

Digitalization in MENA Climate Change Laws and Policies: A Comparative Analysis

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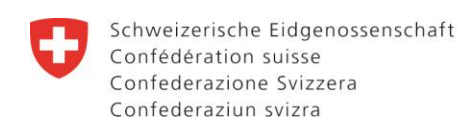
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Introduction

The Paris Agreement's Enhanced Transparency Framework (ETF) requires **twin transitions of decarbonization and digitalization**. Climate governance is now a **data-intensive** endeavor.

The Middle East and North Africa is among the world's **most climate-vulnerable regions**, facing extreme heat, water scarcity, and coastal threats.

Despite the acute need, the integration of digital tools into national climate laws and policies remains **under-studied and unevenly implemented**.

How are digital tools systematically embedded in **national climate frameworks**, and where are the **critical gaps** in adoption and implementation?

This research provides a **comparative, evidence-based mapping** of digitalization across 16 national policy landscapes from foundational inventories to frontier technologies like AI and blockchain.



Why MENA

Accelerated warming, extreme heatwaves, and rapid desertification threaten ecosystems and livelihoods.

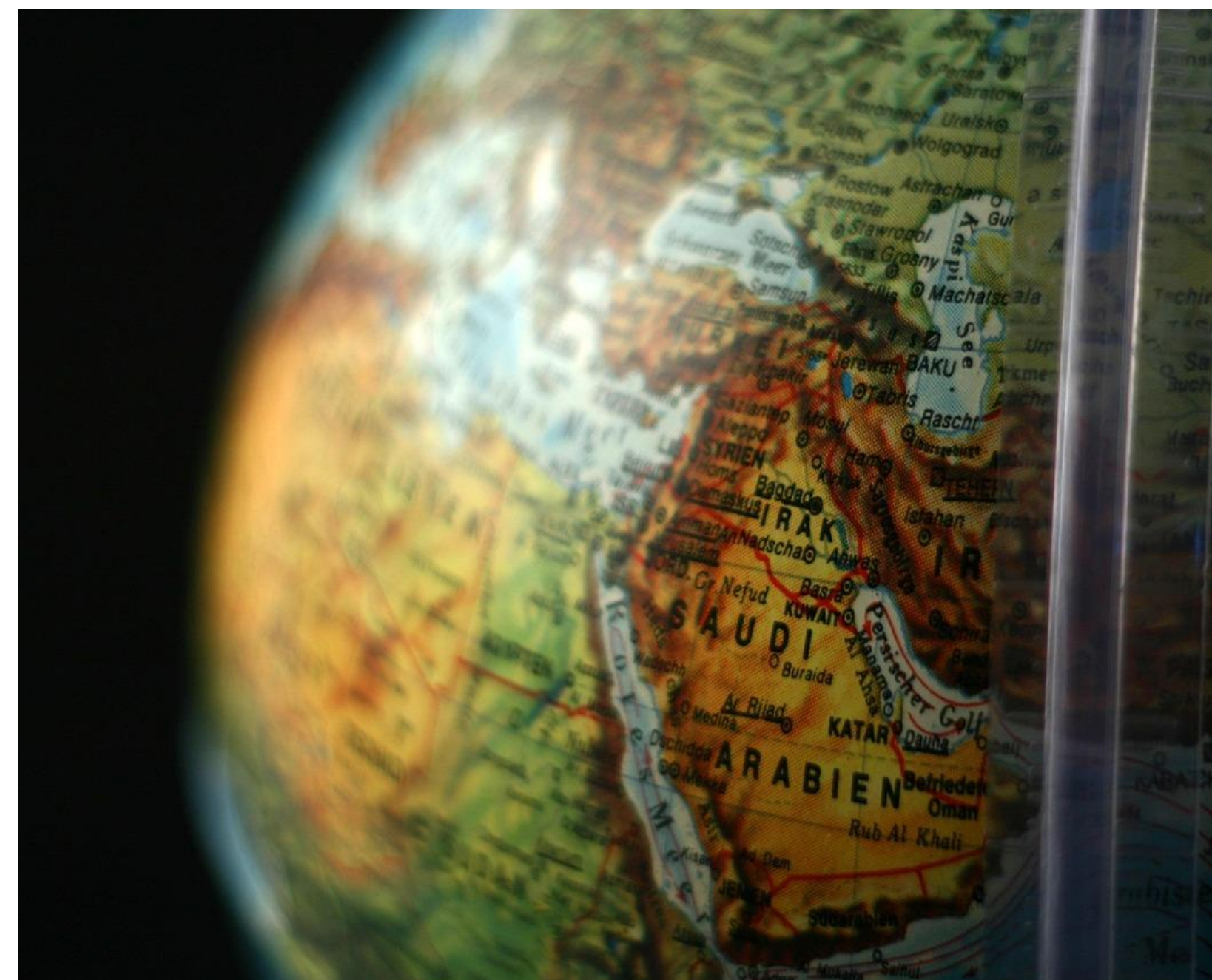
Chronic **shortages** strain agriculture, food security, and urban water supply.

