



Key Findings of the RICCAR *Arab Climate Change Assessment Report*



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ESCWA

UNFCCC-LAS-ESCWA Technical Workshop on Climate Finance in the Arab Region
Cairo, 7 November 2019

Intergovernmental mandates calling for & supporting Climate Change Assessment in the Arab Region

First
Arab Ministerial
Declaration on
Climate Change
CAMRE
2007

Arab
Economic and
Social Summit
*Resolution on
Climate Change
& Water Project*
2009

Arab Permanent
Committee for
Meteorology
Resolutions
2012, 2013, 2014,
2015, 2016,
2017

Arab
Ministerial
Council of for
Meteorology &
Climate
2018

ESCWA
25th Ministerial
Session
*Resolutions on
Climate Change,
Rio+20 follow-up*
2008, 2012,
2014

Arab
Ministerial
Water Council
Resolutions
2010, 2011,
2012, 2013,
2014, 2015,
2016, 2017

ACSAD Board
of Directors
Resolution
2013

ESCWA
30th Ministerial
Session
*Resolution setup
Center for Arab
Climate Change
Policies*
2018

Environment

Foreign Affairs &
Planning

Water

Met

Agriculture

RICCAR

Objective: To assess the impact of climate change on freshwater resources in the Arab Region through a consultative regional initiative that scientifically identifies the socio-economic and environmental vulnerability caused by climate change impacts on water resources based on regional specificities.

Purpose: To provide a common platform for assessing, addressing and informing response to climate change impacts on freshwater resources in the Arab region by serving as the basis for dialogue, priority setting and policy formulation on climate change at the regional level.

