

Scene setting: Migration and climate trends in the Arab region

Climate component

Regional Dialogue on the Climate Change and Migration Nexus in the Arab Region
Webinar, 24 October 2022



Shared Prosperity **Dignified Life**

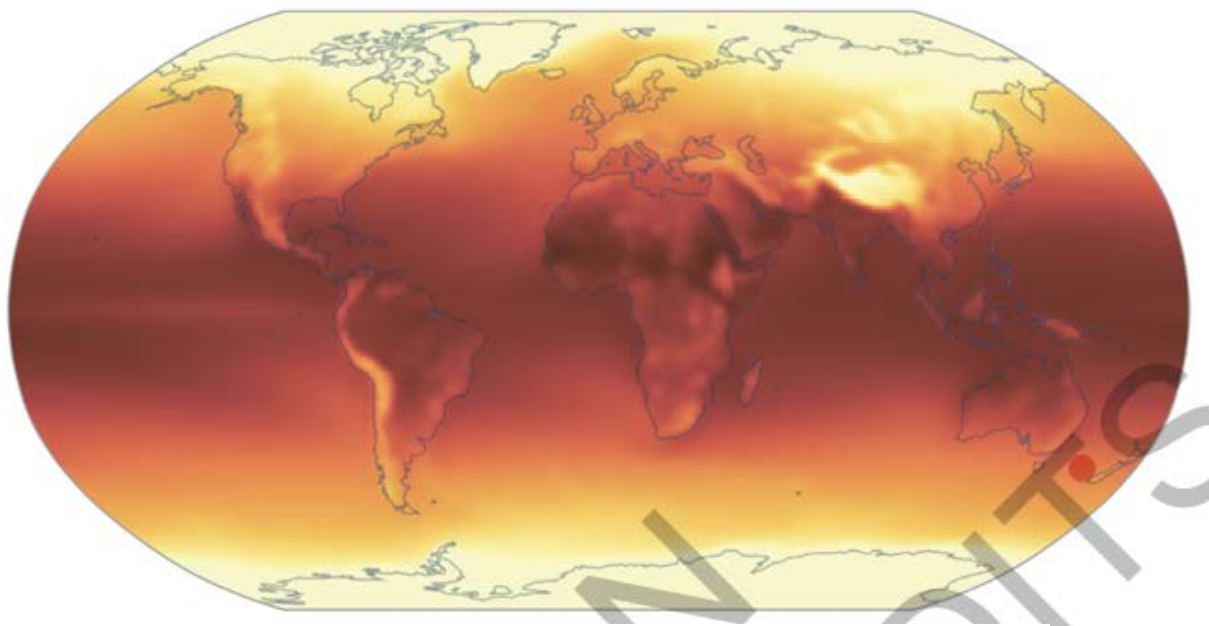


Carol Chouchani Cherfane
Director, Arab Centre for Climate Change Policies
Cluster Leader, Climate Change and Natural Resource
Sustainability Cluster
Economic and Social Commission for Western Asia
United Nations – Beirut, Lebanon

IPCC WGII Sixth Assessment Report: Climate Change 2022

Part II on Impacts, Adaptation and Vulnerability (February 2022)

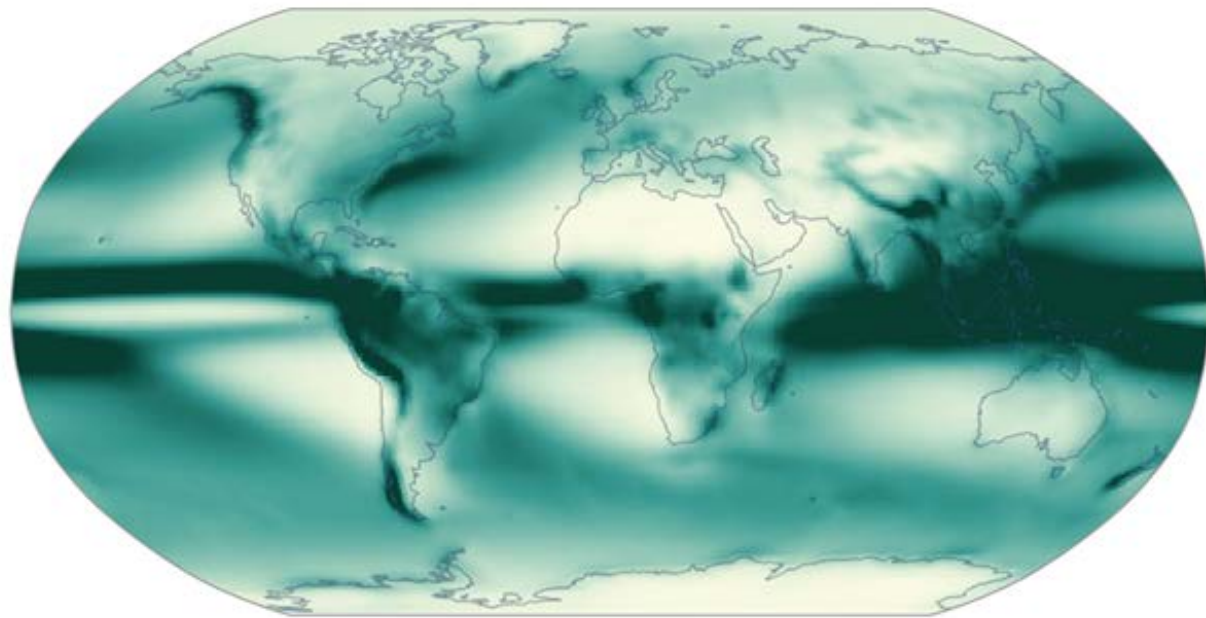
Observed Temperature Change



Mean temperature (°C)
Period 1995–2014



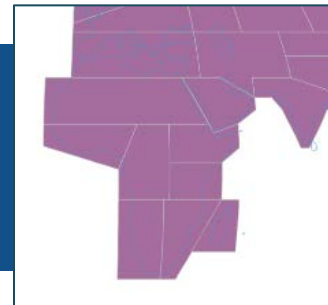
Observed Precipitation Change



Total Precipitation (mm/day)
Period 1995–2014
CMIP6 - Annual (34 models)



Intergovernmental Panel on Climate Change: IPCC Regions



Northern coast of Egypt covered in different region than the rest of the country

SELECT VISUALIZATION

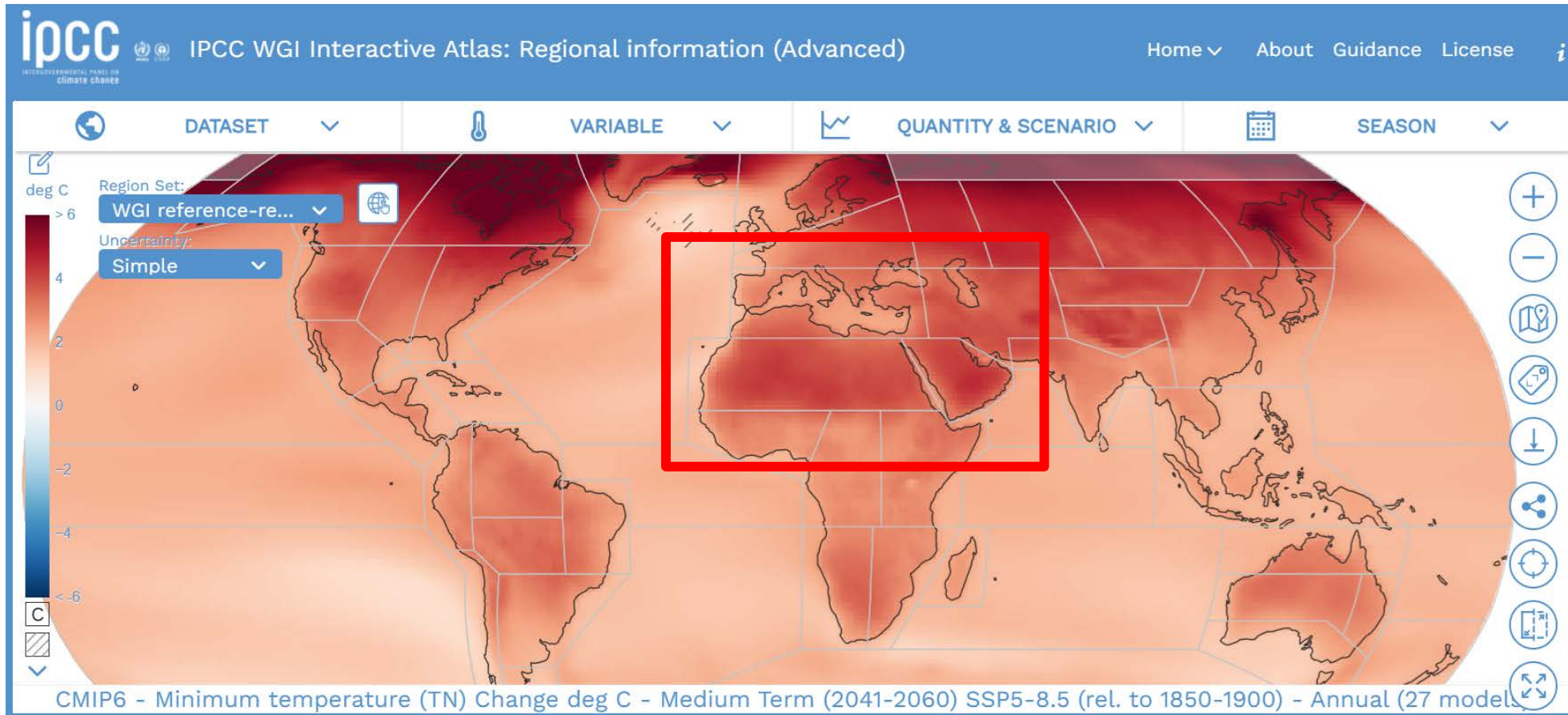
MAP REGIONS

AFRICA

- North Africa
- Sahara (SAH)
- Western Africa (WAF)
- Central Africa (CAF)
- North Eastern Africa (NEAF)
- South Eastern Africa (SEAF)
- West Southern Africa (WSAF)
- East Southern Africa (ESAF)
- Madagascar (MDG)

ASIA

- Arabian Peninsula (ARP)
- West Central Asia (WCA)
- West Siberia (WSB)
- East Siberia (ESB)
- Russian Far East (RFE)
- East Asia (EAS)
- East Central Asia (ECA)
- Tibetan Plateau (TIB)
- South Asia (SAS)
- South East Asia (SEA)

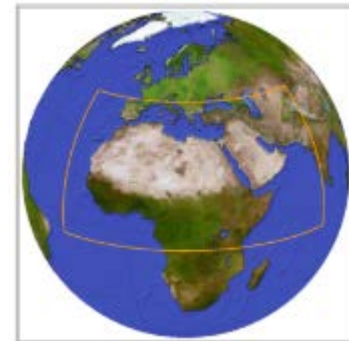
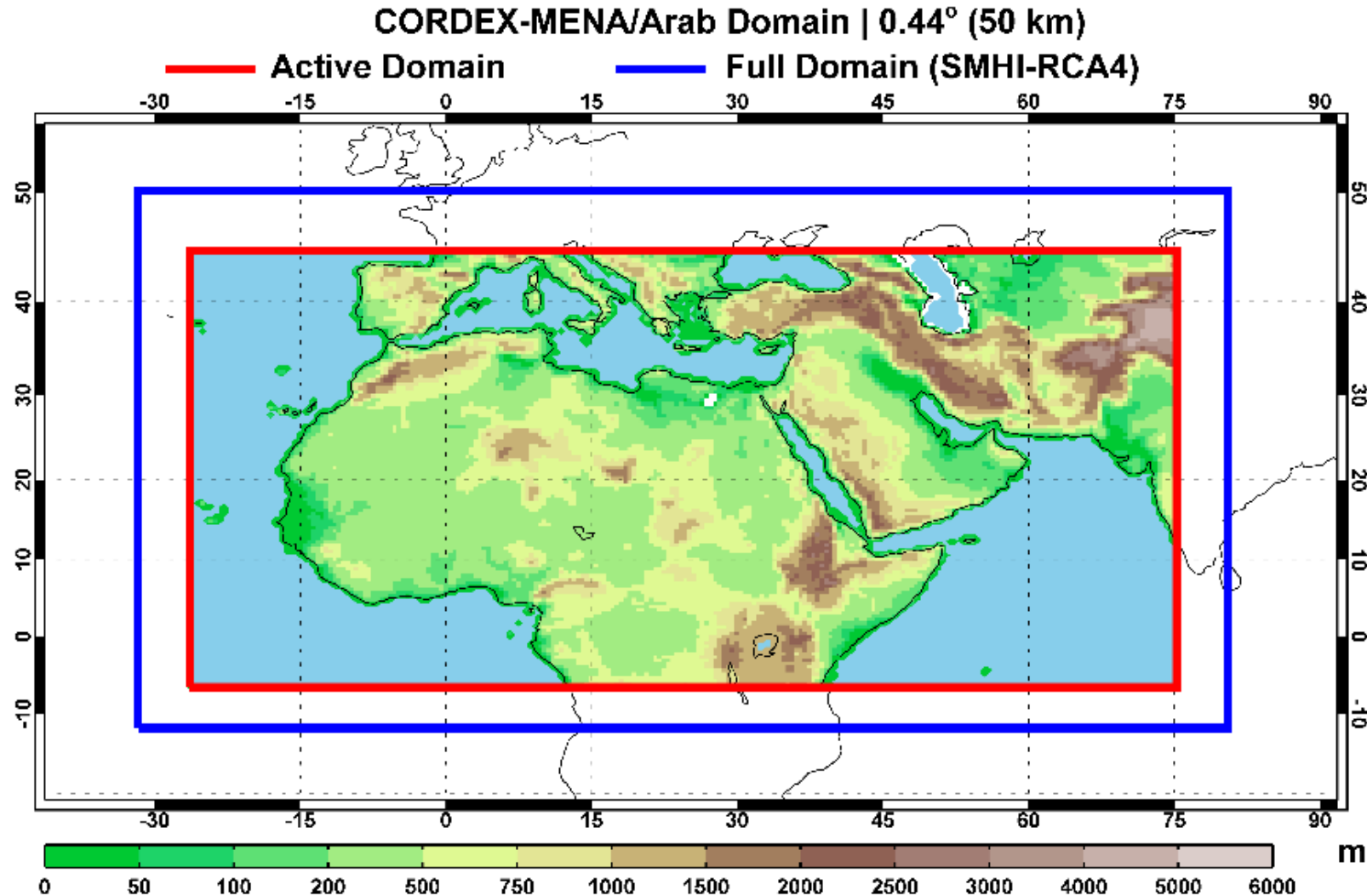