Major cities and economic hubs such as Alexandria and Basra **face high risk from sea-level rise and storm surges**.

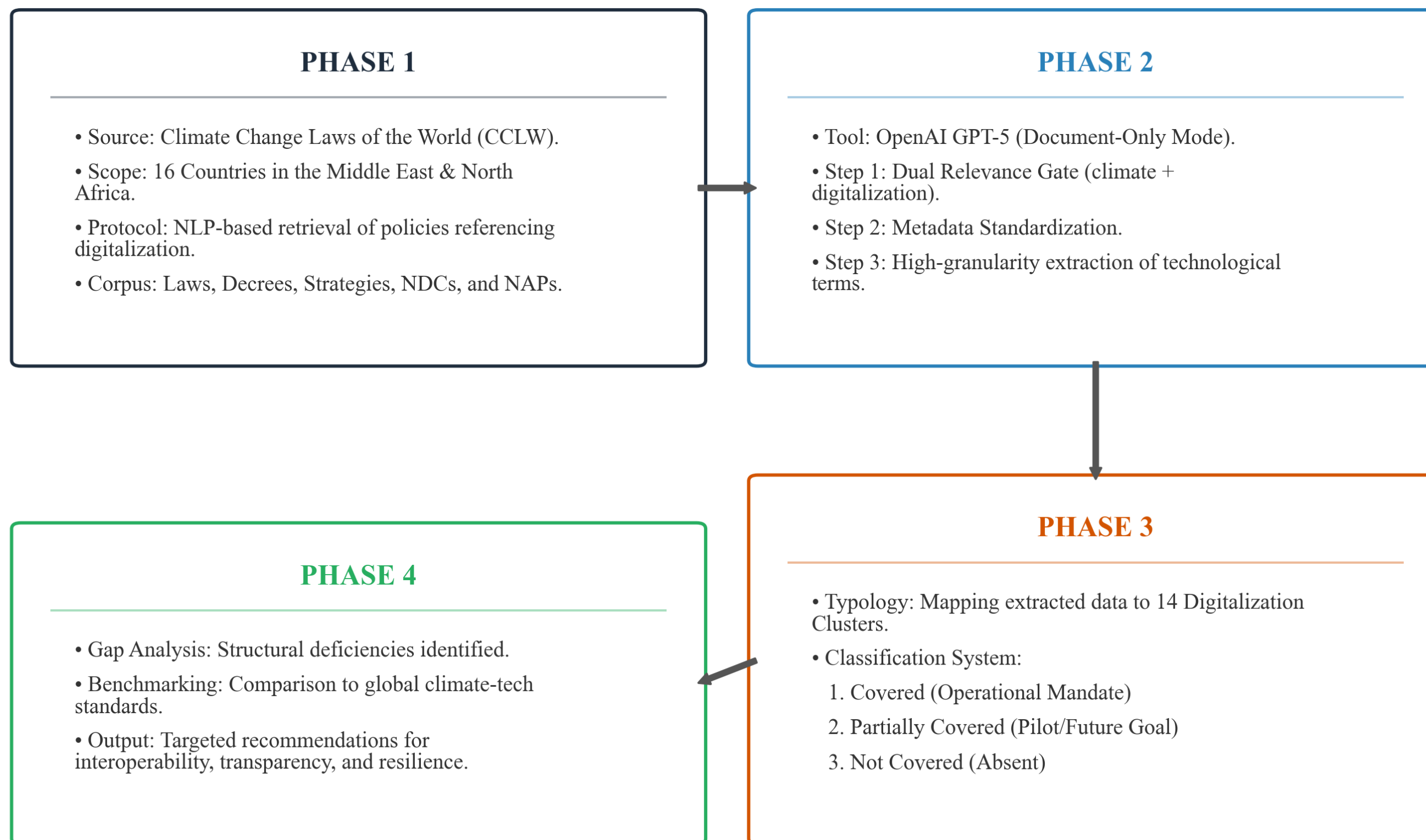
Fossil fuels account for most merchandise exports in major hydrocarbon-producing nations.