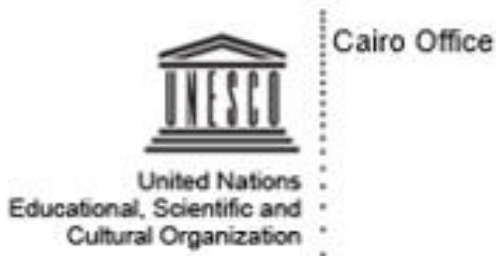
Assessment

Adaptation

Mitigation

Negotiations

RICCAR Partnerships



SWEDISH INTERNATIONAL DEVELOPMENT
COOPERATION AGENCY

ACCWaM

CORDEX/MENA Domain housed at
The Cyprus Institute

RICCAR Publication Series



ARAB CLIMATE CHANGE
ASSESSMENT REPORT



BOOKLET



TECHNICAL NOTES

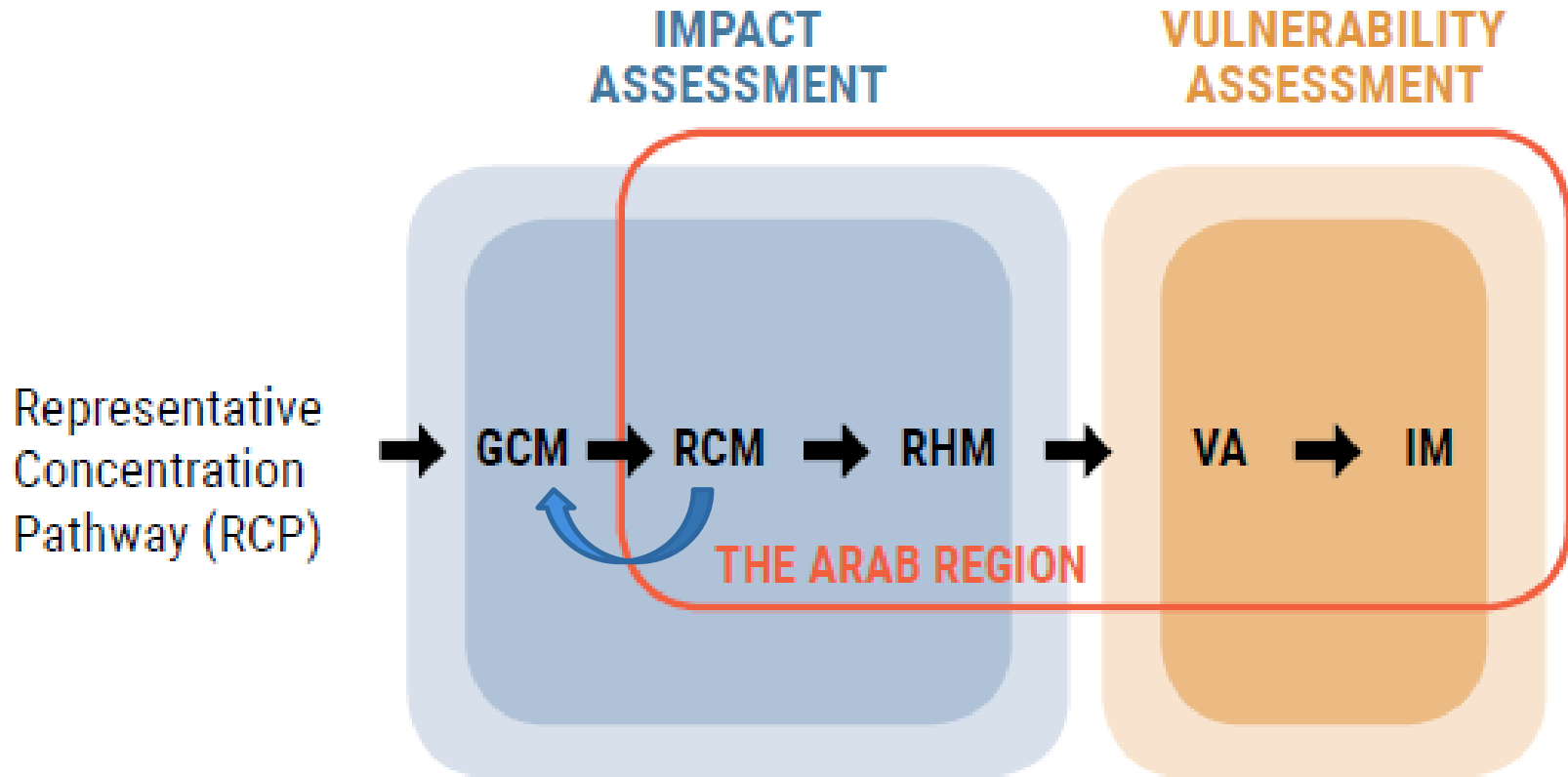


MANUAL



TECHNICAL REPORTS

Integrated Assessment



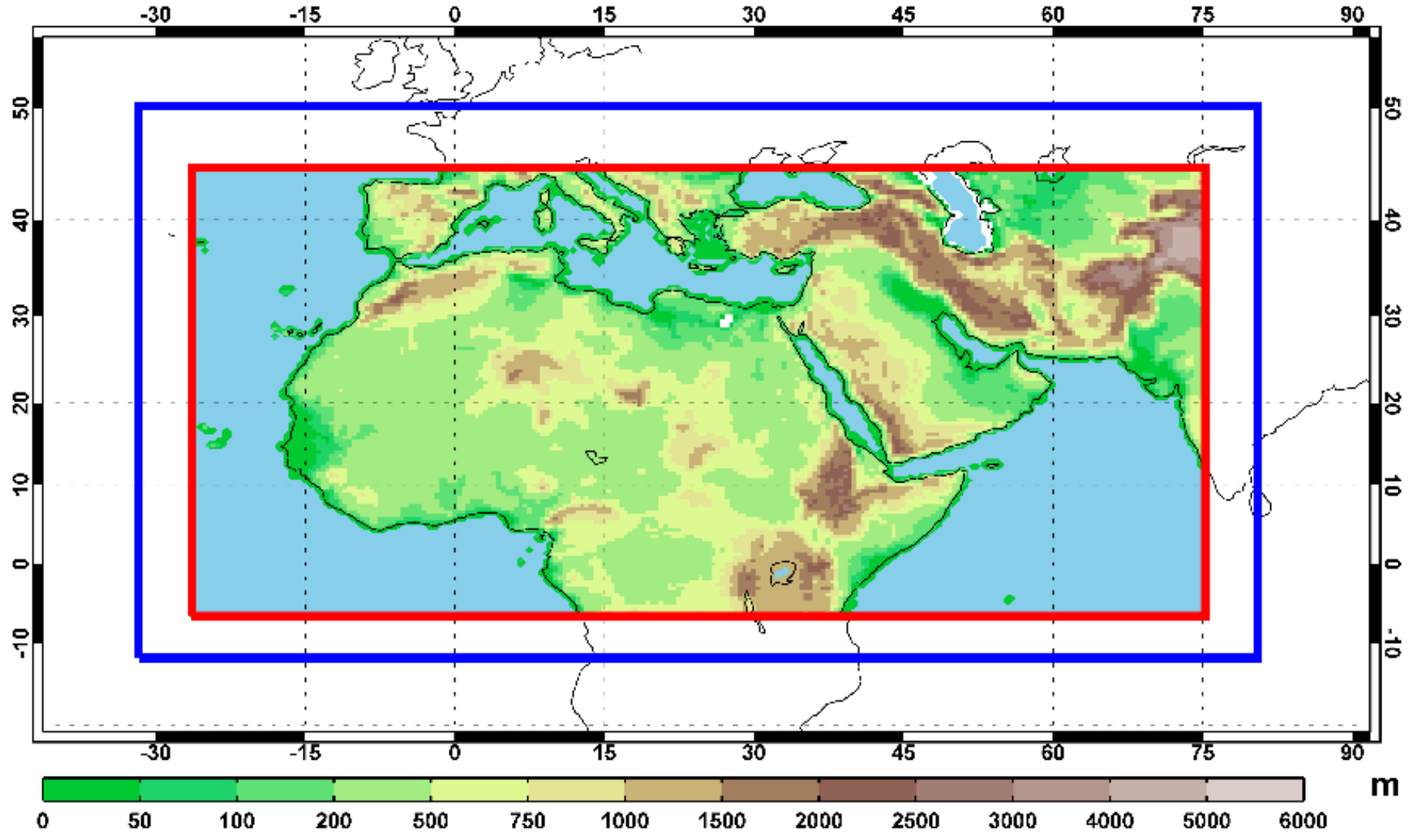
GCM: Global Climate Modelling
RCM: Regional Climate Modelling
RHM: Regional Hydrological Modeling

VA: Vulnerability Assessment
IM: Integrated Mapping
netcdf to ArcGIS

The Arab Domain

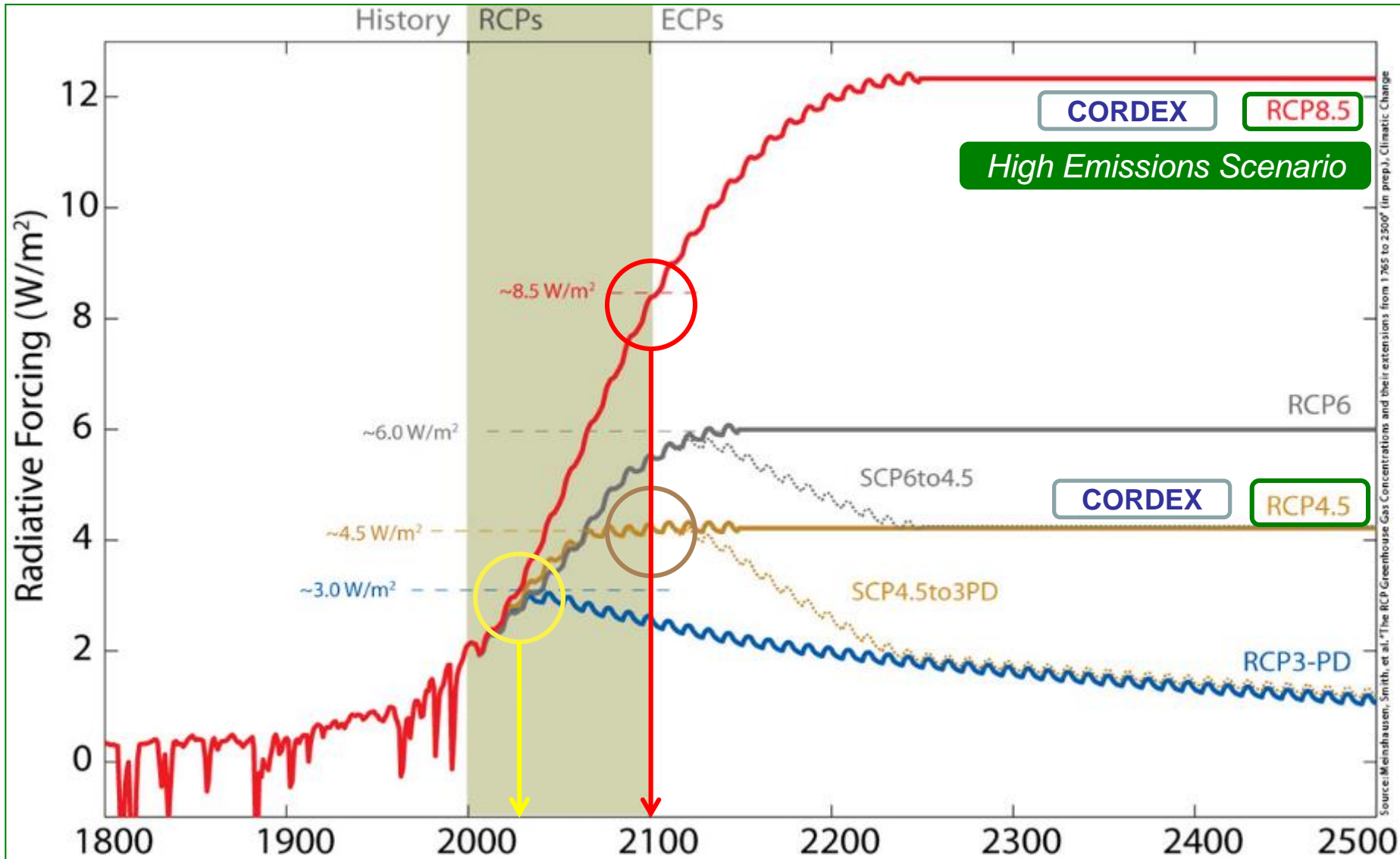
CORDEX-MENA/Arab Domain | 0.44° (50 km)

— Active Domain — Full Domain (SMHI-RCA4)



Representative Concentration Pathways (RCPs)

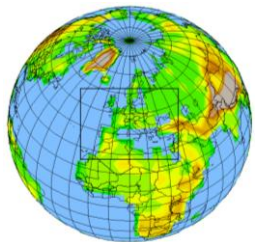
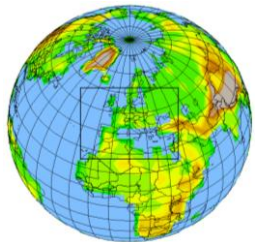
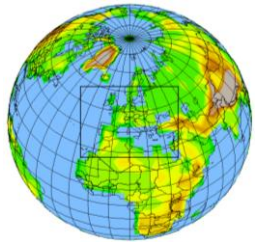
As first represented in IPCC AR5 Projections