Arab Region, Mashreq Region & Maghreb Region are not represented in IPCC reports

<https://interactive-atlas.ipcc.ch/regional-information>

Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region

RICCAR was called for by the **Council of Arab Ministers of Environment (CAMRE)**, and is overseen by **Arab Ministerial Water Council (LAS) & Arab Centre for Climate Change Policies (ESCWA)** with regional partners to inform science-based policy action on climate change since 2010

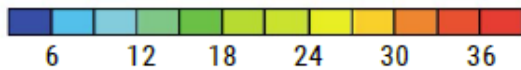
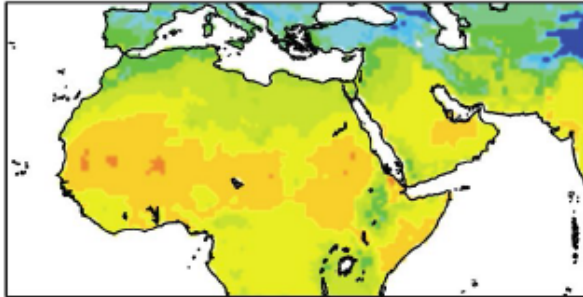


www.riccar.org

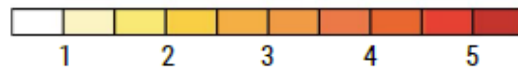
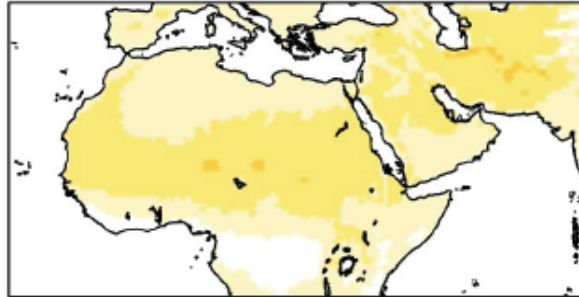
Mean Temperature projected to increase 2.6°C by mid-century and up to 4.8°C by end-century compared to reference period (1986-2005)

RCP 4.5

1986-2005

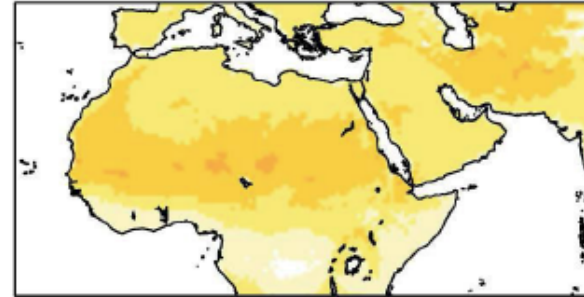


2046-2065



Temperature (°C)

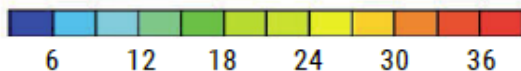
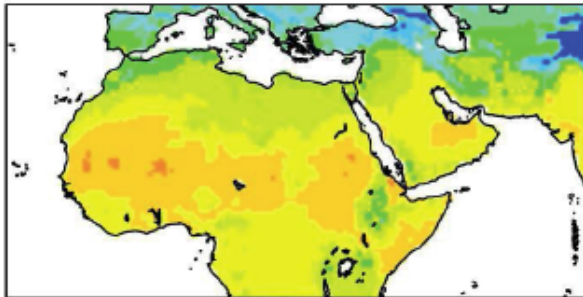
2081-2100



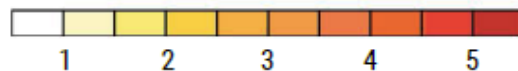
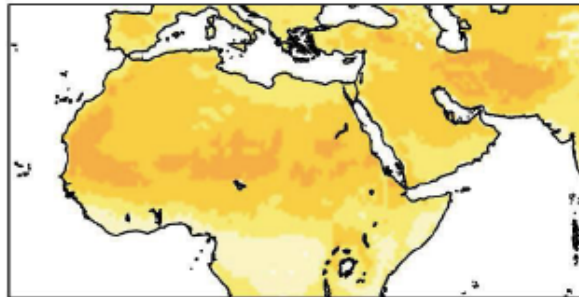
Moderate Emissions Reduction Scenario

RCP 8.5

1986-2005

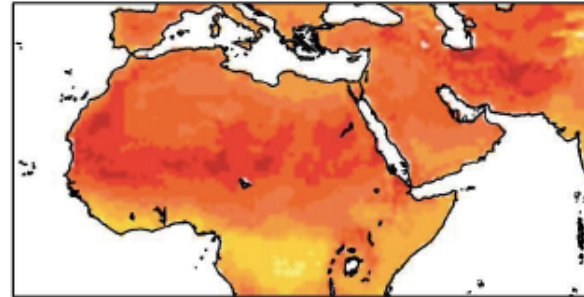


2046-2065



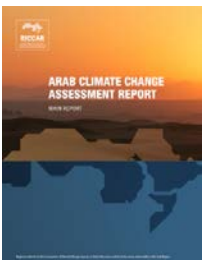
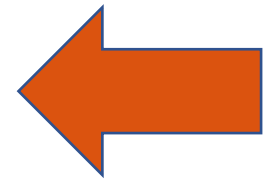
Temperature (°C)

2081-2100



Business-as-Usual Emissions Scenario

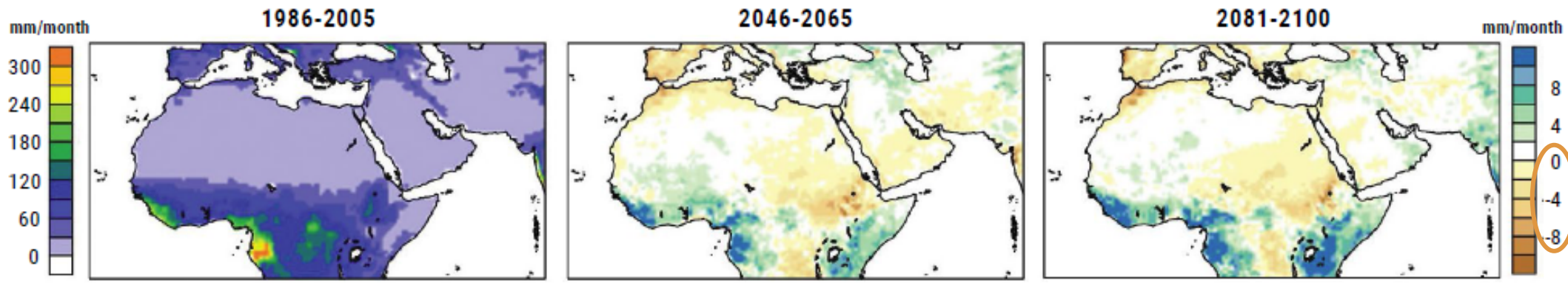
Two RICCAR ensembles of regional climate projections for Arab/MENA Domain at 50 km²



Precipitation trends are largely decreasing until the end of the century, with some areas expected to exhibit an increase in intensity & volume of rainfall

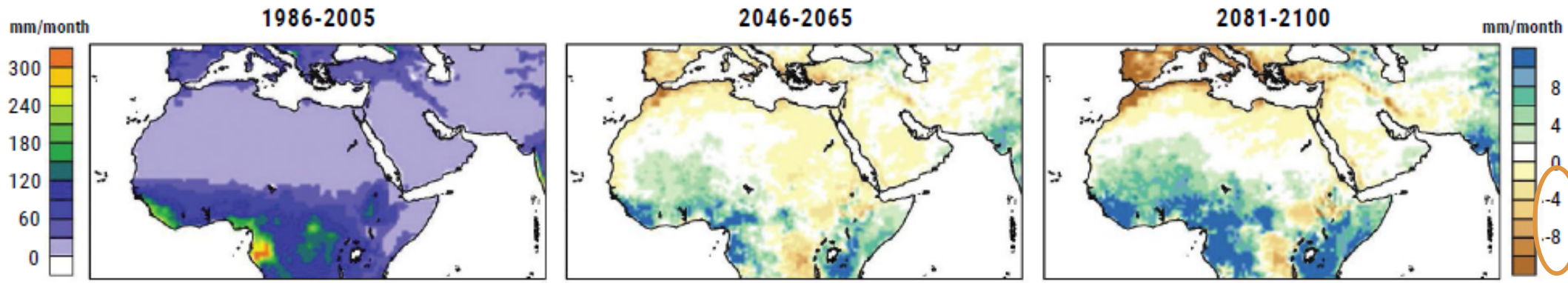
Moderate Emissions Reduction Scenario

RCP 4.5



Business-as-Usual Emissions Scenario

RCP 8.5



Extreme climate events indices

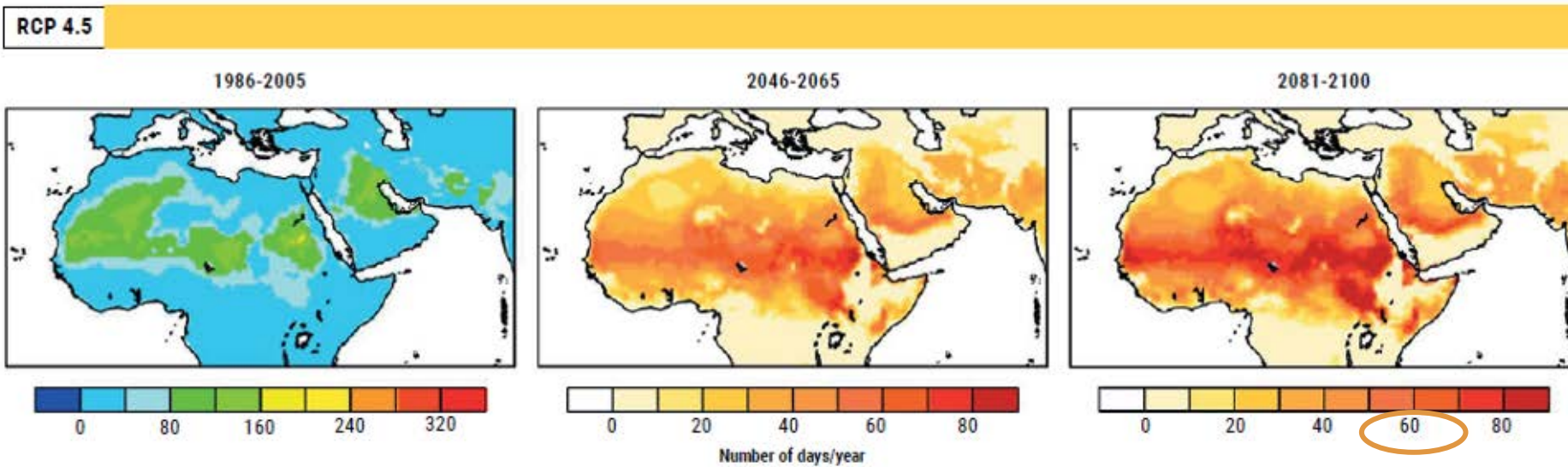
Extreme temperature indices		Extreme precipitation indices	
Index	Full name	Index	Full name
SU	Number of summer days (25°C+)	CDD	Maximum length of dry spell
SU35	Number of hot days	CWD	Maximum length of wet spell
SU40	Number of very hot days	R10	Annual count of 10 mm precipitation days
TR	Number of tropical nights	R20	Annual count of 20 mm precipitation days
		SDII	Simple precipitation intensity index



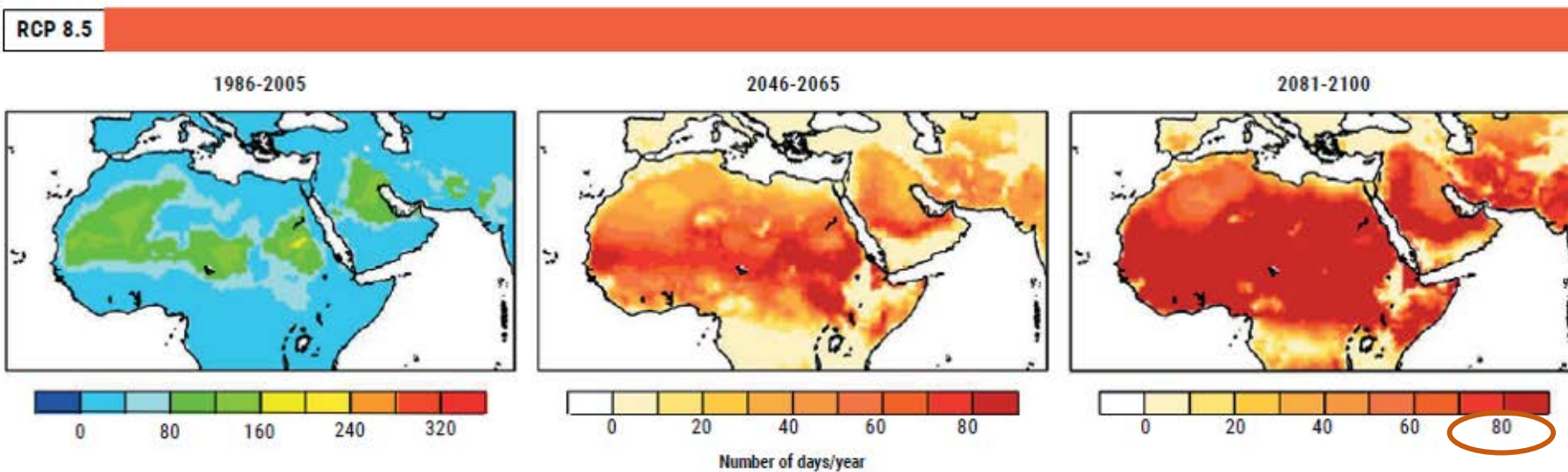
Region Specific

Mean change in SU40 for mid-century and end-century for ensemble of three RCP 4.5 and RCP 8.5 projections compared to the reference period