Despite **acute vulnerability**, the region receives **limited climate finance**, far below regional needs and comparative global flows.

Digital tools offer **cost-effective, scalable pathways** to enhance transparency, monitoring, and resilience.



Methodology – Systematic AI-Driven Analysis



A Taxonomy of Digital Climate Governance (14 Clusters)

Governance & Architecture

C1 National Climate Data Governance & Institutional Set-Up

C2 Core National Greenhouse Gas Inventory & Measurement, Reporting, and Verification Systems

C4 Central Data Hubs, Archives & Interoperability Mechanisms

Technical Monitoring

C6 Observation, Measurement & Monitoring Networks

C7 Remote Sensing, Geographic Information Systems & Mapping Tools

C8 Modelling, Scenario & Decision-Support Systems

Sectoral Implementation

C3 Sectoral Measurement, Reporting, and Verification Systems & Thematic Registries

C10 Smart Infrastructure, Internet of Things & Low-Carbon Urban Systems

C11 Climate Finance, Carbon Markets & Green Investment Tracking

Transparency & Outreach

C5 Digital Reporting Tools & International Submission Interfaces

C12 Knowledge Management, Transparency, Public Portals & Outreach

Resilience & Social

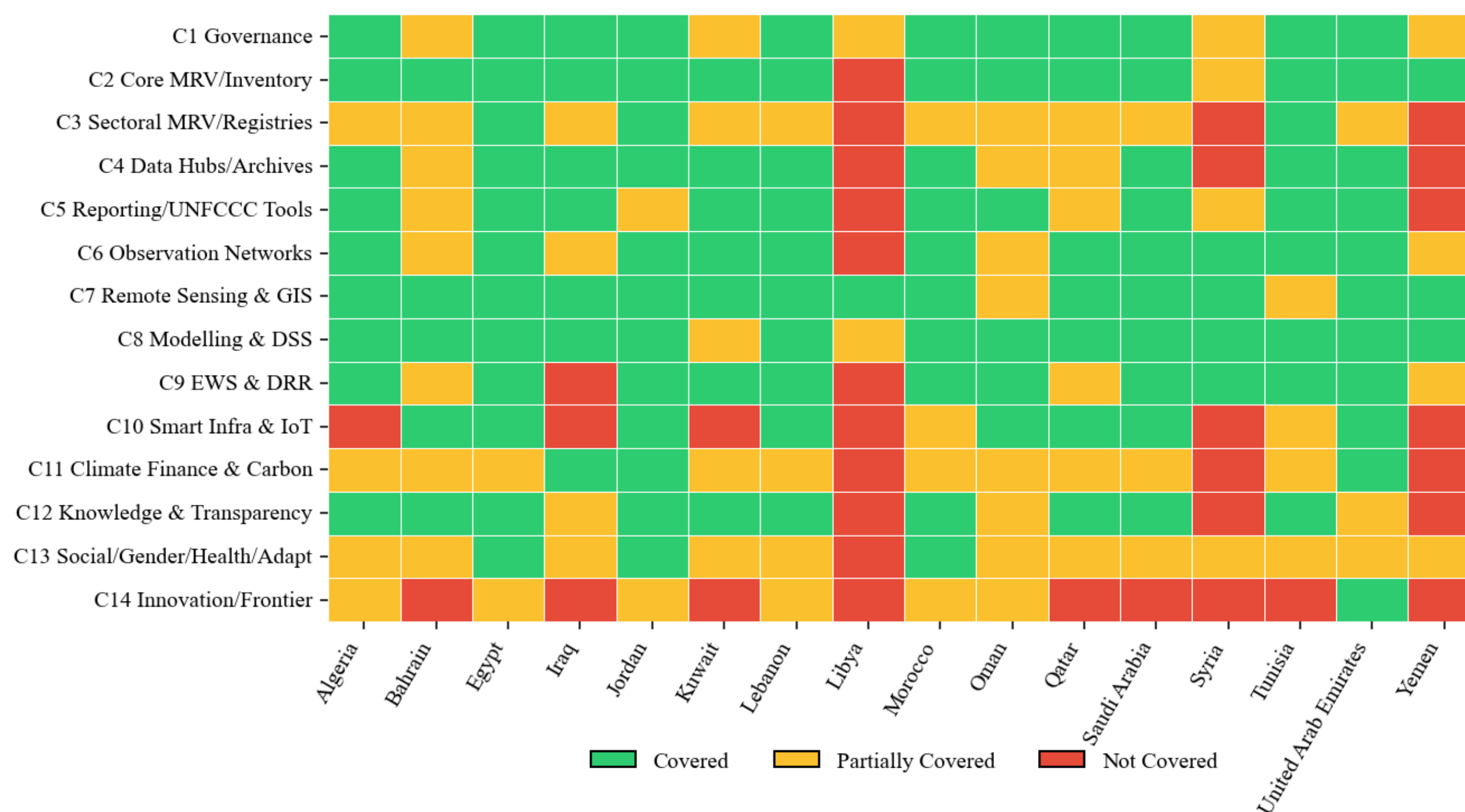
C9 Early Warning, Disaster Risk & Crisis Information Systems