Graph adapted from: Meinshausen et al., 2010

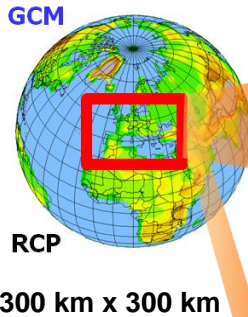
Regional Climate Modeling & Hydrological Modeling

Different GCMs

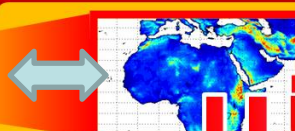


Same RCP

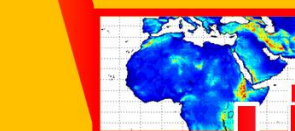
General Circulation Model GCM



Regional Climate Model (RCM)



50km x 50km

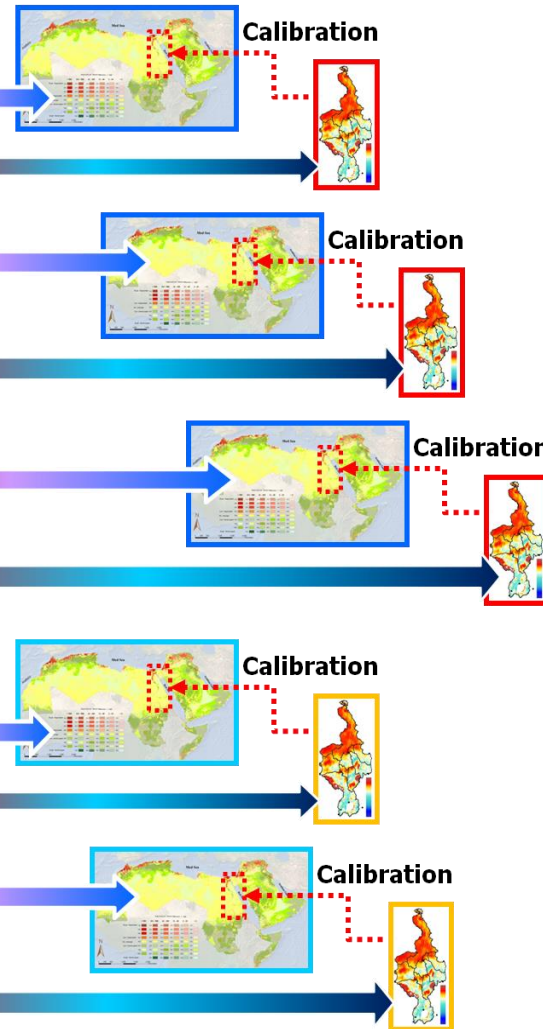


25km x 25km

Ensembles used to reduce uncertainty at level of RCMs & RHM

Ensembles aggregate findings of different RCMs & RHM applied for same RCP & Domain

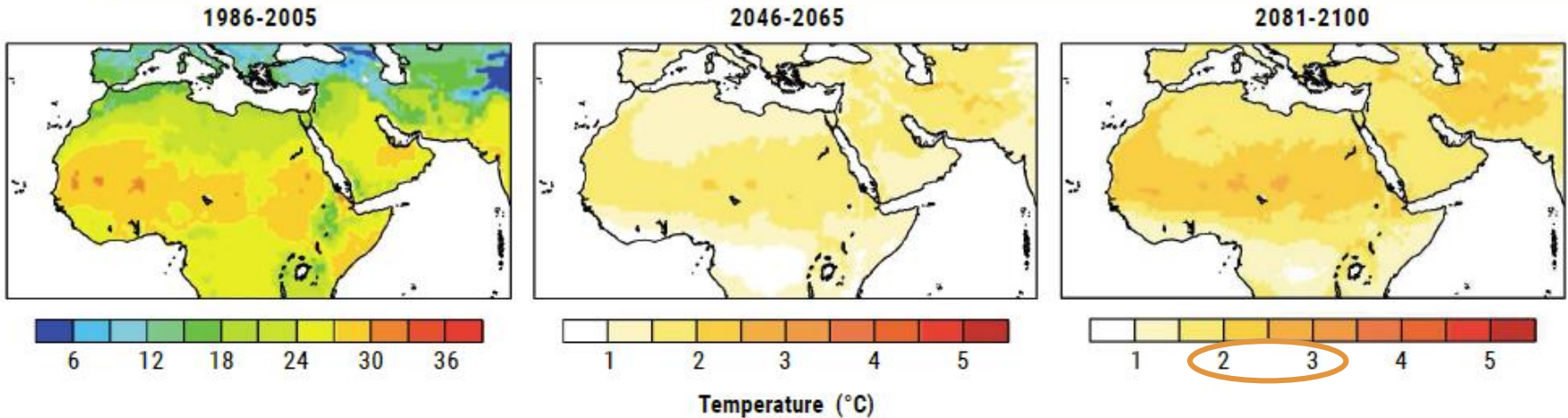
Regional Hydrological Model (RHM)



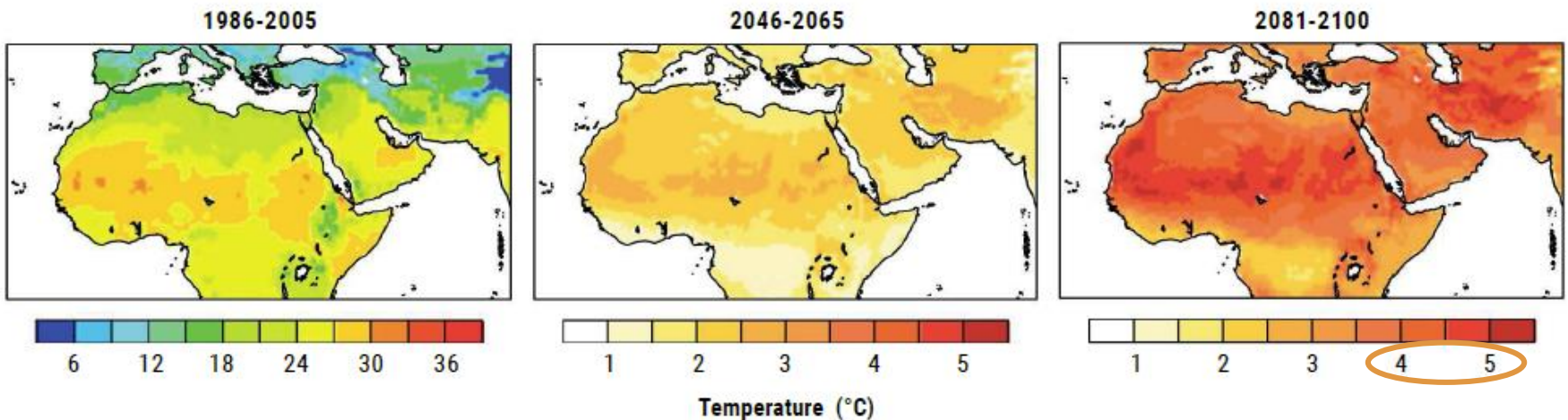
Extreme climate events

Temperature in the Arab region is increasing and is expected to continue to increase until the end of the century.

