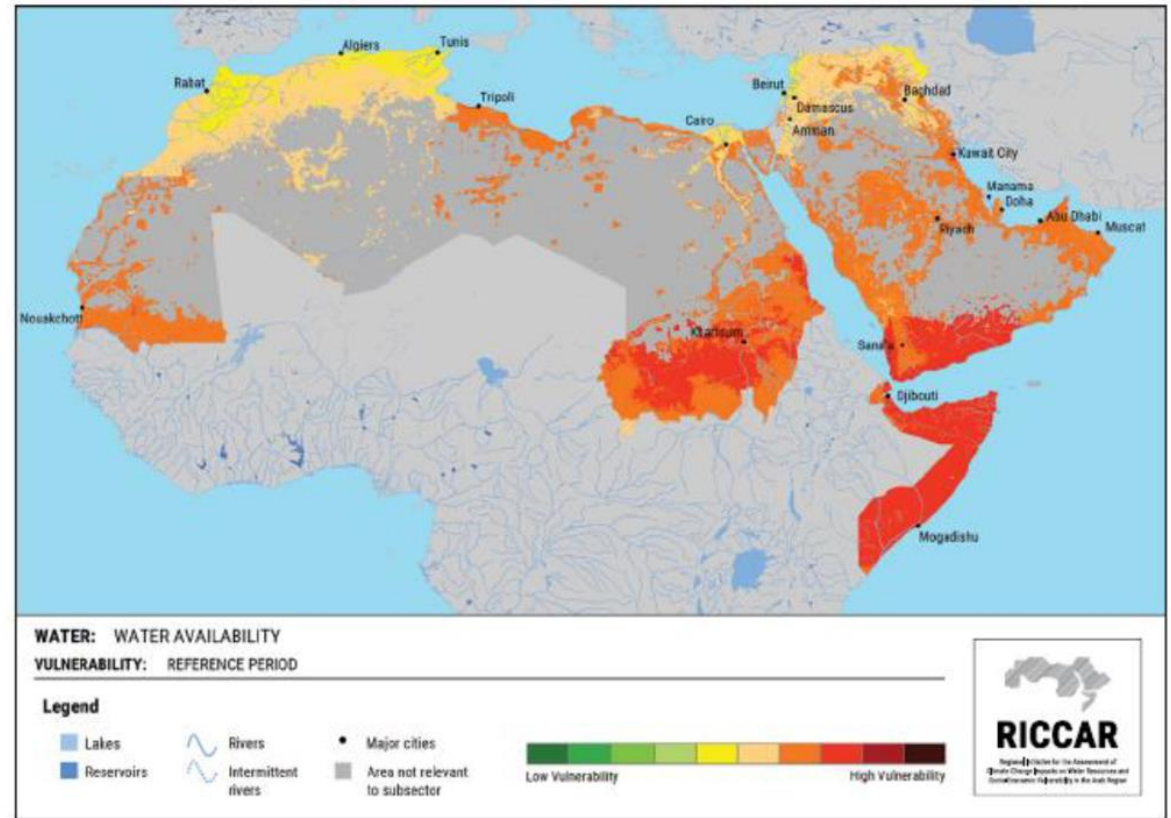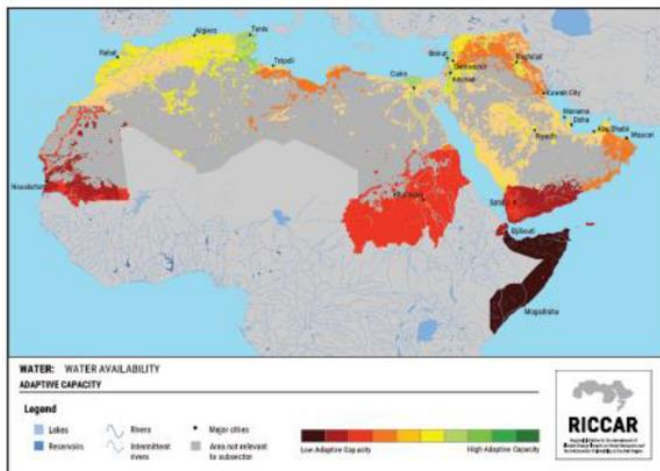# What we know: The future is not easier