C13 Social, Gender, Health, Vulnerability & Adaptation Data Systems

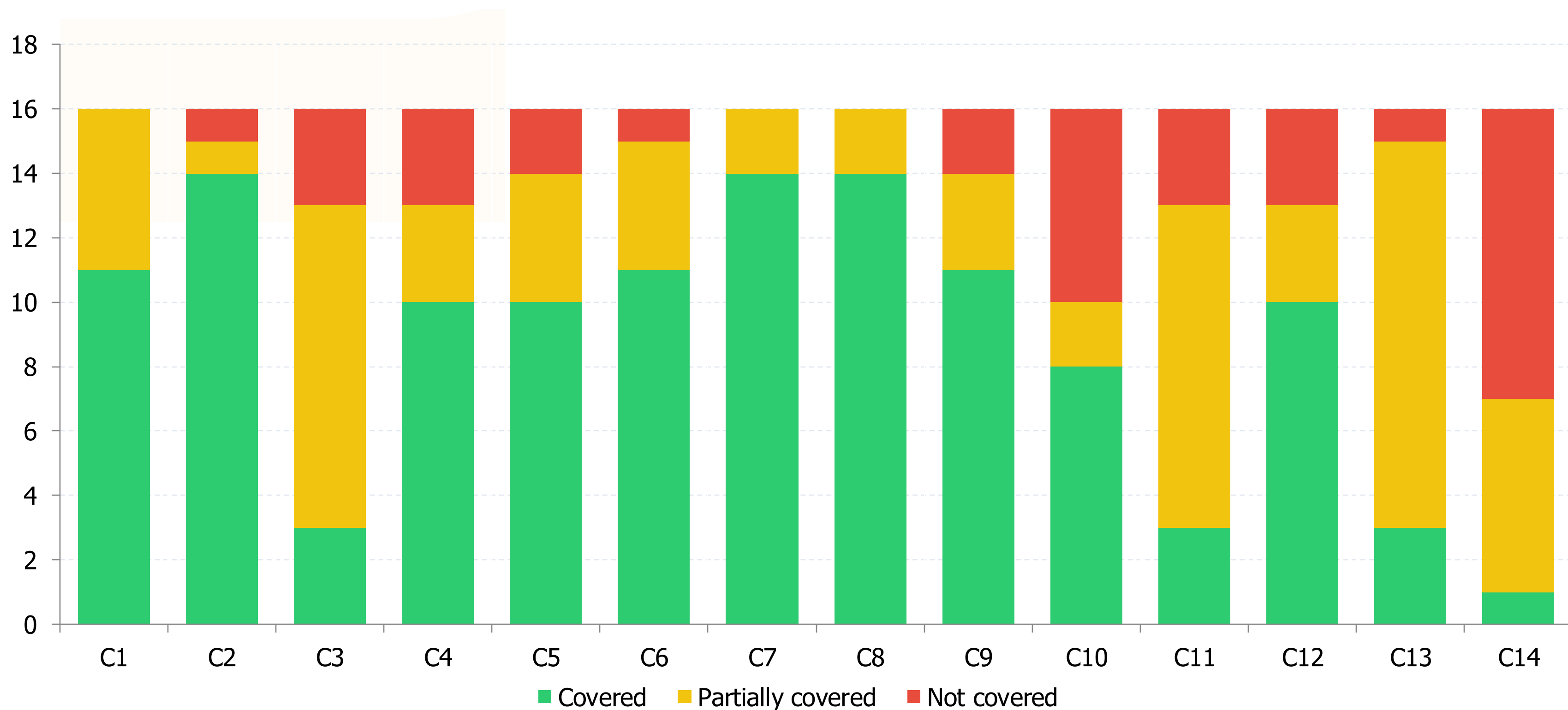
Future Frontiers

C14 Innovation, Frontier Technologies & Experimental Platforms

Results – A Bifurcated Region



Cluster-Level Maturity



Compliance Digitized, Implementation Fragmented

Digitized (stronger)

- National climate data governance (C1)
- Core national GHG inventories & MRV (C2)
- UNFCCC/ETF reporting interfaces (C5)
- Knowledge portals & transparency tools (C12)
- Observation networks + models (C6-C8)



Fragmented / missing (weaker)

- Bottom-up sectoral MRV & registries (C3)
- Interoperable central data hubs (C4)
- Climate finance + carbon market infrastructure (C11)
- Social/gender/health vulnerability data systems (C13)
- Frontier tech at scale (C14)

Policy Recommendations

1) Interoperable national climate data hubs

- Create central data hubs + APIs to connect ministries, statistics offices, and sector systems.
- Move from siloed spreadsheets to integrated web registries; mandate data-sharing where needed.

2) Digitize carbon assets for Article 6 readiness

- Build compatible national carbon registries and finance tracking systems.
- Use robust digital MRV/ledger approaches to reduce double counting and greenwashing risk.

3) Impact-based early warning + social registries

- Upgrade EWS toward “last-mile” delivery (e.g., mobile/SMS/cell-broadcast).
- Digitize vulnerability data (gender/health/social) to target adaptation and finance.

4) Regional learning + innovation sandboxes

- Share open-source tools via a regional “Digital Climate Alliance”.
- Use regulatory sandboxes to pilot AI/blockchain solutions (water, agriculture, finance).