RCP 4.5

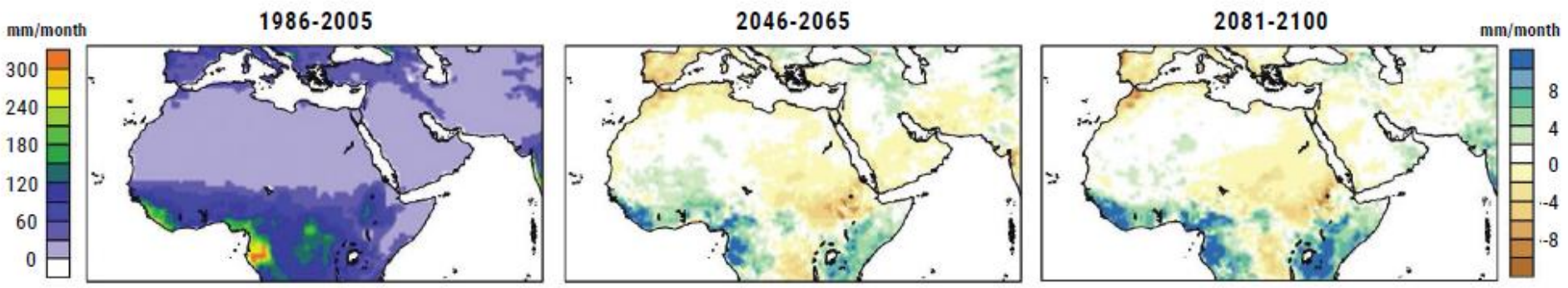


RCP 8.5

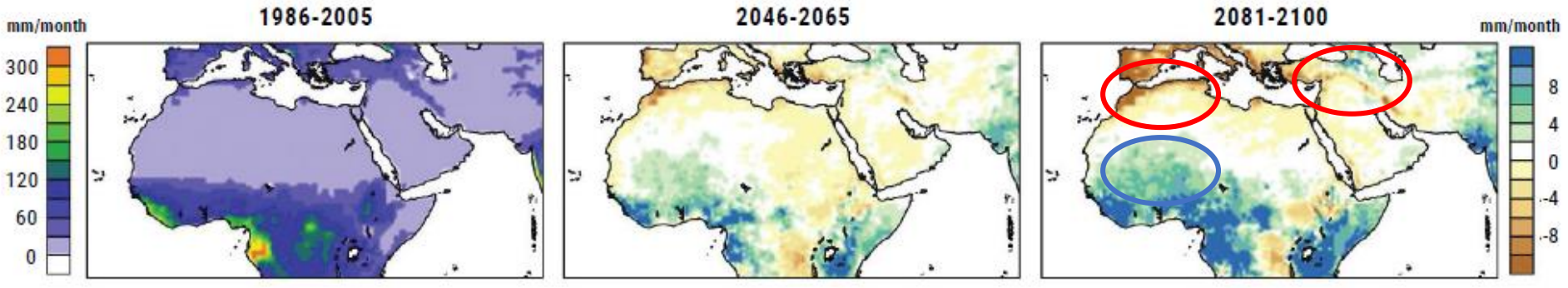


Precipitation trends are largely decreasing across the Arab region until the end of the century, though limited areas expected to exhibit an increase in the intensity and volume of precipitation.

RCP 4.5



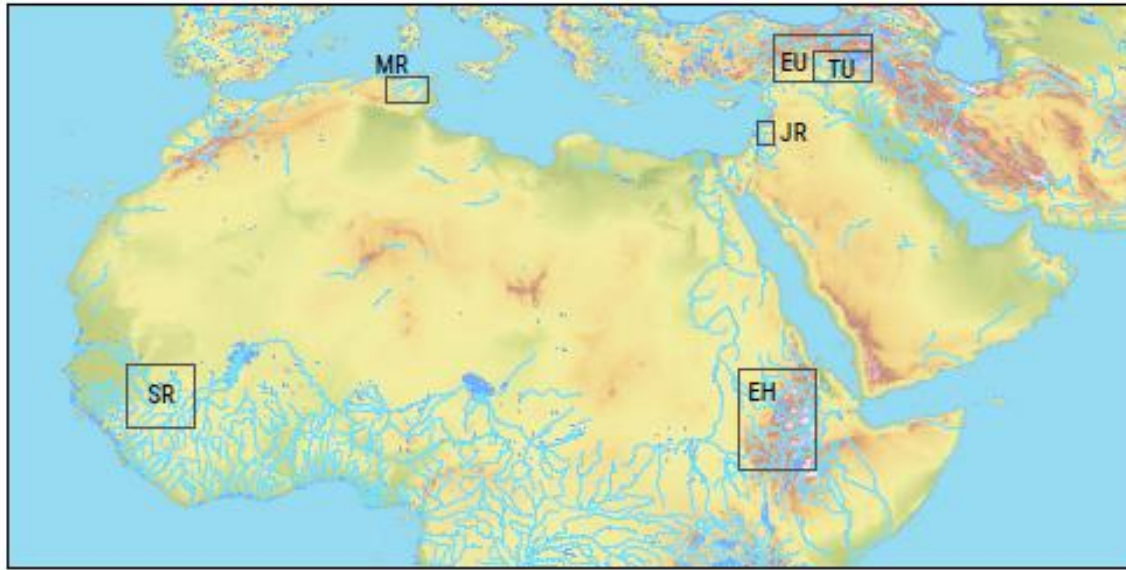
RCP 8.5



Extreme events indices

Extreme temperature indices		Extreme precipitation indices	
Index	Full name	Index	Full name
SU	Number of summer days	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

Climate impacts on Shared Water Resources



Identifier	Subdomain Name
EH	Ethiopian Highlands (Blue Nile Headwaters)
TU	Upper Tigris (Tigris River Headwaters)
EU	Upper Euphrates (Euphrates River Headwaters)
MR	Medjerda River
JR	Jordan River
SR	Senegal River Headwaters



FIGURE 160
Mean change in annual discharge over time for ensemble of three RCP 4.5 and RCP 8.5 projections using HYPE model

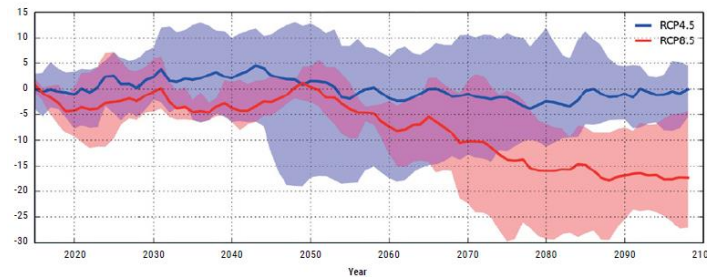
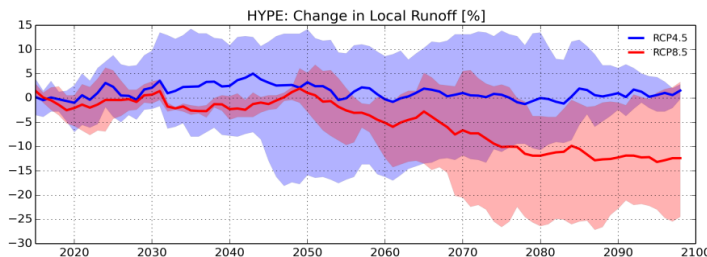
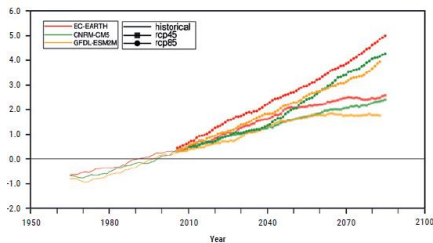


FIGURE 140
Mean change in annual temperature over time for ensemble of three RCP 4.5 and RCP 8.5 projections



Variable	RCP4.5	RCP8.5
Temp.	2.3°C	4.8°C
Precip.	3%	0%
Runoff	-2%	-12%



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Socio-Economic Vulnerability in the Arab Region