Water Availability Vulnerability

Exposure

Adaptive capacity

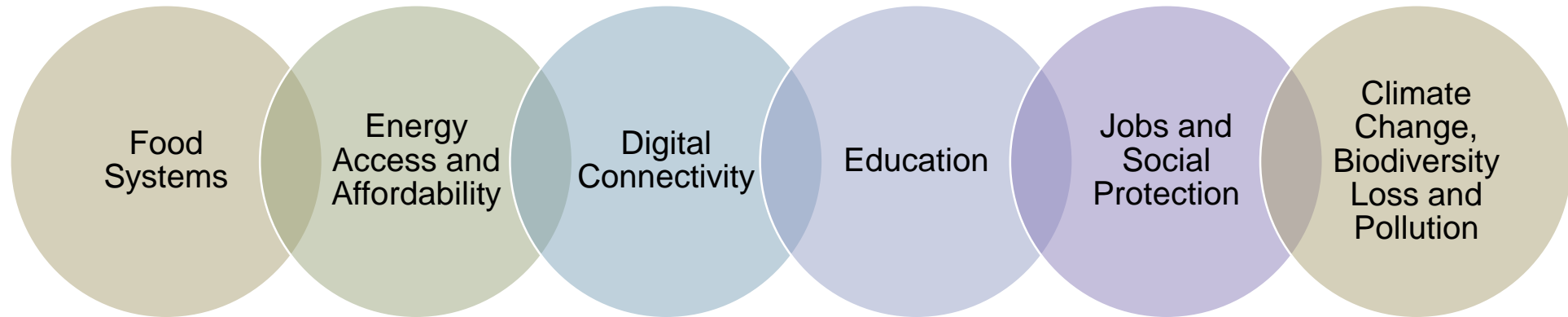**Reference period can then be used to compare with changes in Exposure under RCP 4.5 & RCP 8.5**

Digital technologies development faster than water policies

✓ Over the last decade, the GCC countries and to a lesser extent, the rest of the Arab region has experienced a profound digital transformation:

  ▪ Online population: from 28.8 % in 2012 to 70.3 % in 2022

  ▪ Number of internet users: 327 million.

✓ The transition to digital economies are reflected in countries' visions, and the growing trend in planning and building smart cities is reshaping all economic sectors in GCC.

  ▪ Indeed, AI alone is projected to impact the region's economies to the tune of $320 billion within the next decade

Globally: Digitalization is Major Transition!

✓ **Digitalization is one of the six major transitions identified in SDGs summit 2023** to catalyze investments and accelerate the progress towards achieving SDGs.

✓ **Key transitions** that can have catalytic and multiplier effects across the SDGs include:

Food Systems • Energy Access and Affordability • Digital Connectivity • Education • Jobs and Social Protection • Climate Change, Biodiversity Loss and Pollution

✓ **Digital technologies are revolutionizing economies and transforming societies** but not progressing at the same pace across sectors,

- Digital divide between countries in the region and within countries (urban versus rural)

Solutions to Chronical Challenges to Water Scarcity and Water Security

Bridging the data gaps, real time assessment of the resources, monitoring allocation, loss and efficiency in use

Planning for supply security and demand management

Early warning and crises management readiness

Resilience and sustainability

Foresight and prospective planning

Participation and whole of society approach to efficiency, conservation and risk-mitigation and management

Digital technologies are offering fast developing tools for today management and for planning and foresight

Challenges facing digitalization in water sector: GCC and the region

Digital Divide:

- While urban centers in GCC countries are rapidly digitalizing, **rural and remote areas may face challenges in accessing digital infrastructure and services**.
- Addressing the digital divide requires **targeted investments in expanding broadband connectivity, digital literacy programs, and inclusive digital development policies**.

Skills Mismatch:

- Despite efforts to develop a digitally skilled workforce, there may still be **a gap between the skills demanded by the digital economy and those possessed by the workforce**.
- **Continuous investment in education, training, and lifelong learning programs** is essential to bridge this gap and ensure the workforce remains competitive in the digital age.

Integration and Interoperability:

- **Achieving seamless integration and interoperability among digital systems and platforms remains a challenge**, particularly in sectors with complex ecosystems such as water, healthcare, transportation, and finance.
- **Standardization efforts and interoperability frameworks** are needed to facilitate data exchange, collaboration, and innovation across sectors.

Limited Engagement of Research and Innovation:

- A search online shows that both **RD and peer reviewed publications on digital tools and technologies in water sector are limited** and require, dedicated investments both by the public and private sectors.
- **PPP investments could be a way to accelerate the innovation capacity** for a grounded and secure digitalization in water sector.