Moderate Emissions Reduction Scenario



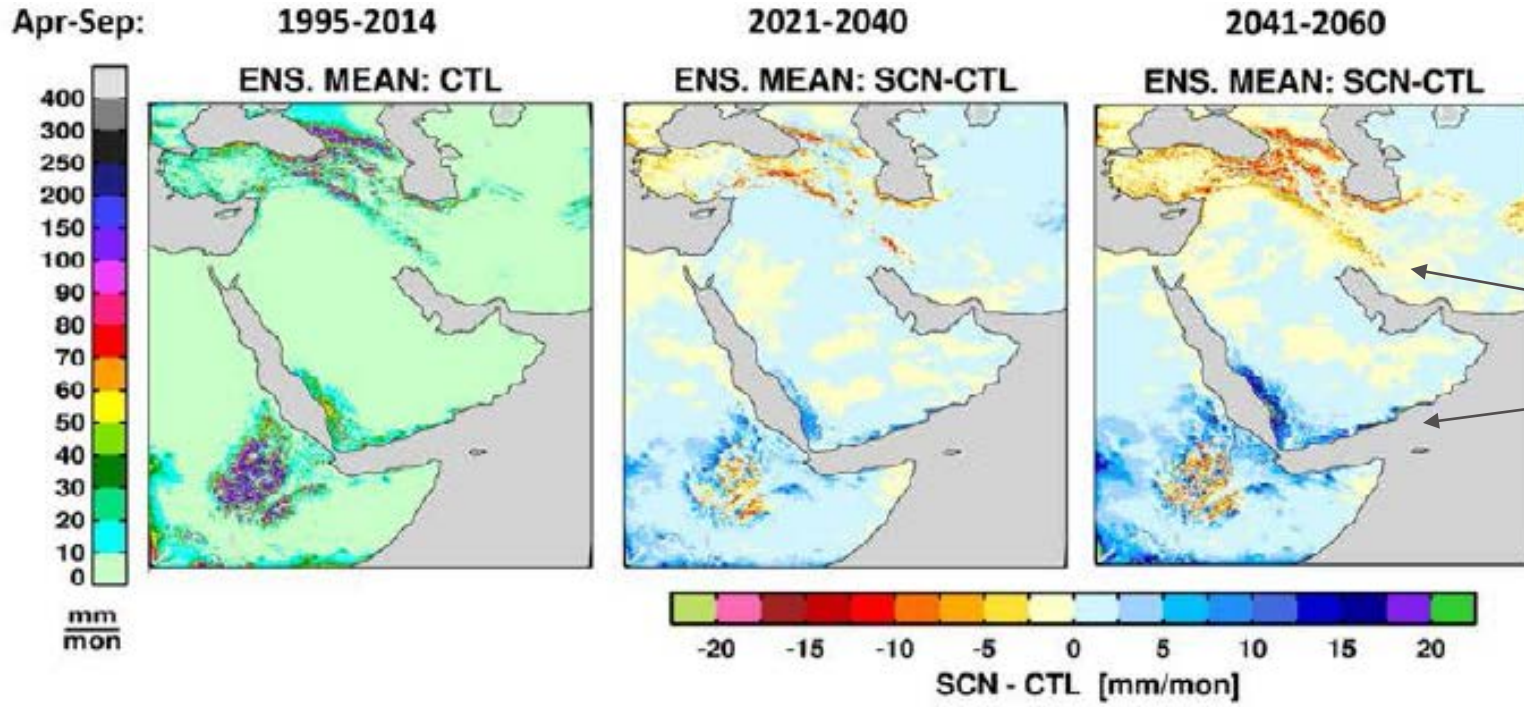
Business-as-Usual Emissions Scenario



Summer Months

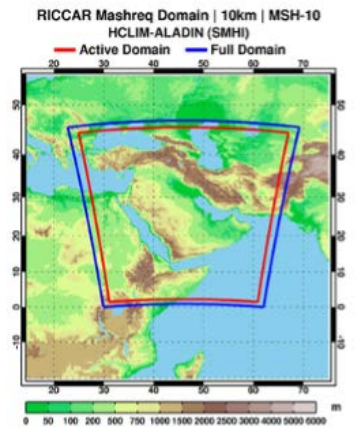
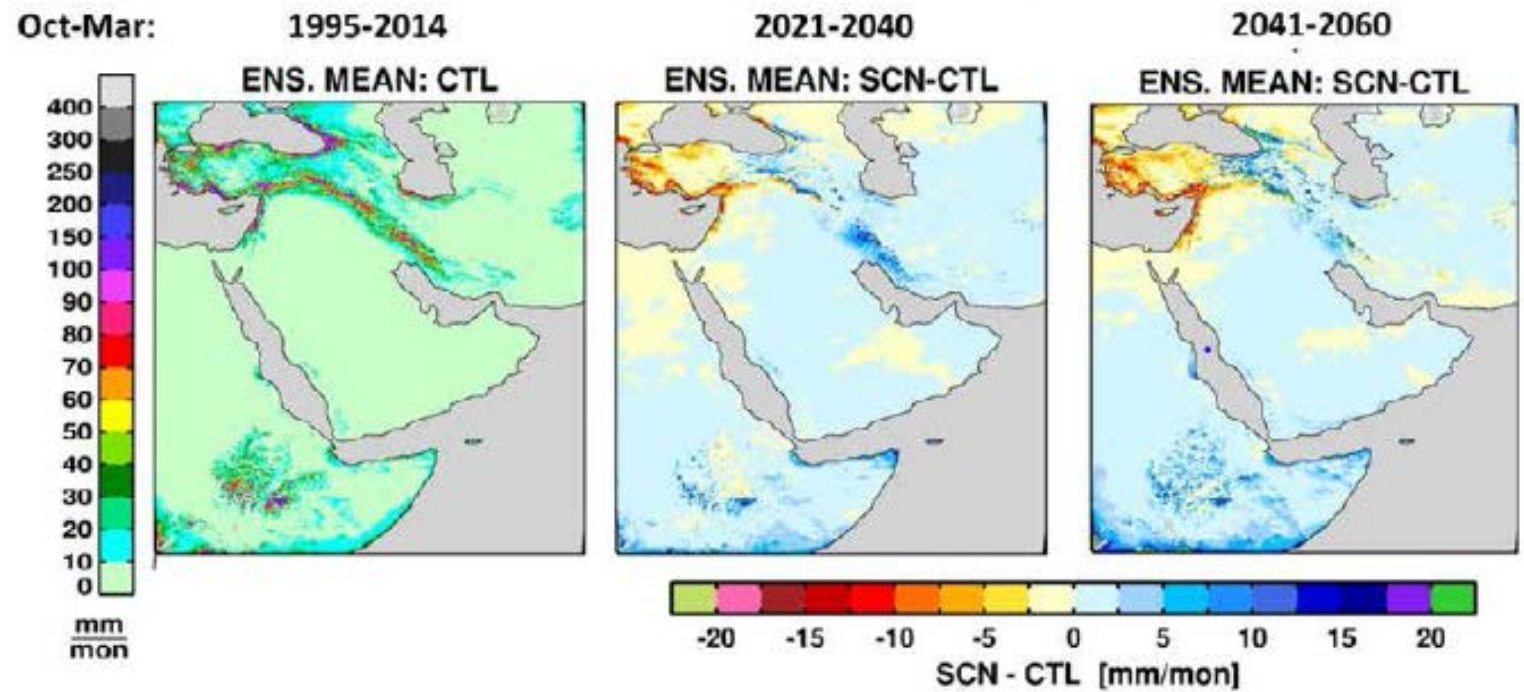
Water stress differs across regions & seasons

Winter Months



Mean runoff change (mm/month)

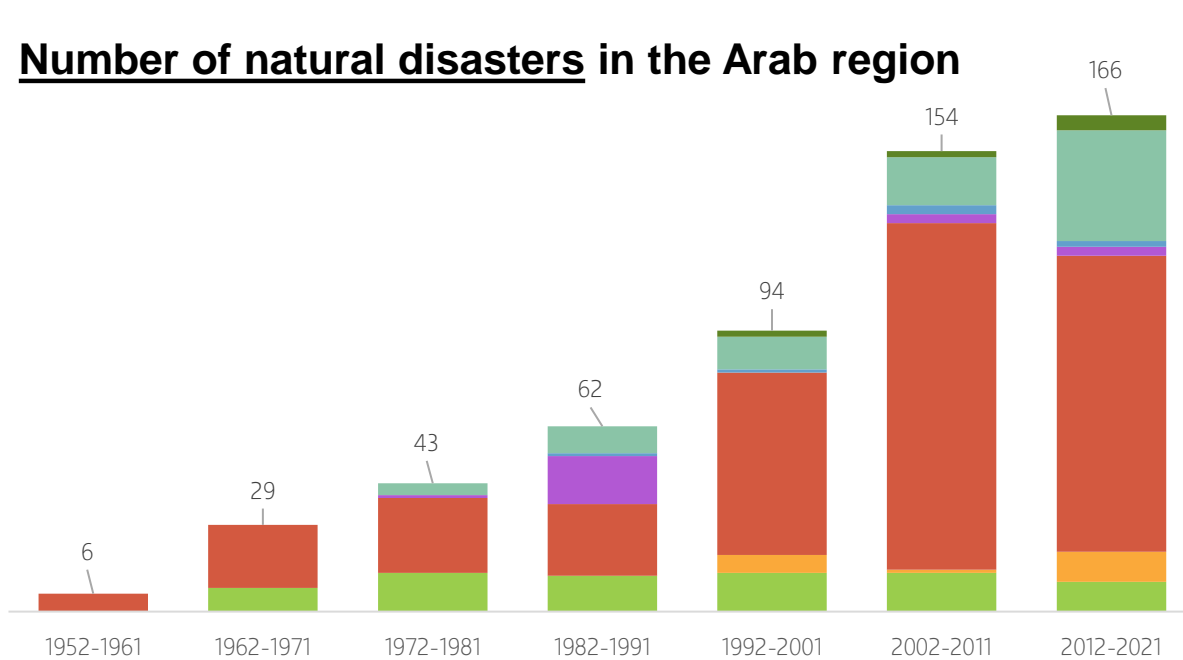
Opposing signals influence projected water availability leading to droughts and floods



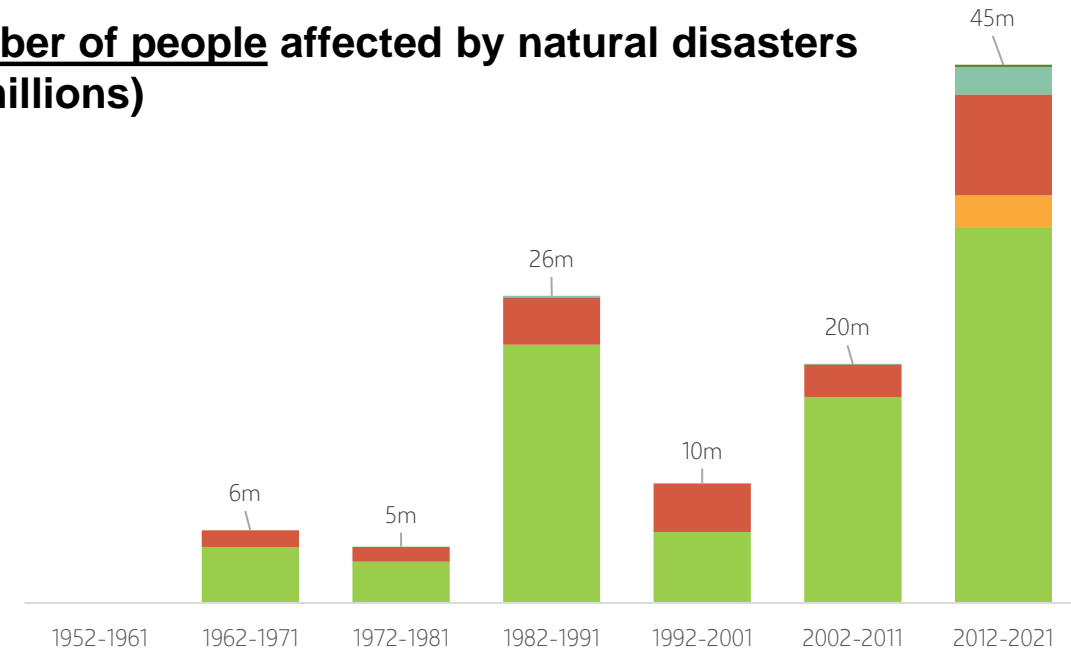
Mashreq Domain
seasonal projections for six-member ensemble for SSP5-8.5 projections through mid-century compared to reference period (1995-2014)

Natural Disasters affecting People in the Arab Region: Water-related Disasters the Most Prevalent

Number of natural disasters in the Arab region



Number of people affected by natural disasters (in millions)