Integrated Vulnerability Assessment: Sectors and Subsectors

SECTORS

SUBSECTORS



Water

- Water availability



Biodiversity and Ecosystems

- Area covered by forests
- Area covered by wetlands



Agriculture

- Water available for crops
- Water available for livestock



Infrastructure and Human Settlements

- Inland flooding area



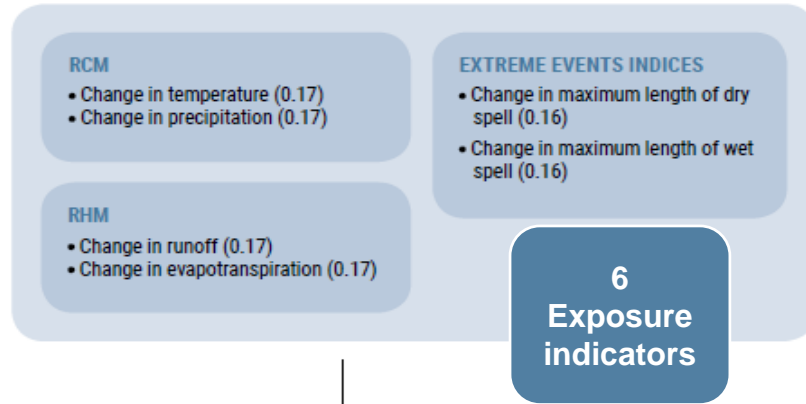
People

- Water available for drinking
- Health conditions due to heat stress
- Employment rate for the agricultural sector

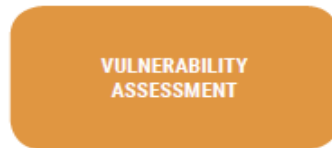
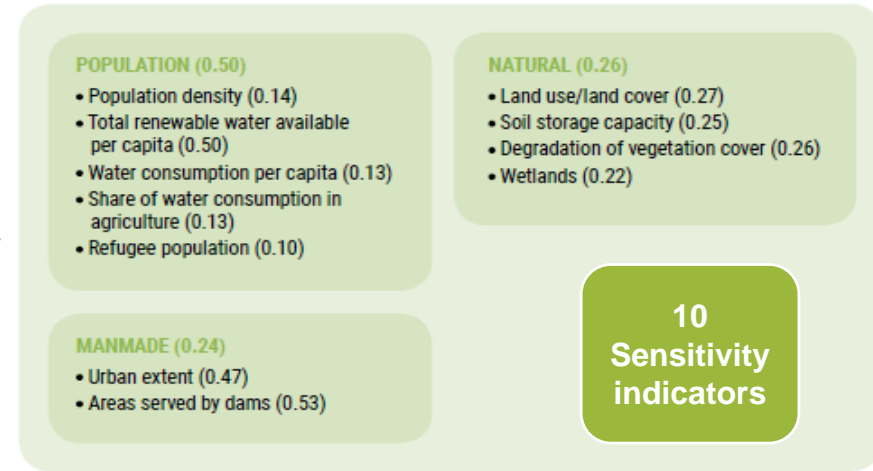
Vulnerability Assessment Impact Chain

Water Availability

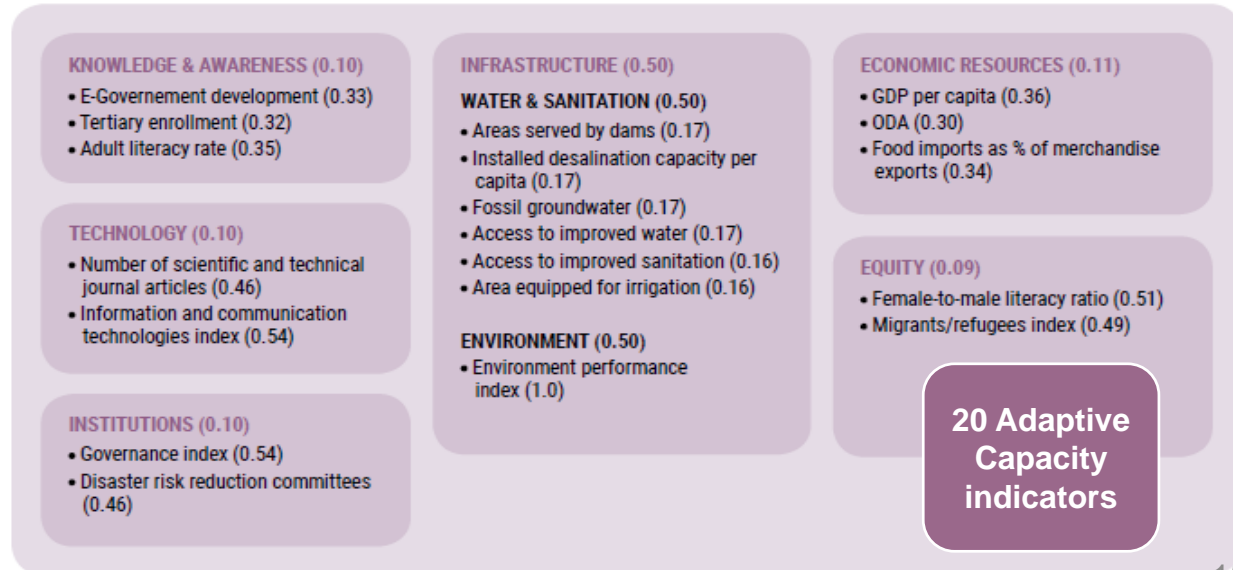
EXPOSURE (0.50)



SENSITIVITY (0.50)



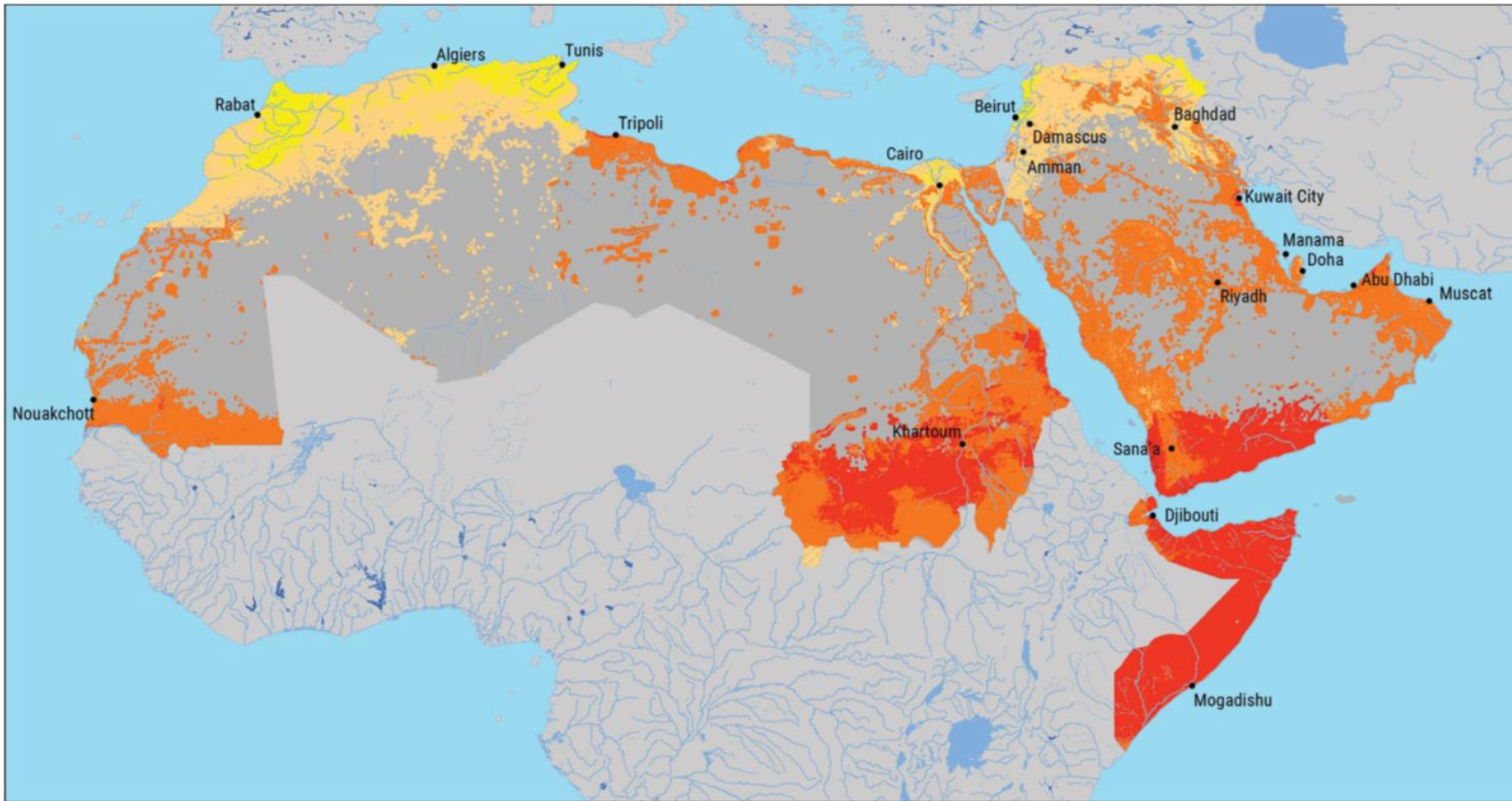
ADAPTIVE CAPACITY (0.50)