Steadily Growing Cybersecurity Risks Inherent to Digitalization

The **rapid development in the cyber threat landscape** has put **GCC countries in front of a growing threat:**

- **Cyberattacks:** ransomware, phishing, and malware attacks

- **Targeting:** government institutions, critical infrastructure, businesses, and individuals.

Actions & Solution

Governments in the GCC region have established **national cybersecurity strategies and agencies** tasked with enhancing cybersecurity capabilities, raising awareness, and coordinating responses to cyber threats.

Regulatory frameworks related to cybersecurity are being developed and strengthened to ensure the protection of critical infrastructure, personal data, and digital assets.

Compliance requirements and cybersecurity standards are enforced to mitigate cyber risks.

Collaboration between government agencies, private sector organizations, and academic institutions is essential for sharing threat intelligence, best practices, and resources to combat cyber threats effectively.

Investments in cybersecurity education, training, and workforce development are crucial for building a skilled cybersecurity workforce capable of defending against evolving cyber threats and vulnerabilities.

Investment in cybersecurity technologies such as intrusion detection systems, endpoint security solutions, encryption, and threat intelligence platforms to detect, prevent, and respond to cyberattacks are increasing in the GCC countries

Digital Tools in Water Management
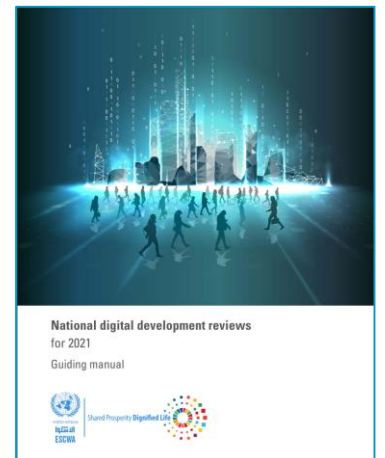
Balancing Opportunities & Cybersecurity

Besides the many remarkable opportunities digitalization implies in enhancing water sector resilience, sustainable management of water resources and water security,

*Expanding the use of digital tools (AI, Blockchain, cloud computing and IoT integration, Remote sensing and satellite imaging….) comes with **new emerging cyber security threats to water infrastructure and service delivery systems requiring a whole new approach to water security.***

Global Support: ESCWA and UN Initiatives

ESCWA placing digital technology at the core of inclusive and sustainable development

- ✓ A **comprehensive conceptual framework for digital development** covering all aspects of digital policies related to the state, the individual, society and the economy

- ✓ A **Guiding Manual**: a fundamental tool for preparing national and regional digital development reports.

- ✓ **Two rounds of Arab and National Digital Development Review Reports (ADDRs and NDDRs), in more than 14 Arab countries, during the five-year period from 2019 to 2023.**

- ✓ **Arab Digital Agenda 2023-2033** – through joint technical cooperation between cooperation between ESCWA and League of Arab States

Arab Digital Development Report 2019
Towards Empowering People and Ensuring Inclusiveness

National digital development reviews
for 2021
Guiding manual

https://www.unescwa.org/publications/arab-digital-development-report-2019-towards-empowering-people-and-ensuring
https://www.unescwa.org/publications/national-digital-developmet-reviews-manual-2021

National Efforts and Success Stories

Country	Details
Egypt	• Remote Monitoring wells by telemetry, IRWI application developed by IWMI
Iraq	• Digital technologies to support application of drip irrigation
Jordan	• Digital technologies have been adopted to estimate evapotranspiration and monitor agricultural water use, including within irrigation system
Qatar	• Real time detection of leakage in municipal networks
Morocco	• Use of smart card to cap the volumetric provision of drinking water in informal settlements and poor households in Tanger • Public screens showing instant ET and good practices in irrigation per crop type in Agadir
KSA	• The public Sustainable Agriculture Research Centre conducts applied research on innovative techniques for protected agriculture, including water use efficiency and pest management • National Digital Index
Tunisia	• Start-up companies including Ezzayra offer precision agriculture technologies. Ezzayra is a private company offering management solutions in the form of sensors to monitor and regulate soil conditions (including irrigation and fertilization), as well as control irrigation leaks.
UAE	• (Cloud seeding technologies) Responsive Drip Irrigation is a start-up company developing self-regulating irrigation technologies