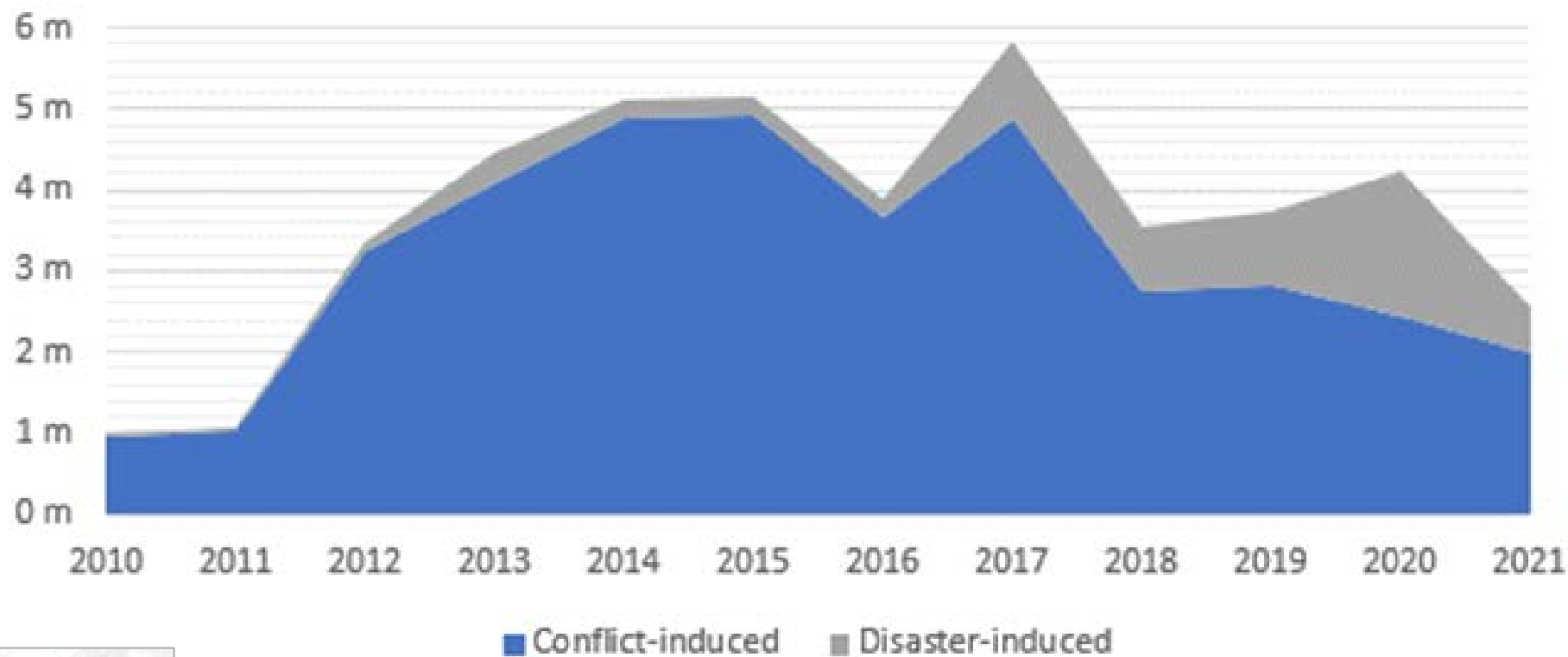


Frequency at Regional Scale

Implications for People



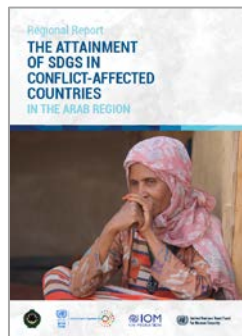
Natural disasters contribute to internal displacement, but Conflict remain key cause in the Arab Region



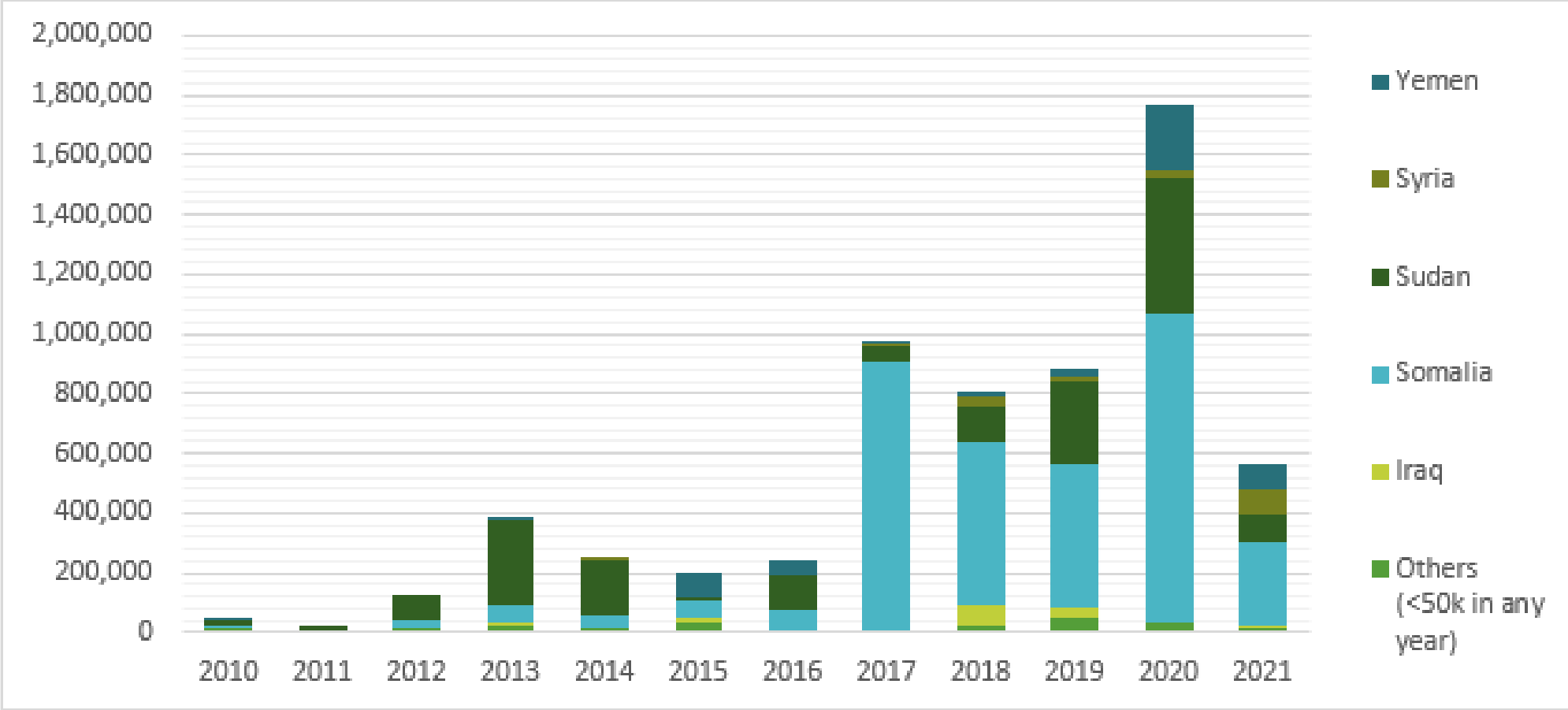
Disaster-induced IDPs [due to natural disasters](#) were pronounced in 2020 reaching **31 million** globally and **2 million** regionally (42% of total IDPs in the Arab region).

However, the volume fell in 2021 to 24 million globally and 560 thousand regionally (22% of IDPs in the Arab region). [Share is increasing](#)

Conflict-induced IDPs peaked regionally in 2017 (4.9 million), while disaster-related IDPs that year totalled under 1 million (16% of IDPs in the region) and declined until 2020 flood events.



Natural Disaster-related IDP: Share among Arab States



Internal displacement:
2017-present:
Severe drought in
Somalia

Annual seasonal
flash floods in
Somalia (Gu) and
southern **Sudan**

IDPs in **Syria** due
to natural
disasters is limited

Yemen new
hotspot

Flooding in Southern Sudan causes internal displacement, loss of livelihoods & exacerbates conflict

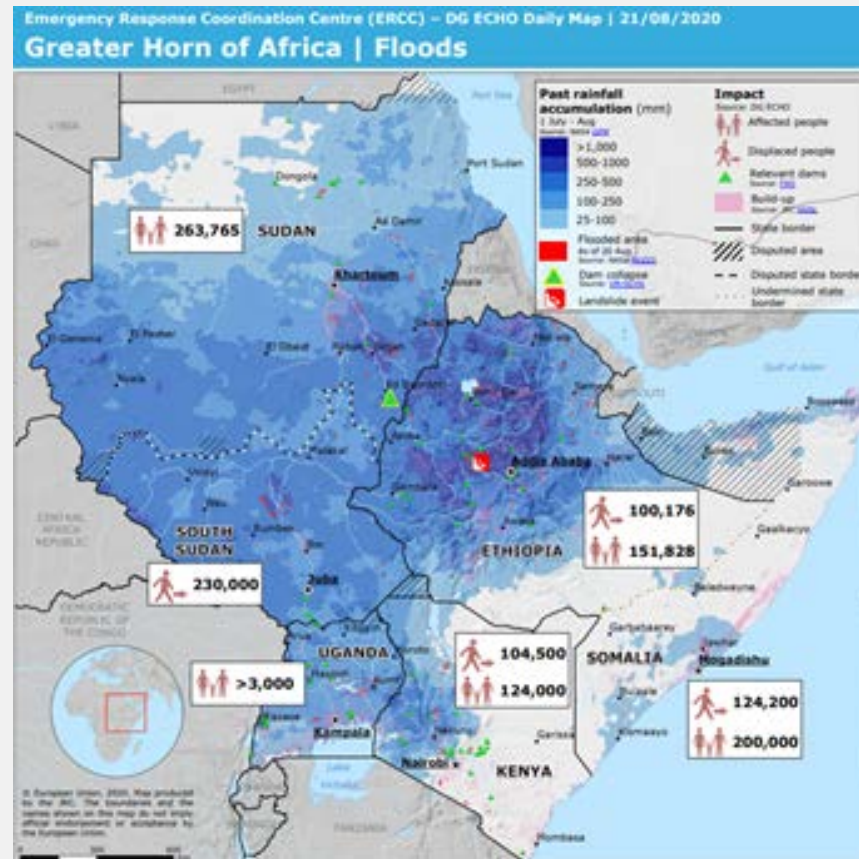
Sudanese Floods – Aug 2013
“Worst floods in 25 years”
 affected est. 530,000 people

Sudanese/Horn of Africa Floods – Aug/Sept 2020 – State of Emergency
“Worst floods in 100 years” – affected est. 800,000 people

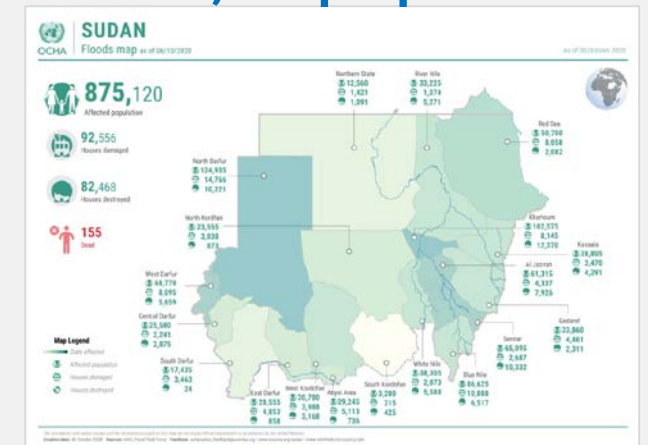
Sr. No.	State	Figures reported by MoH			Figures provided by WES			Figures provided by HAC		
		Houses totally destroyed	Houses partially damaged	Total affected families	Houses totally destroyed	Houses partially damaged	Total affected families	Houses totally destroyed	Houses partially damaged	Total affected families
1	Khartoum	15,089	10,587	25,676	15,089	10,587	25,676	18,000	18,000	36,000
2	Northern	142	961	1,016	142	961	1,016	503	529	1,032
3	River Nile	1,720	1,511	3,231	1,720	1,511	3,231	1,101	2,365	3,466
4	El Gezeira	1,868	6,132	7,548	60,012	4,007	23,783	2,704	3,799	6,503
5	Red Sea	573	1,337	1,900	573	1,337	1,900	573	1,337	4,000
6	Sennar	336	669	826	336	669	826	556	50	606
7	N. Kordofan	208	178	392	208	178	392	268	45	313
9	Gedaref	2	250	252	2	250	252	166	1,072	1,238
10	North Darfur	685	1,112	2,207	685	1,112	2,207	2,100	1,075	3,175
11	Blue Nile	891	286	12,495	891	286	12,495	213	86	21,283
12	White Nile	570	841	4,088	570	841	4,088	865	900	2,276
13	South Darfur	3,070	1,910	4,980	3,070	1,910	4,840	6,024	2,200	11,000
14	Kassala	70	425	833	70	425	833	683	934	1,572
15	S. Kordofan	478	973	1,451	478	973	1,451	-	-	-
16	Abyei	-	-	-	-	-	-	1,500	400	7,500
17	West Kordofan	-	-	-	-	-	-	3,800	2,200	6,000
	TOTAL	25,702	27,172	66,895	83,846	25,047	83,350	39,011	34,992	105,964

Sudan: Flash Update

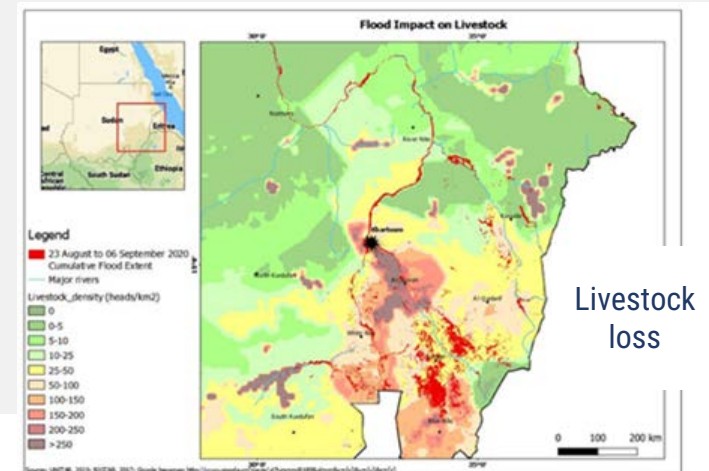
<https://reliefweb.int/sites/reliefweb.int/files/resources/OCHA%20flash%20update%20%236.pdf>



<https://erccportal.jrc.ec.europa.eu/getdailymap/docId/3428>



<https://reports.unocha.org/en/country/sudan>



Source: ESCWA based on UNITAR 2020 and RICCAR, 2017

Floods happening each year. Frequency & Intensity impacts vulnerability

Need to move from Vulnerability to Resilience through Investments in Adaptation & Adaptive Capacity