WATER AVAILABILITY VULNERABILITY

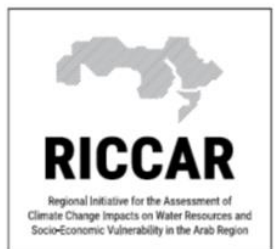
Reference Period
(1986-2005)



WATER: WATER AVAILABILITY
VULNERABILITY: REFERENCE PERIOD

Legend

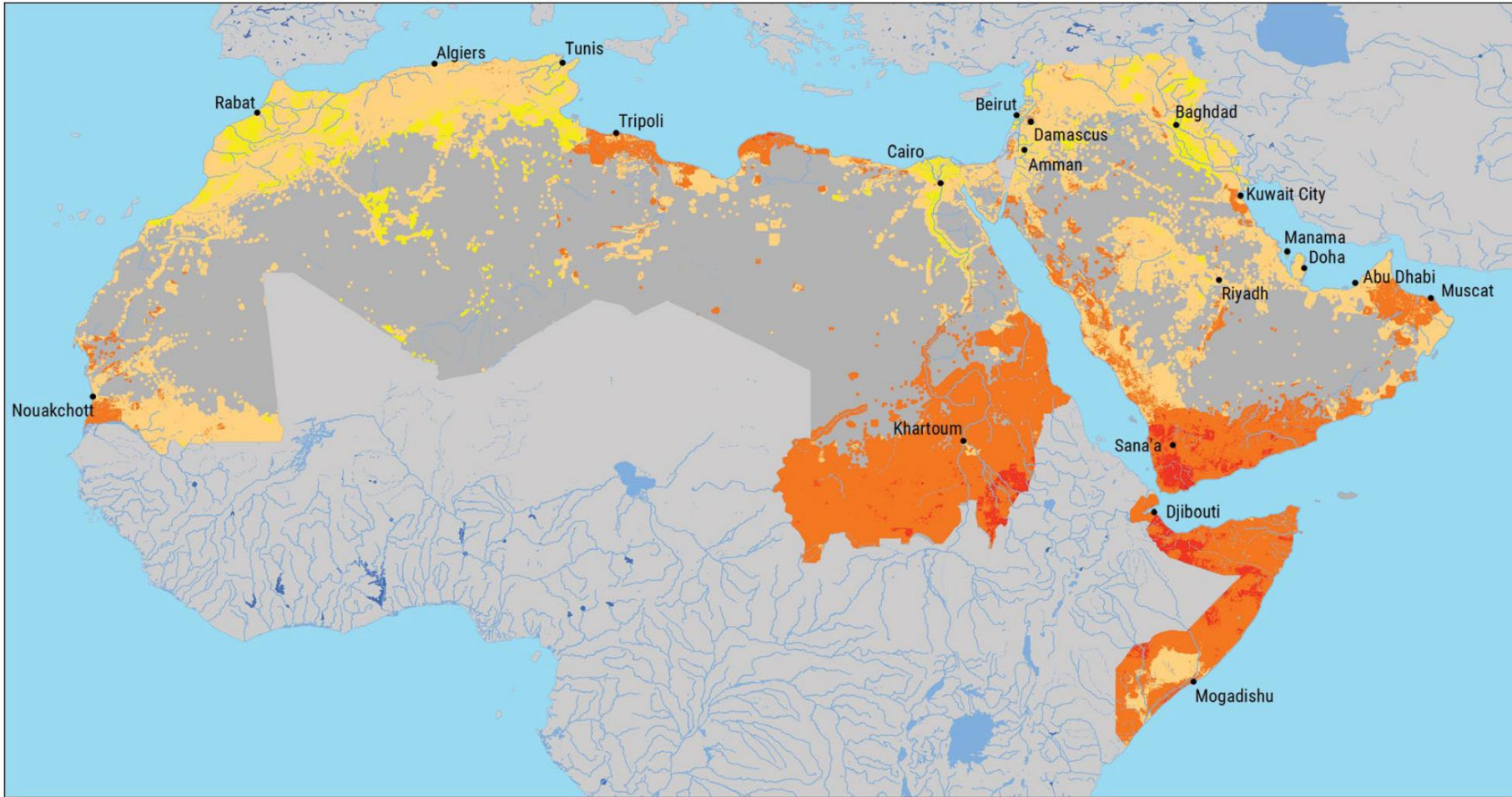
- Lakes
- Reservoirs
- Rivers
- Intermittent rivers
- Major cities
- Area not relevant to subsector





WATER AVAILABILITY VULNERABILITY

Mid-Century RCP 4.5



WATER: WATER AVAILABILITY

VULNERABILITY: RCP4.5 MID-CENTURY (2046-2065)