Arab Groundwater Knowledge Platform

Monitoring groundwater storage change with GRACE mission
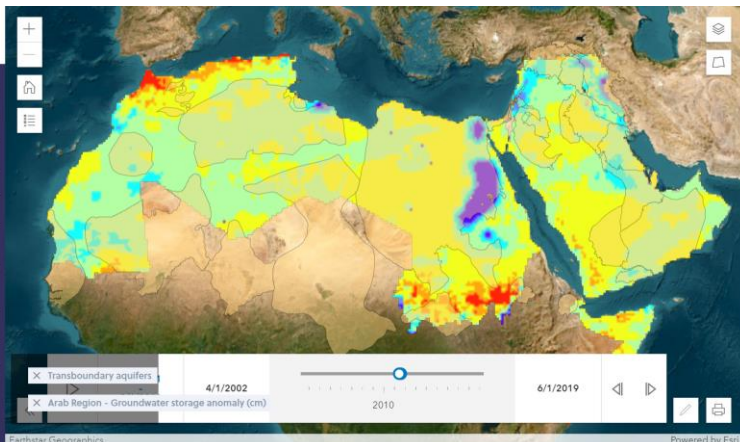
Remote Sensing for estimating groundwater quantities used for irrigation

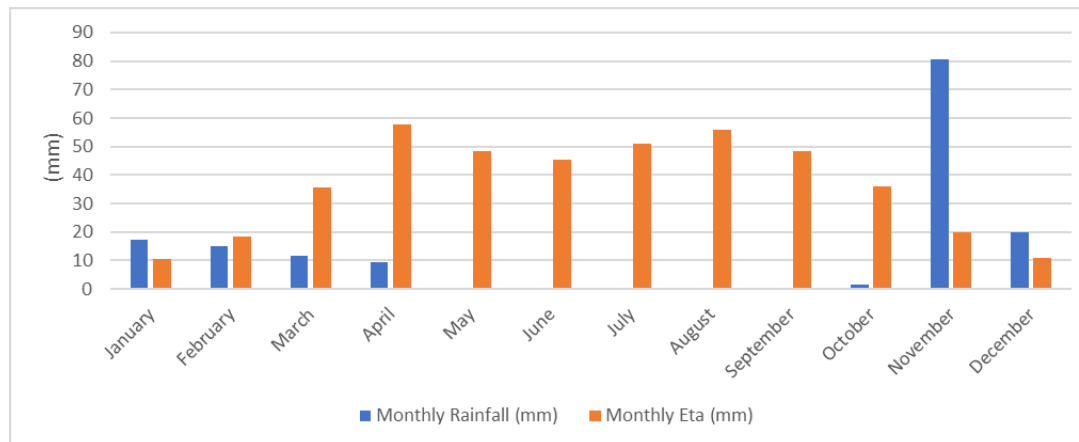GWuse = Precipitation – Evapotranspiration – Surface flow – Change in soil water storage/time
For areas where surface flow can be assumed negligible, and for long periods, the last two terms would be assumed negligible

- In the absence of in-situ data and to determine Precipitation, CHIRPS satellite data is used
- To determine mean ETa, Landsat satellite data is used

To calculate the net groundwater use for a certain region:

Net groundwater use = abs. $\sum$(Negative Effective Rainfall) (m) $\times$ Area (m^2)

Histogram showing the difference between monthly rainfall (mm) and monthly ETa (mm) for 2022 over Skaka.

Provisional Actual Evapotranspiration for Skaka in Saudi Arabia using Landsat

https://riccar.org/

ARAB DIGITAL ECONOMY VISION

TOWARDS A SUSTAINABLE INCLUSIVE AND SECURE DIGITAL FUTURE

Concluding remarks

- ✓ Key strategic drivers: Innovation-Capacities-Regulation and Investments

- ✓ Digitalization and cyber security strategy should be coupled in terms of strategies and investments to mitigate the fast-growing risks

- ✓ Digitalization in water sector alone will not yield the intended sustainability of water resources unless coupled with digitalization of agriculture with mutual benefits

- ✓ Mainstreaming Water, agriculture and climate policies, GCC UWS (2015 – 2035) and The Arab Water Strategy 2030

- ✓ Invest in research, innovation and link research to policy to limit the dependency on external supply

- ✓ Whole of government and whole of society for security and risk mitigation

- ✓ Accelerate Regional cooperation