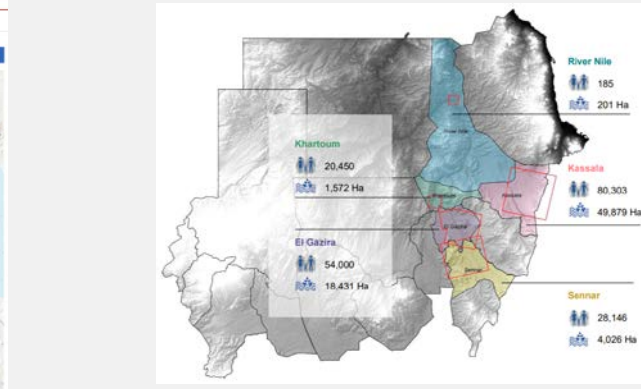
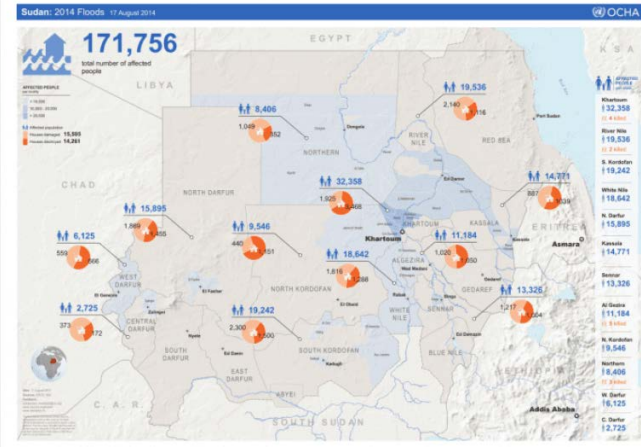
UNITAR - UNOSAT
Situation Analysis Report, Floods in Sudan Aug 2016

July - Dec 2018

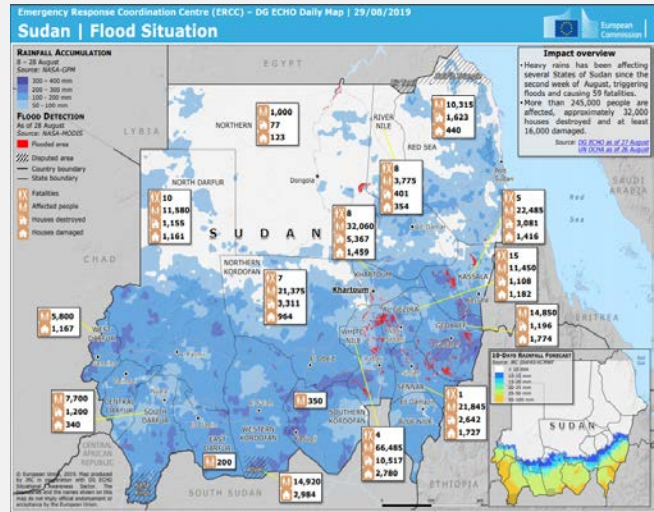
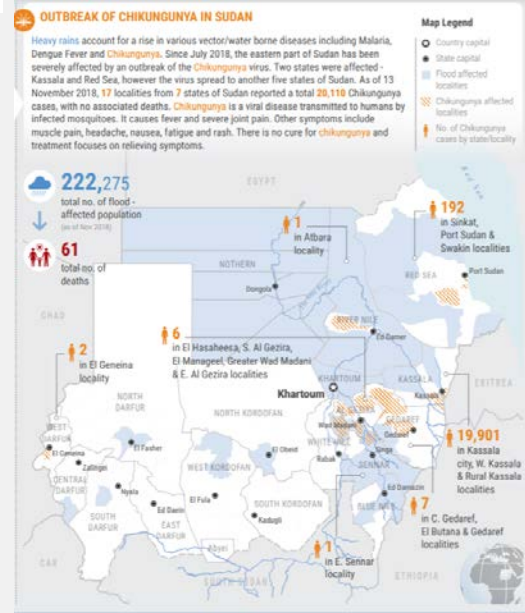
August 2019

Sudan: 2014 Floods (as of 17 August 2014)

Map • Source: OCHA • Posted: 18 Aug 2014 • Originally published: 17 Aug 2014



Sept 2018

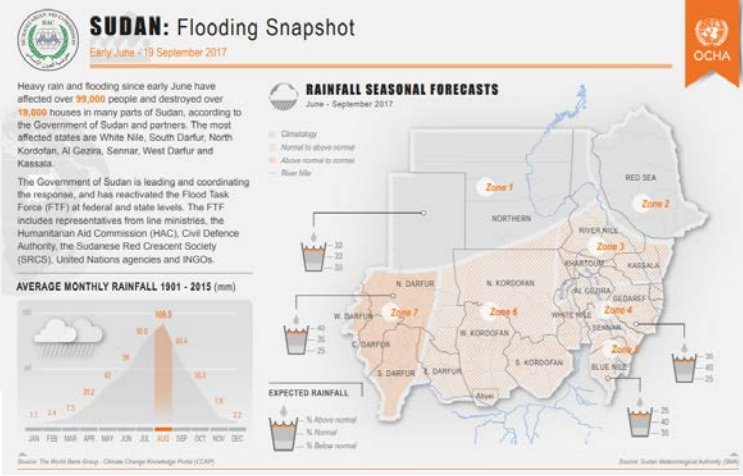


https://reliefweb.int/sites/reliefweb.int/files/resources/ECMD_20190829_Sudan_Flood.pdf

https://reliefweb.int/sites/reliefweb.int/files/resources/Sudan_Humanitarian_Snapshots_A4_1_Dec_2018.pdf

Adaptation needs a Whole-of-society Approach that goes beyond exposure & hazards

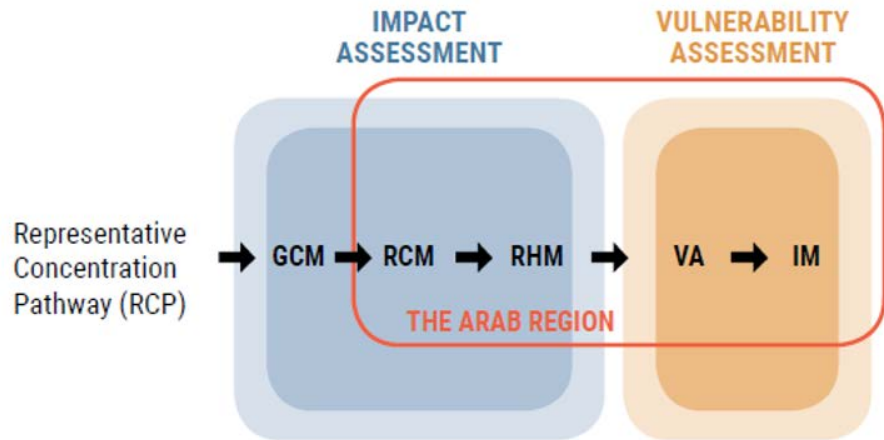
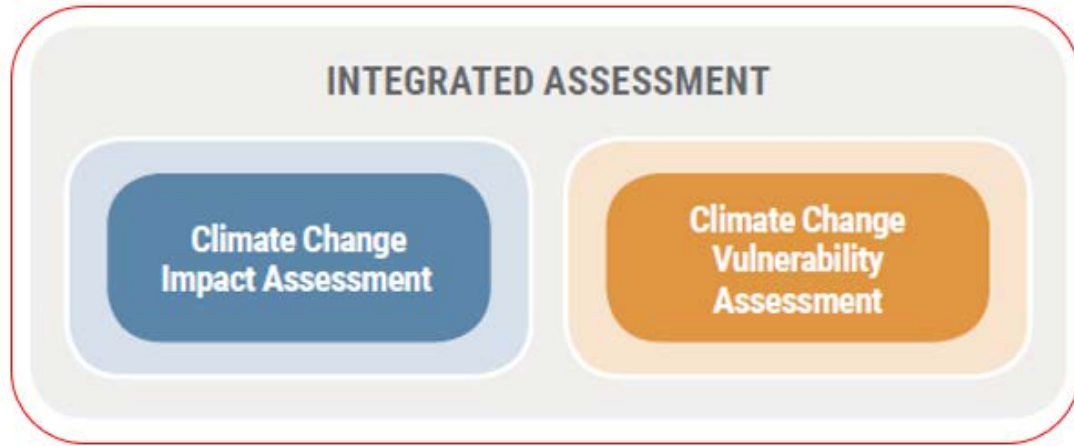
- Multiple Crisis contributing to vulnerability:**
- Climate
 - Conflict
 - Locust
 - Loss of crops / livestock / livelihoods
 - Currency devaluation
 - Debt
 - Political transition
 - Pandemic



Women collecting water from well, Kuma Garadayat, Sudan, 2012. Source: UN Photo/Albert González Farran.

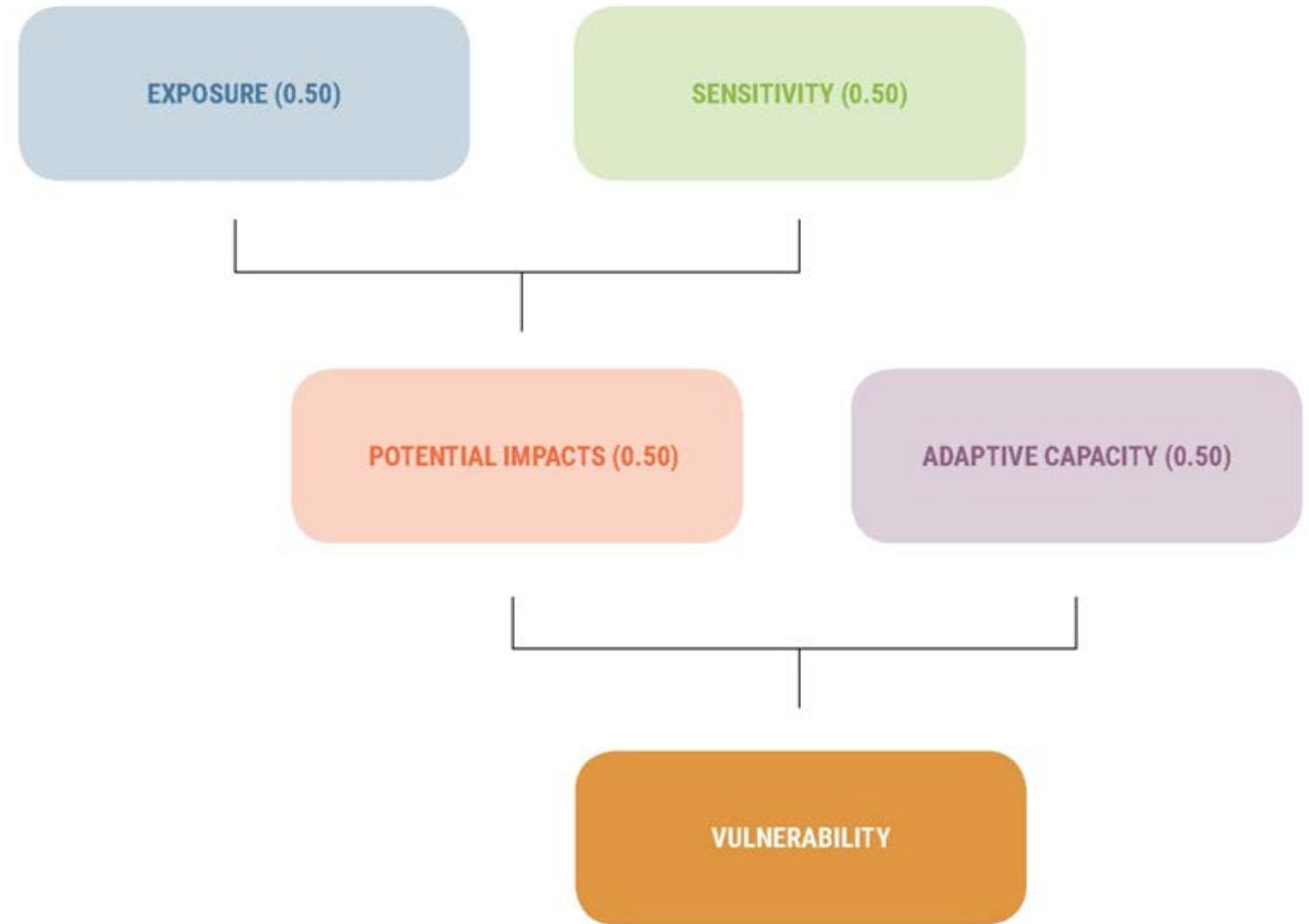
https://reliefweb.int/sites/reliefweb.int/files/resources/Sudan_Flooding_Snapshot_A4_19_Sep_2017.pdf

Integrated Vulnerability Assessment



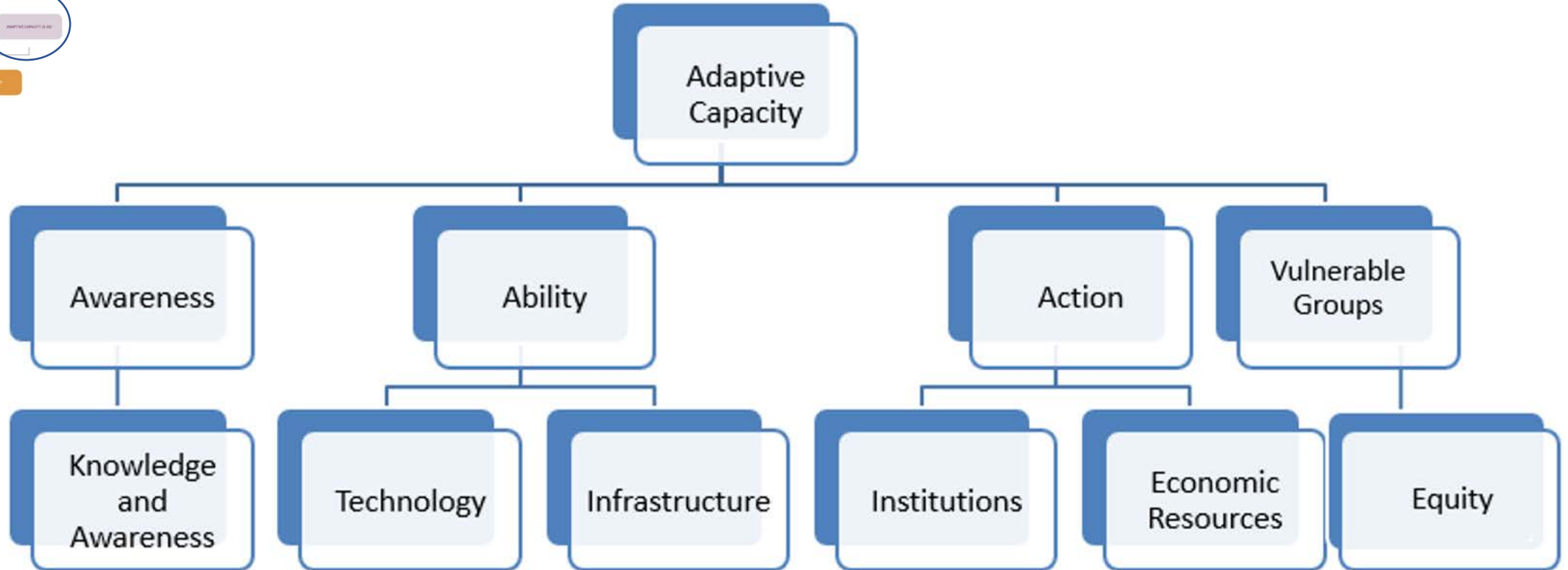
GCM: Global Climate Modelling
RCM: Regional Climate Modelling
RHM: Regional Hydrological Modelling