Legend



Lakes



Rivers



Major cities



Reservoirs



Intermittent rivers



Area not relevant to subsector



Low Vulnerability

High Vulnerability



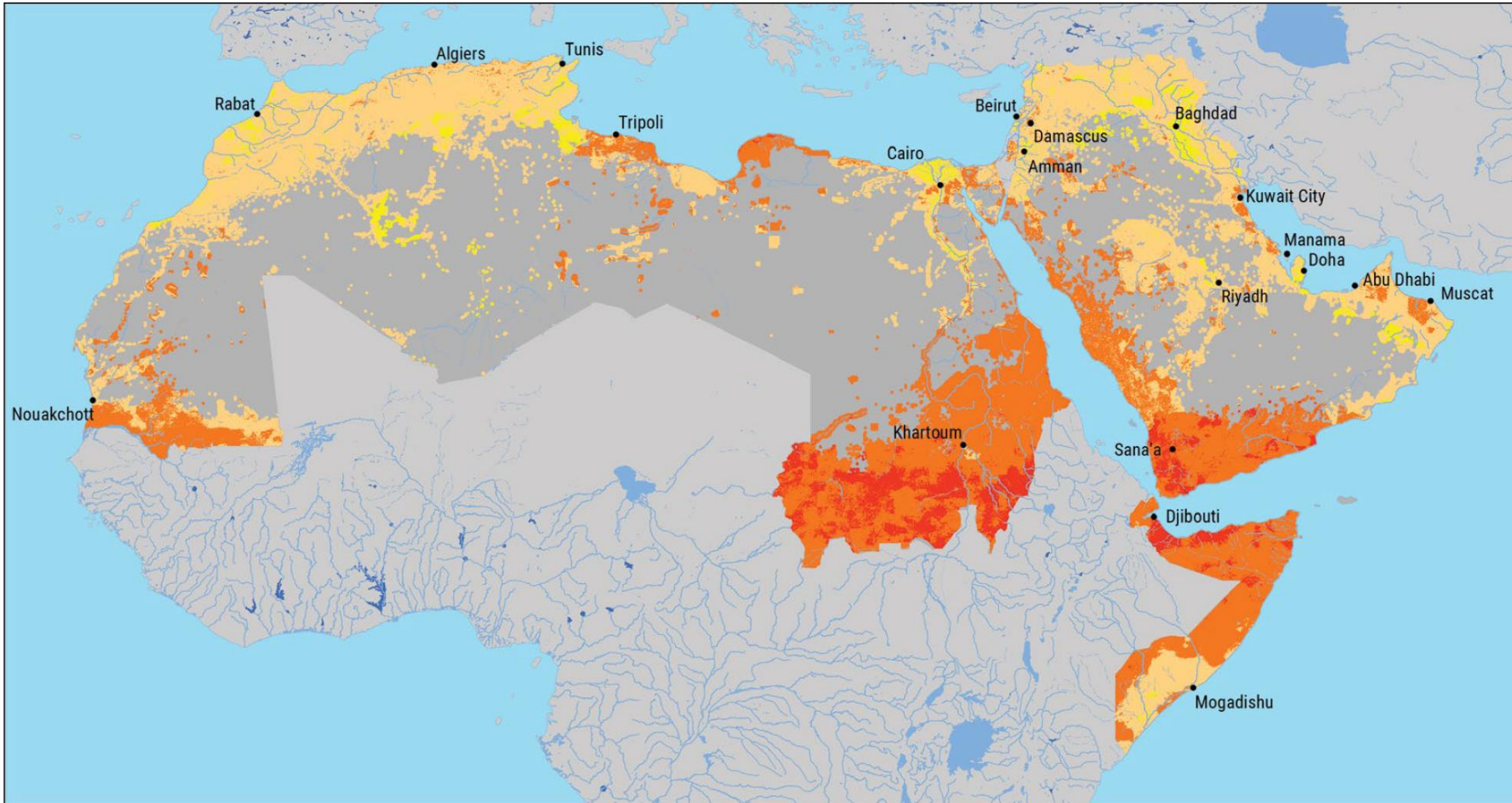
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Socio-Economic Vulnerability in the Arab Region



WATER AVAILABILITY VULNERABILITY

End-Century RCP 4.5

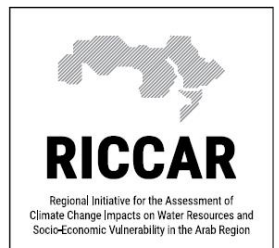


WATER: WATER AVAILABILITY

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

Legend

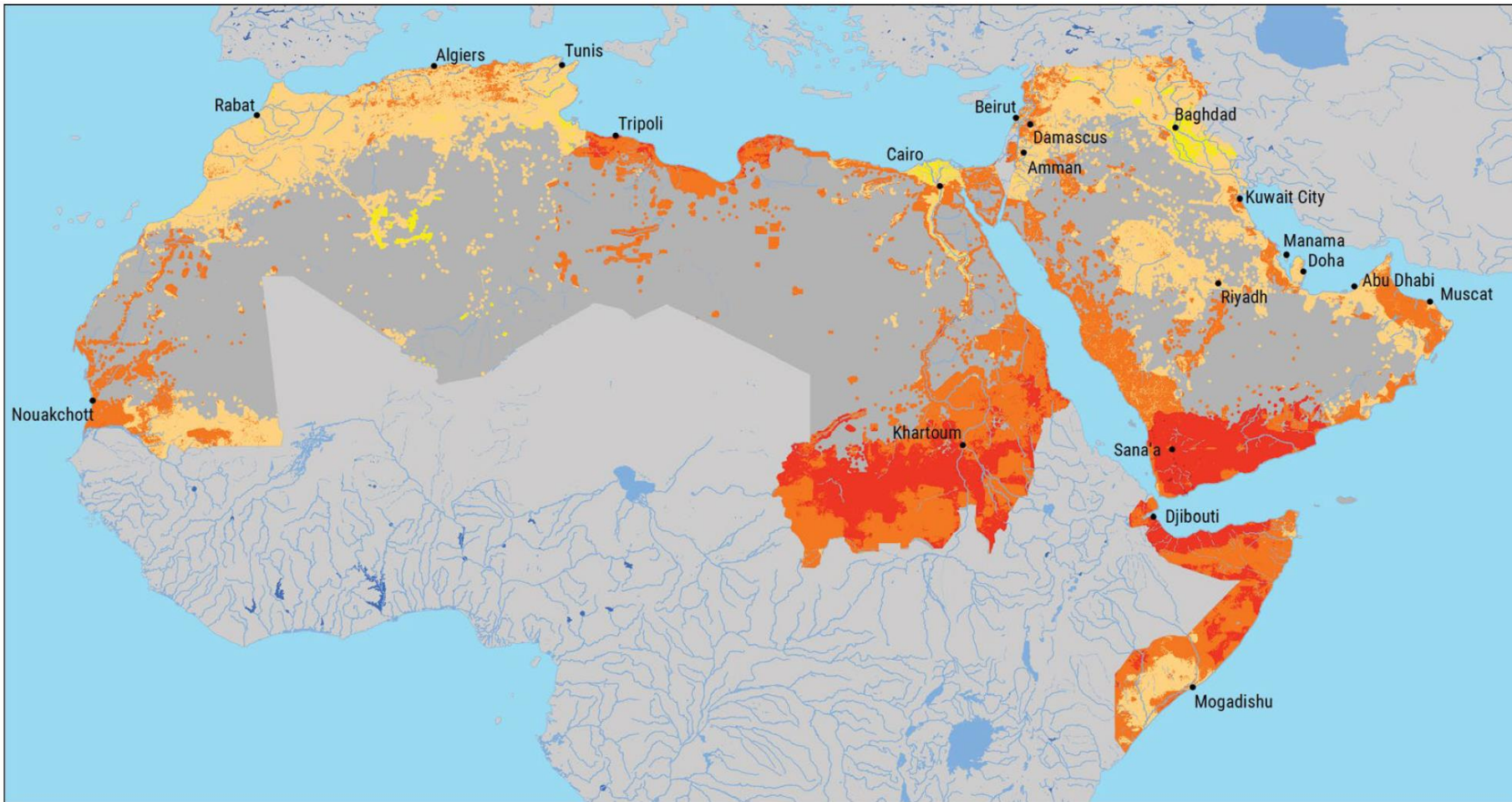
- Lakes
- Reservoirs
- Rivers
- Intermittent rivers
- Major cities
- Area not relevant to subsector