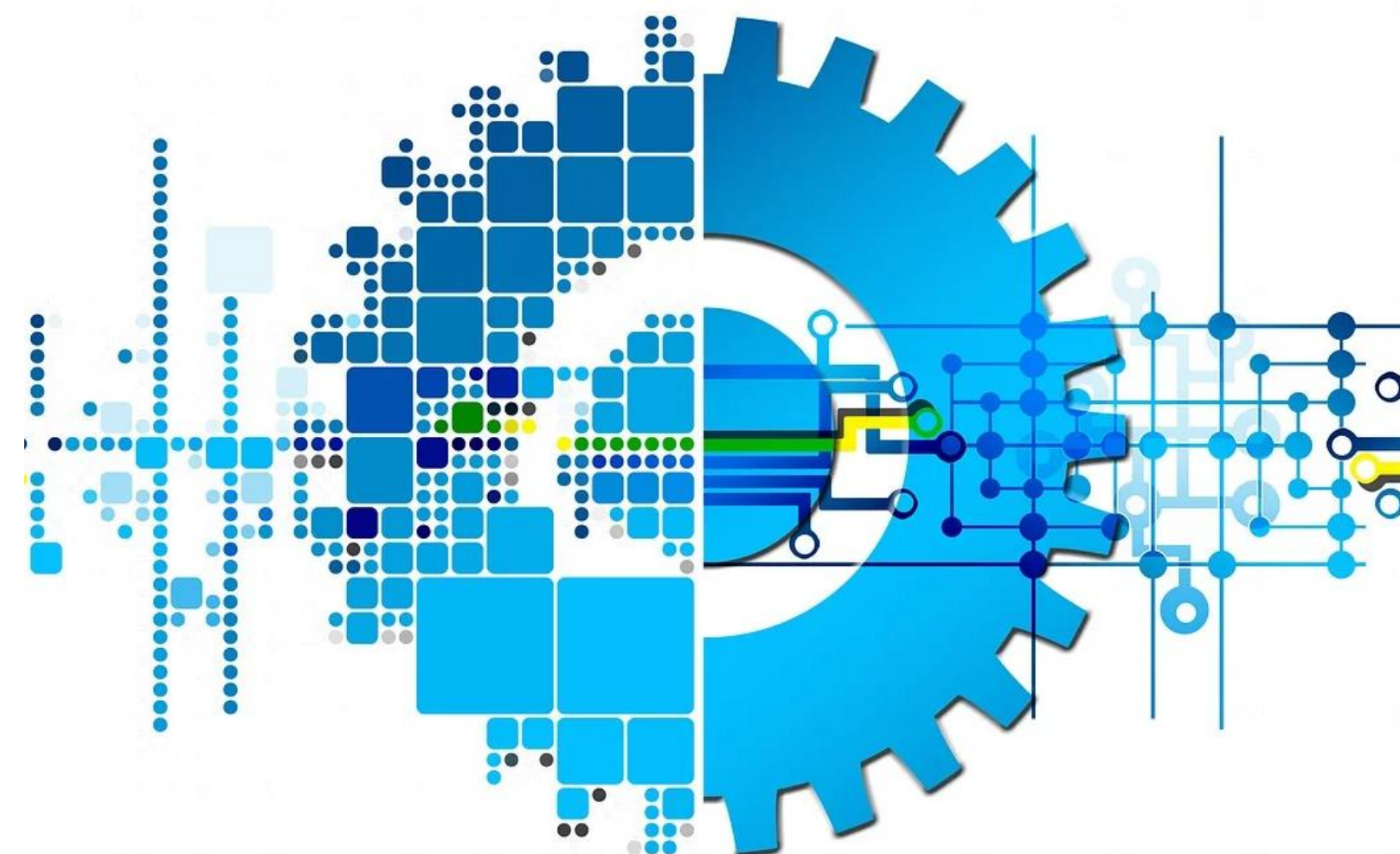
Key Takeaways

Our analysis reveals that MENA's **climate digitalization is highly uneven**. A small group of proactive states has built consolidated digital ecosystems, while conflict-affected or fragile nations remain in early or fragmented stages.

The region shows **relative strength in top-down reporting and technical monitoring** but **lags critically in bottom-up sectoral MRV, digital finance/carbon registries, and integrated social vulnerability systems**.

Currently, digital tools are often harnessed for backward-looking compliance. To build true resilience, the region must bridge this digital divide shifting focus toward **forward-looking, data-driven management** that enhances adaptive capacity, unlocks climate finance, and protects vulnerable populations.

The path to climate resilience in MENA will be increasingly digital. **Prioritizing inclusive, interoperable, and implementation-focused digitalization** is essential for translating climate pledges into measurable, on-the-ground outcomes.



Thank you

For your attention

Special Issue Invitation

Special Issue

Algorithmic Resistance:
Communities Against Climate
Disruption Empowered by
Digital Tools



Guest Editor

Dr. Dmitry Erokhin

Deadline

30 June 2026

IMPACT
FACTOR
1.6

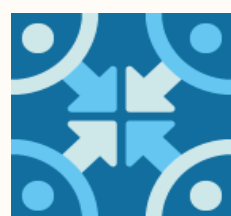
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Call for Paper

This Special Issue focuses on what we term “algorithmic resistance”, i.e., the diverse ways in which communities are harnessing, subverting, and reimagining digital tools to challenge existing power structures, counter harmful narratives, and build local resilience against climate disruption.

This bottom-up mobilization is vital. It moves beyond techno-solutionism to center the agency of those most affected by environmental injustice. From analyzing public discourse on social media during climate-related disasters to developing citizen-led environmental monitoring networks, these community-driven actions represent a crucial frontier in the fight for a just and sustainable future. Understanding these dynamics is essential for developing equitable climate adaptation and mitigation strategies that are genuinely empowering. The aim of this Special Issue is to convene interdisciplinary research that examines the nexus of community-led climate action and digital technology. It welcomes contributions from environmental studies, sociology, media and communication, geography, science and technology studies, and disaster risk management.

Special Issue Invitation



societies

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- ❖ Founded: 2011 (Volumes 15)
- ❖ 1785 papers published so far

Scope

- justice, diversity, equity, and inclusion
- social constructions of groups, identities, and relationships
- science, technology, and society
- citizenship, active citizens, and participation in society
- role of sports in society
- challenges, risks, and opportunities for a local, glocal and global society
- challenges, risks, and opportunities for social groups and their relationships
- education, occupational landscape, health, and wellbeing of societies throughout time



➤ **69 Days**
Article Processing Time

➤ **34.4 Days**
Submission to First Decision

➤ **3.9 Days**
Acceptance to Publication