VA: Vulnerability Assessment
IM: Integrated Mapping



Adaptive Capacity: Dimensions and Determinants

*Strengthen
Adaptive Capacity
for
Climate Change
Resilience*



Adaptive capacity is “the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behavior and in resources and technologies” - IPCC (2007)

Water Availability – Vulnerability Impact Chain

EXPOSURE (0.50)

RCM

- Change in temperature (0.17)
- Change in precipitation (0.17)

RHM

- Change in runoff (0.17)
- Change in evapotranspiration (0.17)

EXTREME EVENTS INDICES

- Change in maximum length of dry spell (0.16)
- Change in maximum length of wet spell (0.16)

SENSITIVITY (0.50)

POPULATION (0.50)

- Population density (0.14)
- Total renewable water available per capita (0.50)
- Water consumption per capita (0.13)
- Share of water consumption in agriculture (0.13)
- Refugee population (0.10)

NATURAL (0.26)

- Land use/land cover (0.27)
- Soil storage capacity (0.25)
- Degradation of vegetation cover (0.26)
- Wetlands (0.22)

MANMADE (0.24)

- Urban extent (0.47)
- Areas served by dams (0.53)



POTENTIAL IMPACT
(0.50)

VULNERABILITY ASSESSMENT

ADAPTIVE CAPACITY (0.50)

KNOWLEDGE & AWARENESS (0.10)

- E-Government development (0.33)
- Tertiary enrollment (0.32)
- Adult literacy rate (0.35)

TECHNOLOGY (0.10)

- Number of scientific and technical journal articles (0.46)
- Information and communication technologies index (0.54)

INSTITUTIONS (0.10)

- Governance index (0.54)
- Disaster risk reduction committees (0.46)

INFRASTRUCTURE (0.50)

WATER & SANITATION (0.50)

- Areas served by dams (0.17)
- Installed desalination capacity per capita (0.17)
- Fossil groundwater (0.17)
- Access to improved water (0.17)
- Access to improved sanitation (0.16)
- Area equipped for irrigation (0.16)

ENVIRONMENT (0.50)

- Environment performance index (1.0)

ECONOMIC RESOURCES (0.11)

- GDP per capita (0.36)
- ODA (0.30)
- Food imports as % of merchandise exports (0.34)

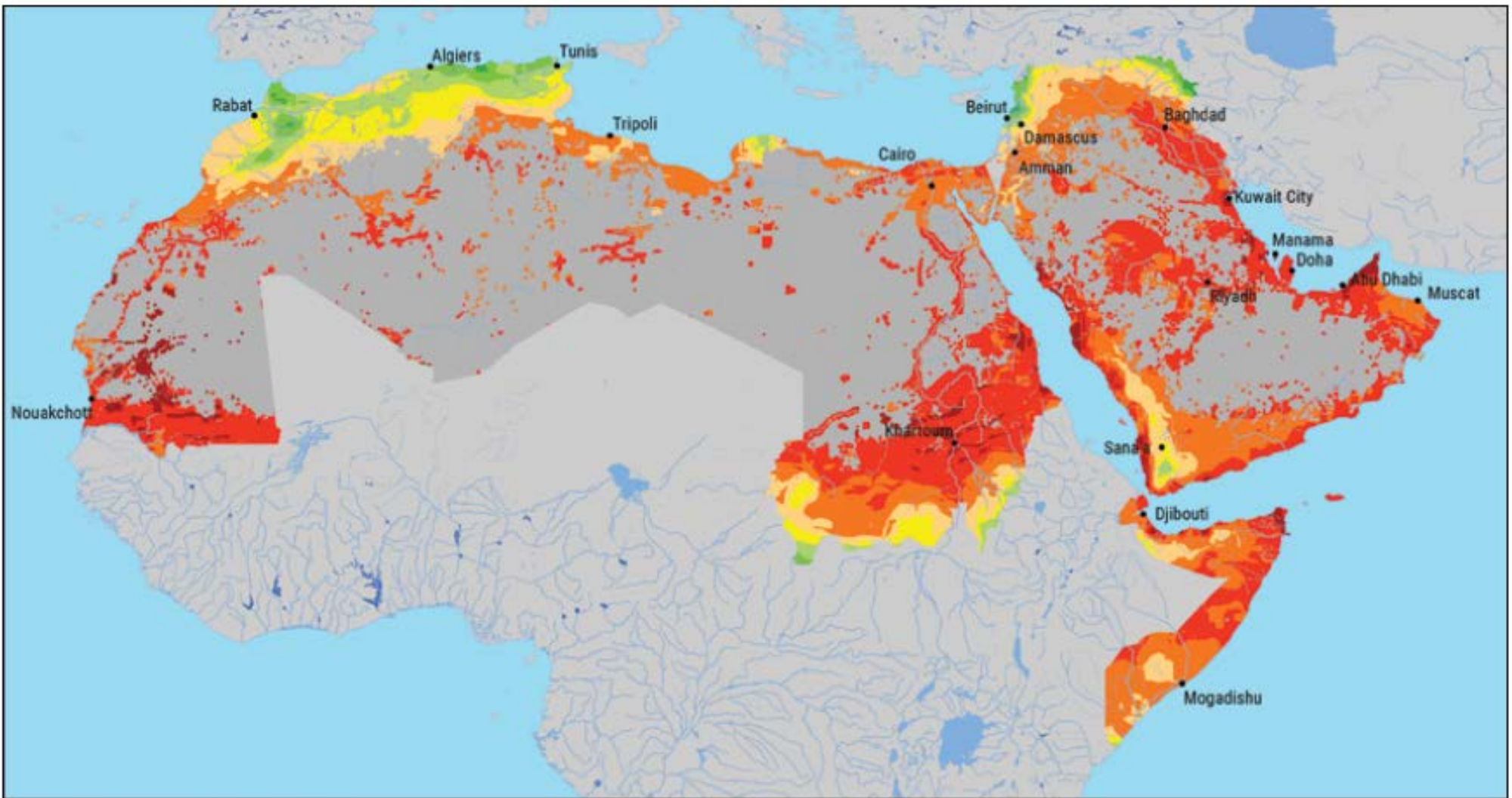
EQUITY (0.09)

- Female-to-male literacy ratio (0.51)
- Migrants/refugees index (0.49)



Water Availability Vulnerability

**Exposure at
Reference Period**



WATER: WATER AVAILABILITY

EXPOSURE: REFERENCE PERIOD

Legend



Lakes



Rivers



Major cities



Reservoirs



Intermittent
rivers



Area not relevant
to subsector



Low Exposure

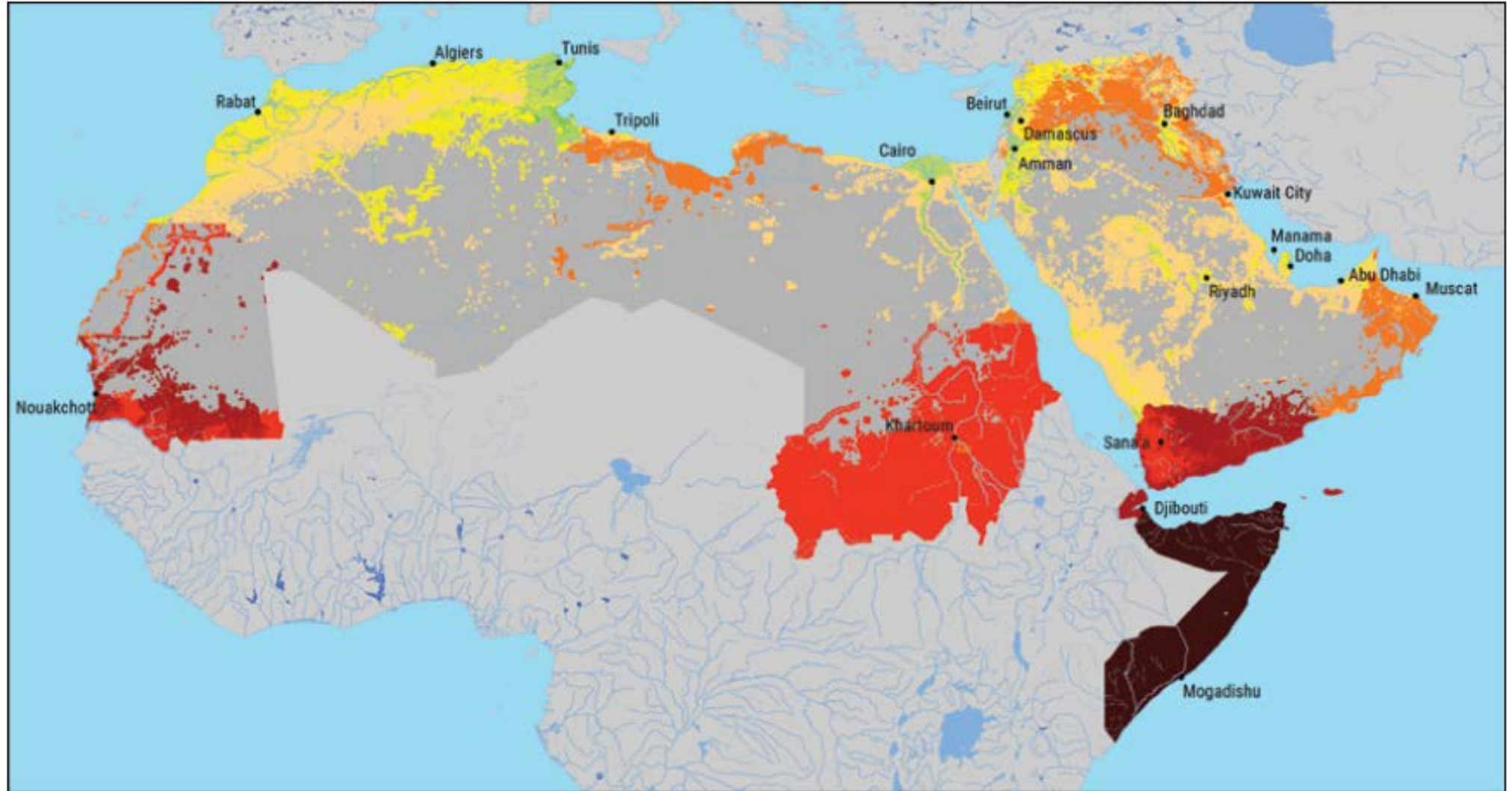
High Exposure





**Water Availability
Vulnerability**

Adaptive Capacity



**WATER: WATER AVAILABILITY
ADAPTIVE CAPACITY**

Legend

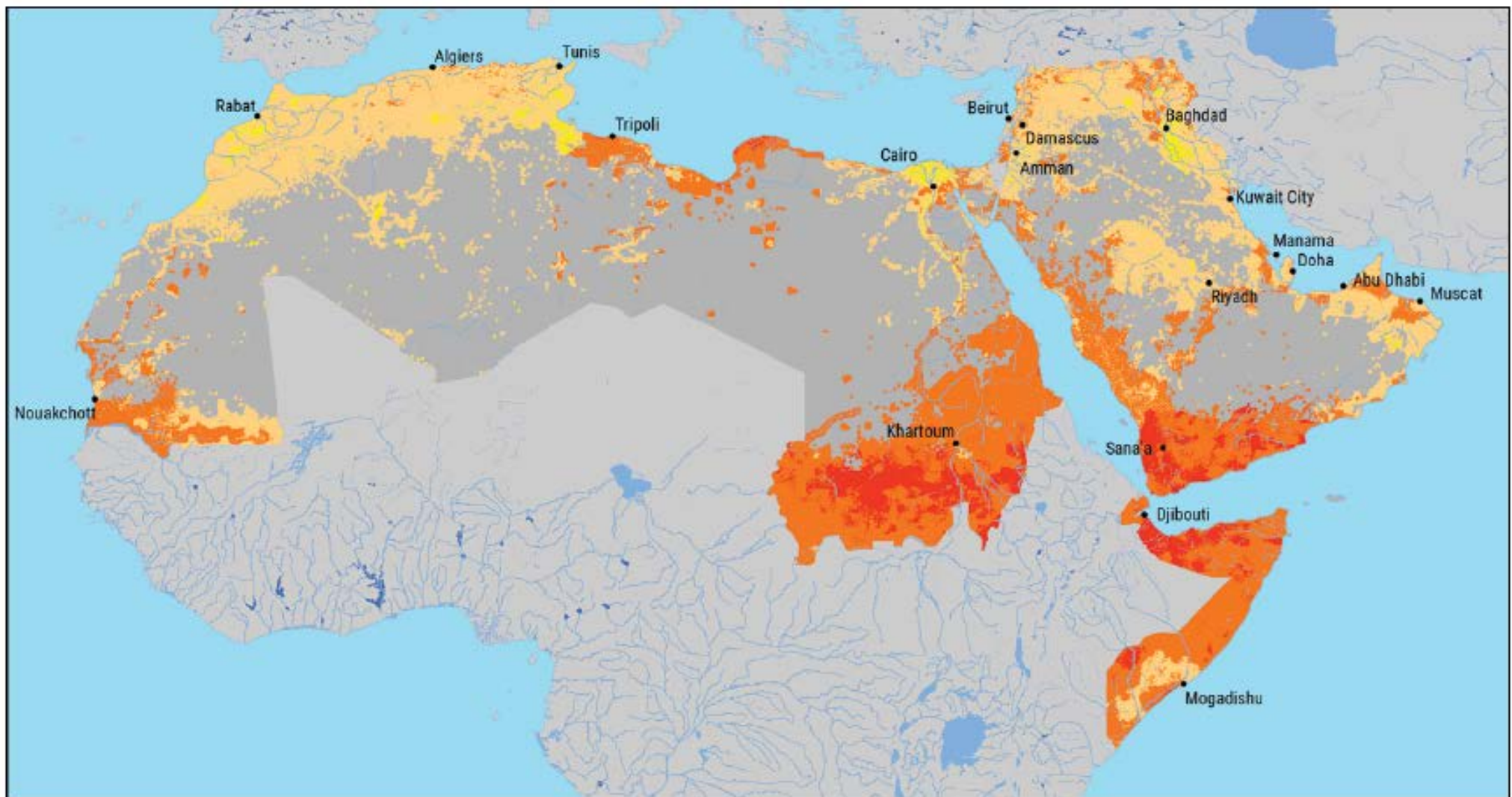
-  Lakes
-  Reservoirs
-  Rivers
-  Intermittent rivers
-  Major cities
-  Area not relevant to subsector





Water Availability Vulnerability

**Mid-Century
(2046-2065)
RCP 8.5**



WATER: WATER AVAILABILITY

VULNERABILITY: RCP8.5 MID-CENTURY (2046-2065)

Legend

Lakes

Reservoirs

Rivers

Intermittent
rivers

Major cities

Area not relevant
to subsector

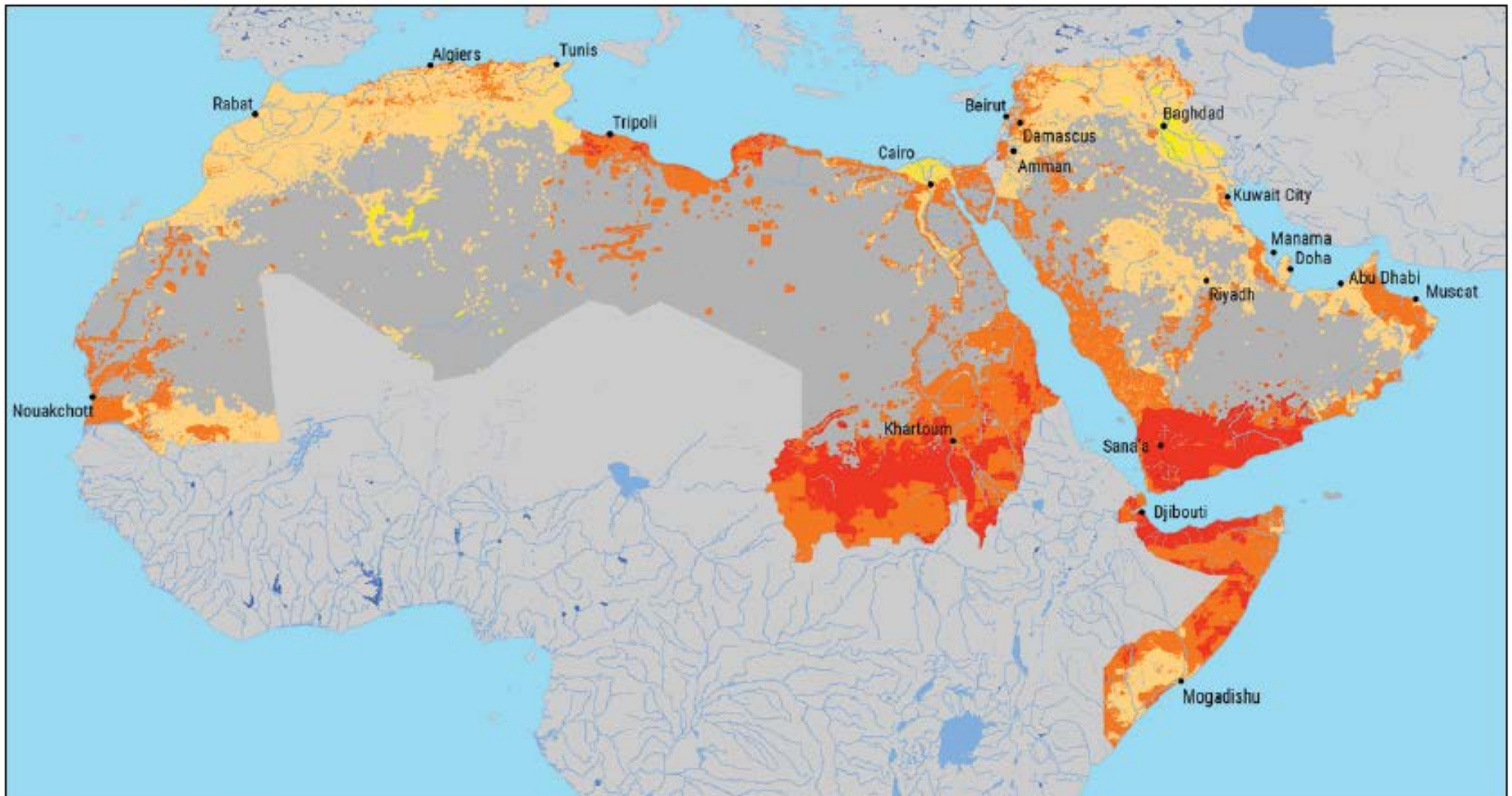
Low Vulnerability

High Vulnerability



Water Availability Vulnerability

**End-Century
RCP 8.5**



WATER: WATER AVAILABILITY
VULNERABILITY: RCP8.5 END-CENTURY (2081-2100)

Legend

Lakes

Reservoirs

Rivers

Intermittent
rivers

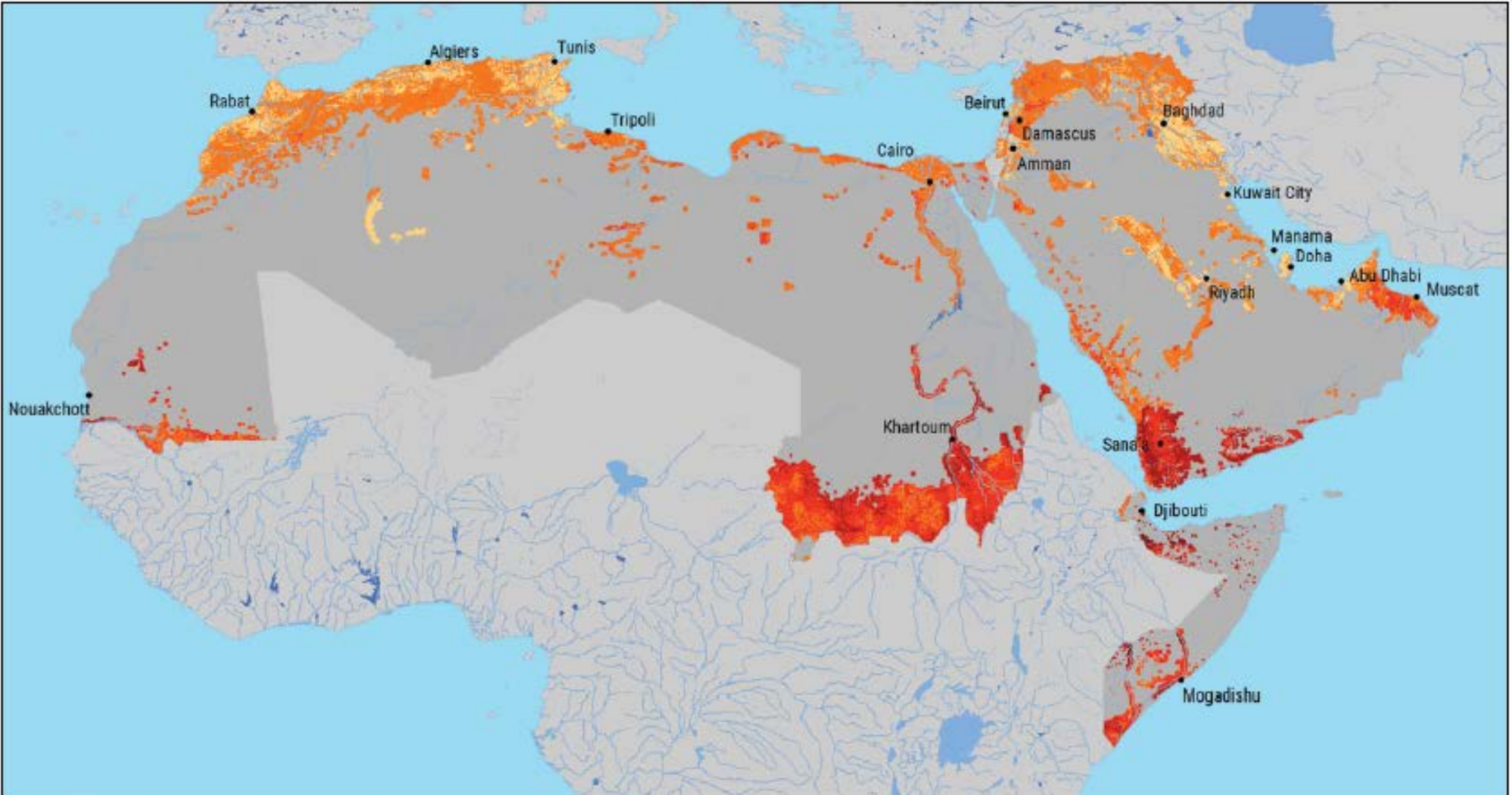
Major cities

Area not relevant
to subsector

Low Vulnerability

High Vulnerability





**Water Availability
for Crops
Vulnerability**

**End-Century
RCP 8.5**

AGRICULTURE: WATER AVAILABLE FOR CROPS
VULNERABILITY: RCP8.5 END-CENTURY (2081-2100)

Legend

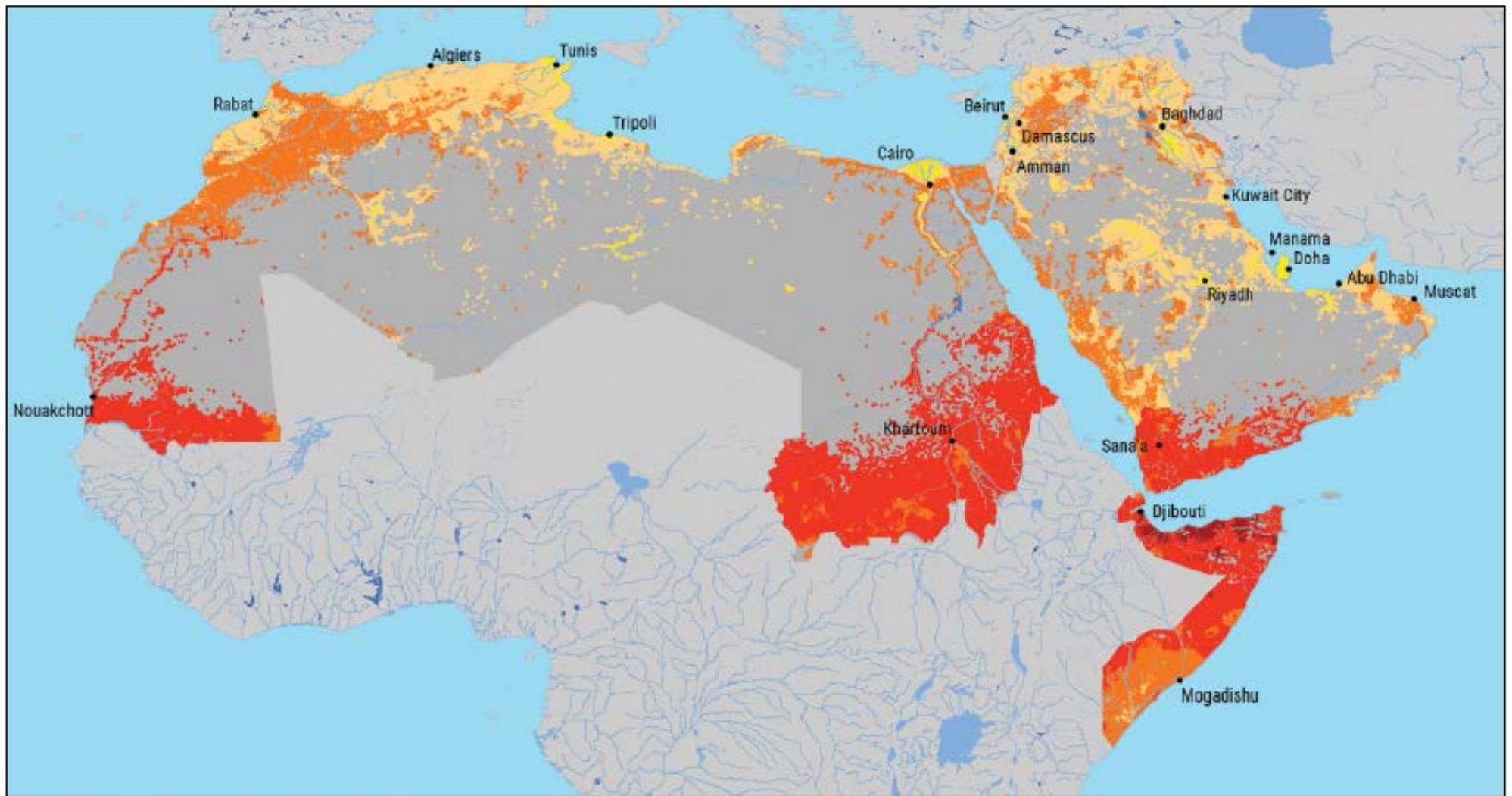
- Lakes
- Reservoirs
- Rivers
- Intermittent rivers
- Major cities
- Area not relevant to subsector





Water Availability for People: Agricultural Employment Vulnerability

**End-Century
RCP 8.5**



PEOPLE: EMPLOYMENT RATE FOR THE AGRICULTURAL SECTOR

VULNERABILITY: RCP4.5 END-CENTURY (2081-2100)

Legend


 Lakes

 Reservoirs

 Rivers

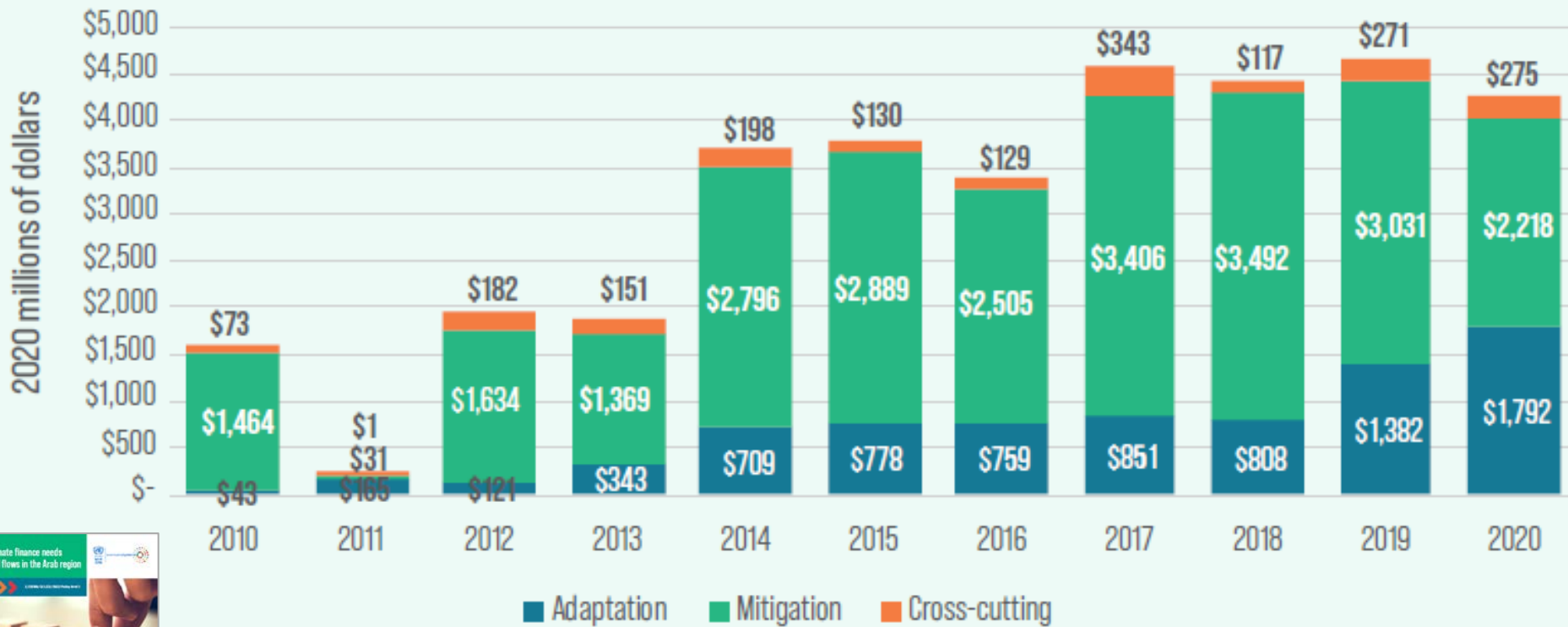
 Intermittent rivers

 Major cities

 Area not relevant to subsector



Financial Flows Not Responding to Adaptation Priorities



Source: Compiled by ESCWA based on the OECD database entitled "Climate-related development finance at the activity level: Recipient perspective 2000–2020".

*Above figures are for climate flows that are principally for climate.
For flows that are tagged as significant, adaptation on parity with mitigation*

Flows to mitigation summed

\$24.84 billion

were **three times greater** than flows to adaptation

\$7.75 billion

over the period 2010–2020

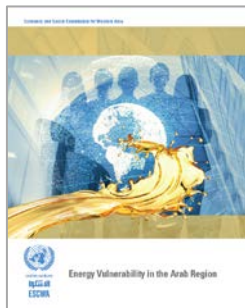
Articulated adaptation needs in Arab region are largely focused on water & agriculture

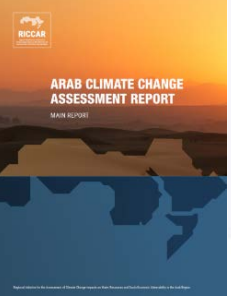
Just & Inclusive Energy Transition

Mitigation measures to achieve global climate goal may also contribute to labour migration.

Energy Vulnerability in Arab States – fuels migration

- **Energy for development needs:** right to development / energy needed to achieve the SDGs and basic needs. Climate change agreement aim to produce more with less GHG emissions (mitigation measures). With sufficient availability and affordability, energy needed to create and maintain jobs possible; currently supports heavy industries/extractive industries. Transition will impact key economic sectors; labour migration outflows & inflows dependent on industry costs & revenues
- **Shifting the energy mix:** Energy efficiency initiatives and diversification of energy sources can create green jobs; could event generate labour migration inflows in new green industries
- **Economic diversification by oil and gas producers:** transition away from fossil fuels disrupts income and labour markets; transition to other sectors as well as labour migration outflows
Reducing reliance of government income on exports reduces fluctuations in income and creates room for alternative sectors, that could create new job opportunities if expat labour force retrained.





The Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region



KNOWLEDGE RESOURCES

The central aim of this Regional Knowledge Hub is to provide access to information that can facilitate cooperation, coordination, dialogue and exchange among Arab States, organizations

DATA PORTAL

The data portal allows interactive visualization of RICCAR maps and provides access to RICCAR data repository.

KNOWLEDGE NODES

Innovation of National, Regional and International Nodes for the Transfer and Sharing of Knowledge

PARTNERSHIPS

Strategic partnerships for supporting strategic objectives to implement climate change adaptation and mitigation programs at the national and regional levels

Request Data

www.riccar.org



CORDEX-MENA Domain hosted by The Cyprus Institute 26



Regional Knowledge Hub: Mashreq Domain Portal



Regional Knowledge Hub Data Portal

About

Mashreeq Region

Bias Corrected data

Reference period (1995-2014)

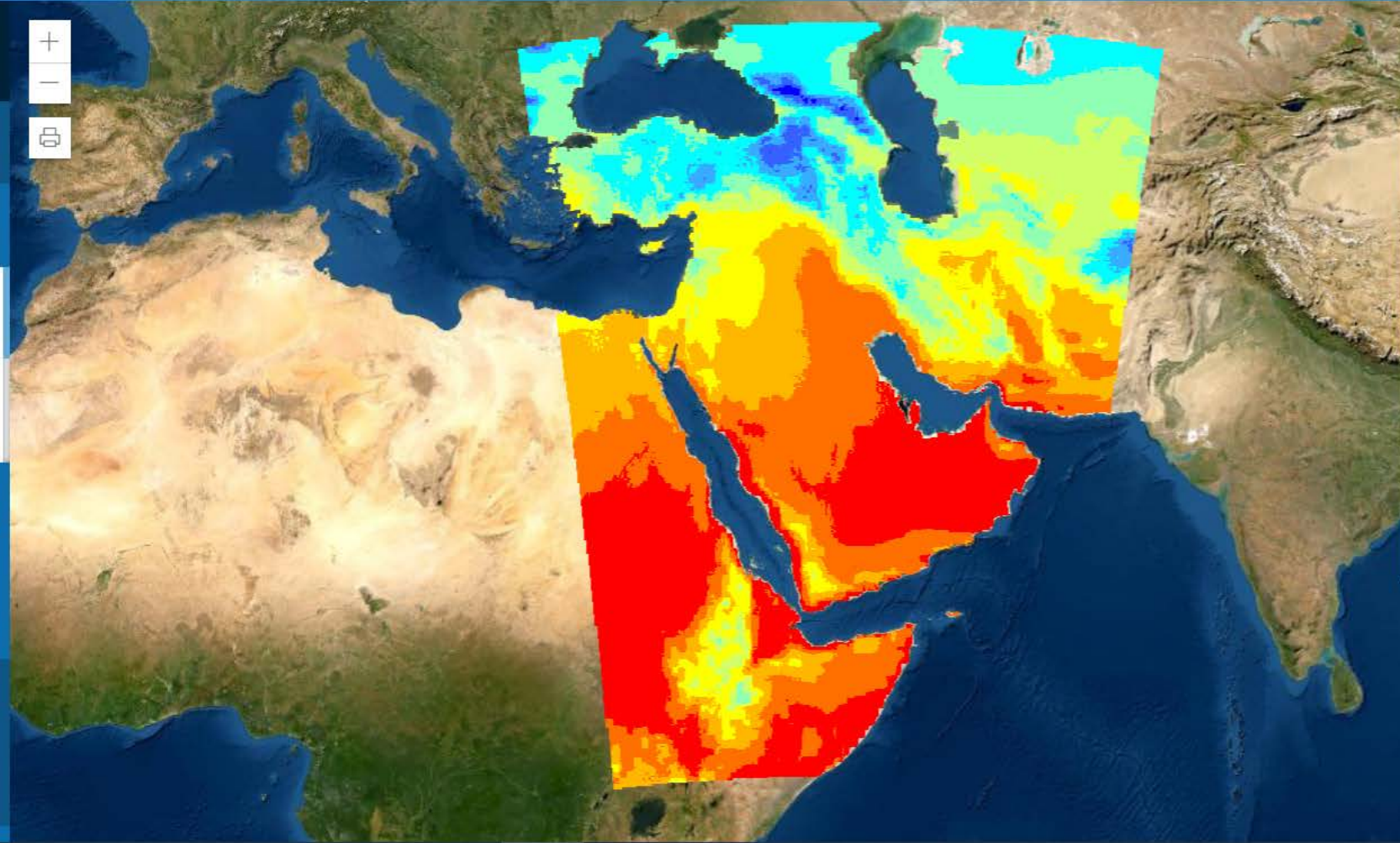
- Temperature
- Precipitation
- SU
- SU35
- SU40

Near-term (2021-2040)

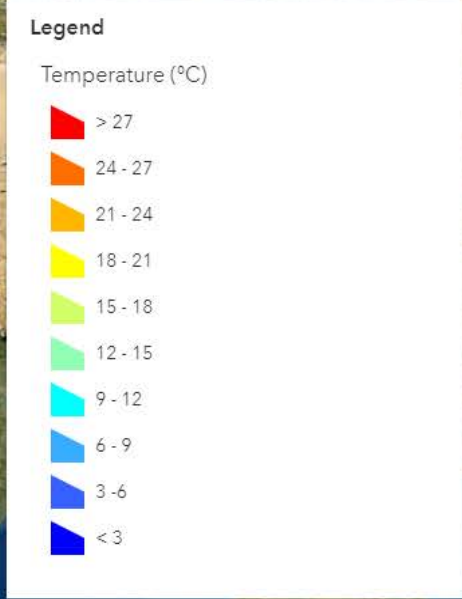
Mid-term (2041-2060)

Raw RCM outputs

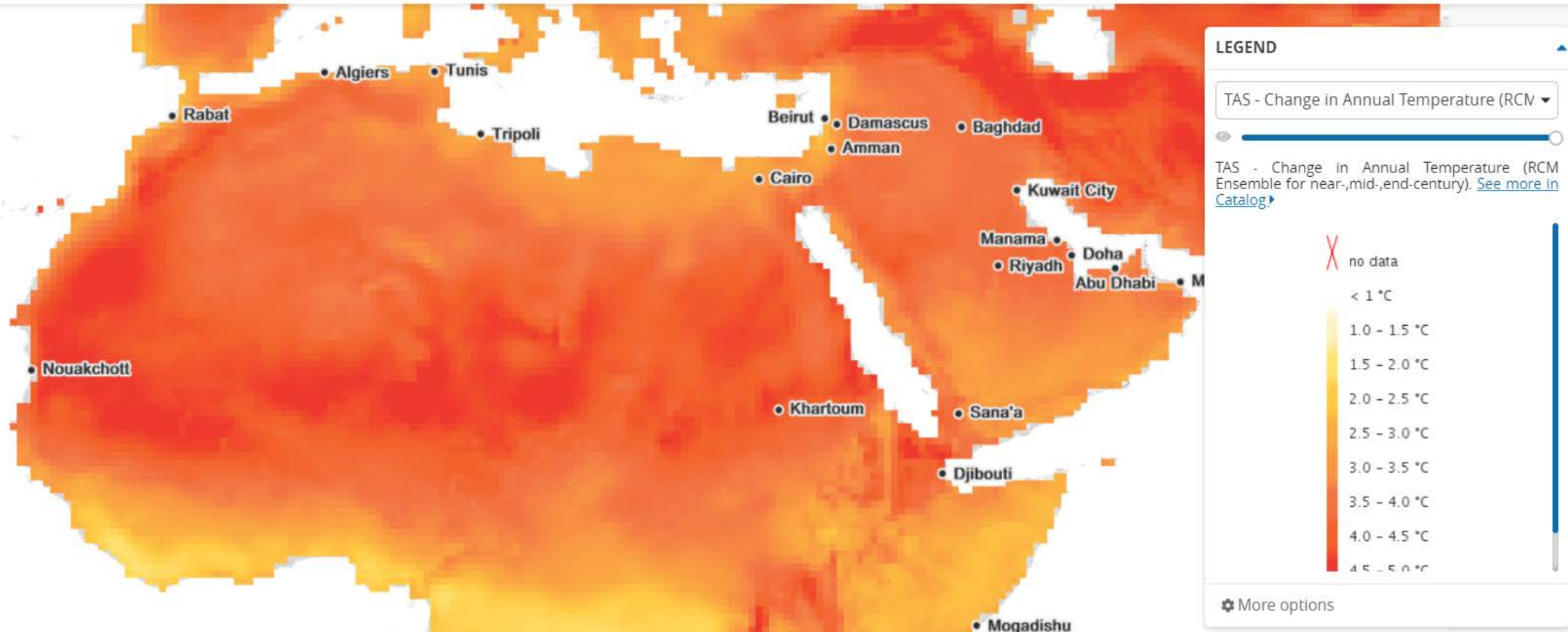
Upload your file



Find address or place



CLIMATE



LEGEND

TAS - Change in Annual Temperature (RCM)

TAS - Change in Annual Temperature (RCM Ensemble for near-,mid-,end-century). [See more in Catalog](#)

- X no data
- < 1 °C
- 1.0 - 1.5 °C
- 1.5 - 2.0 °C
- 2.0 - 2.5 °C
- 2.5 - 3.0 °C
- 3.0 - 3.5 °C
- 3.5 - 4.0 °C
- 4.0 - 4.5 °C
- 4.5 - 5.0 °C

⚙ More options

ANALYSIS LOCATE

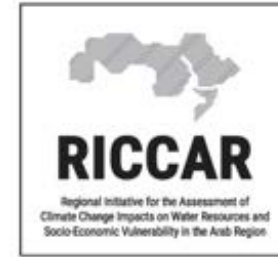
LAYERS CATALOG

500 km

RICCAR projects freely available for
download & analysis on request



Shared Prosperity Dignified Life



Thank you

chouchanicherfane@un.org

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