WATER AVAILABILITY VULNERABILITY

End-Century RCP 8.5



WATER: WATER AVAILABILITY

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

Legend



Lakes



Rivers



Intermittent rivers



Major cities



Area not relevant to subsector



Low Vulnerability

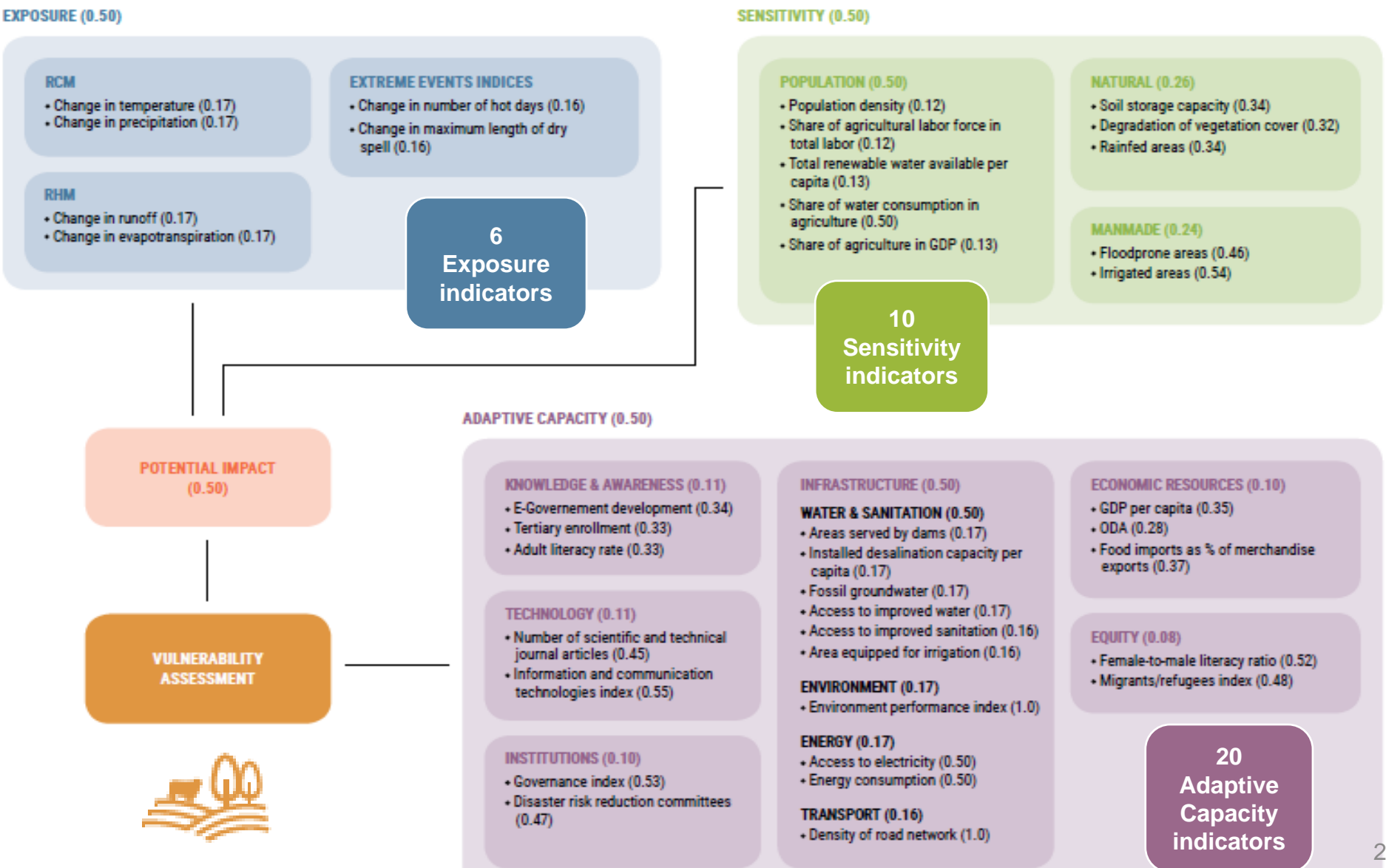
High Vulnerability



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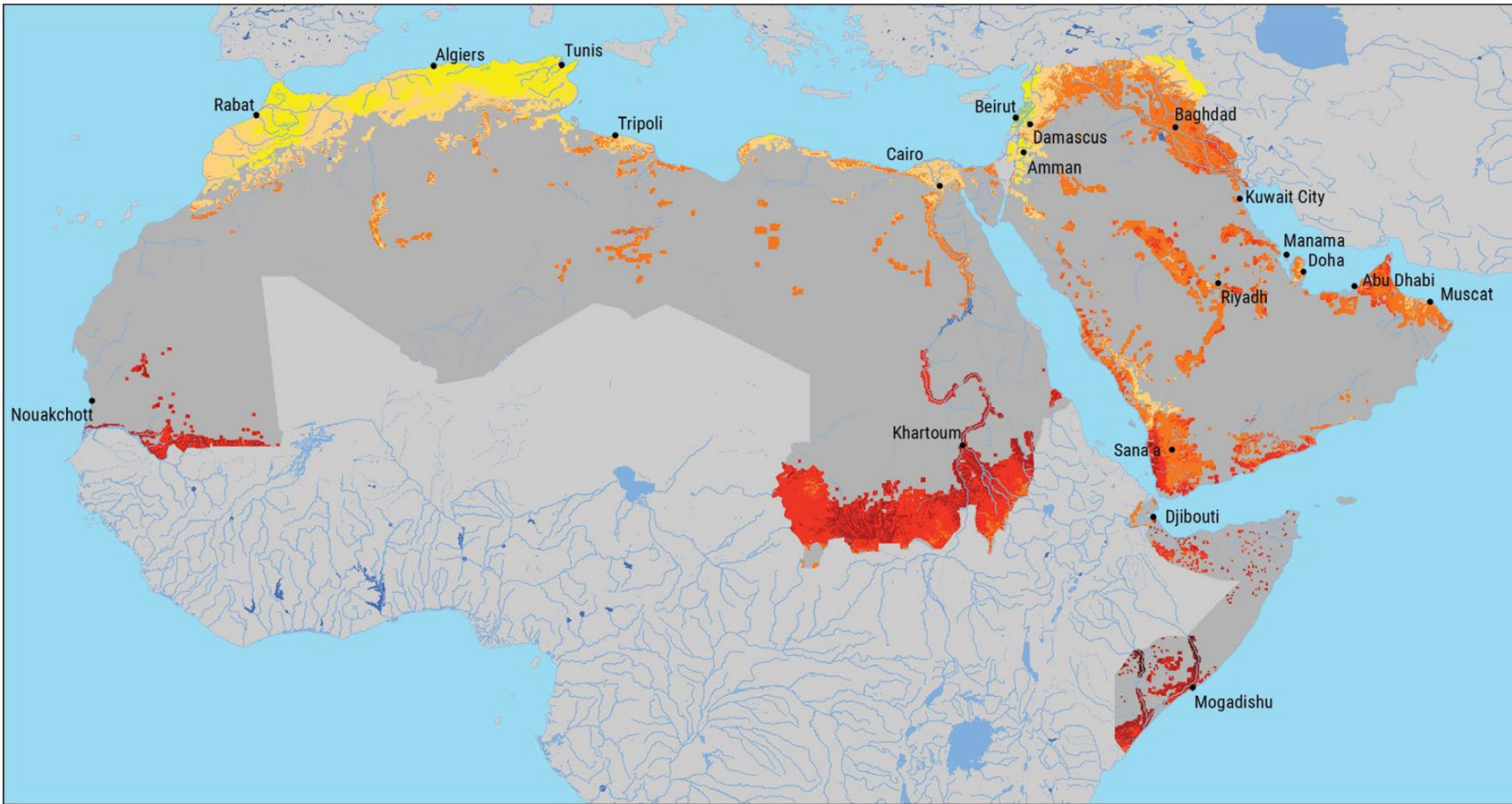
Vulnerability Assessment Impact Chain Agriculture: Crops





WATER AVAILABLE FOR CROPS VULNERABILITY

Reference

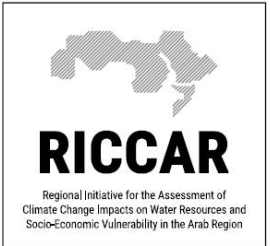


AGRICULTURE: WATER AVAILABLE FOR CROPS

VULNERABILITY: REFERENCE PERIOD

Legend

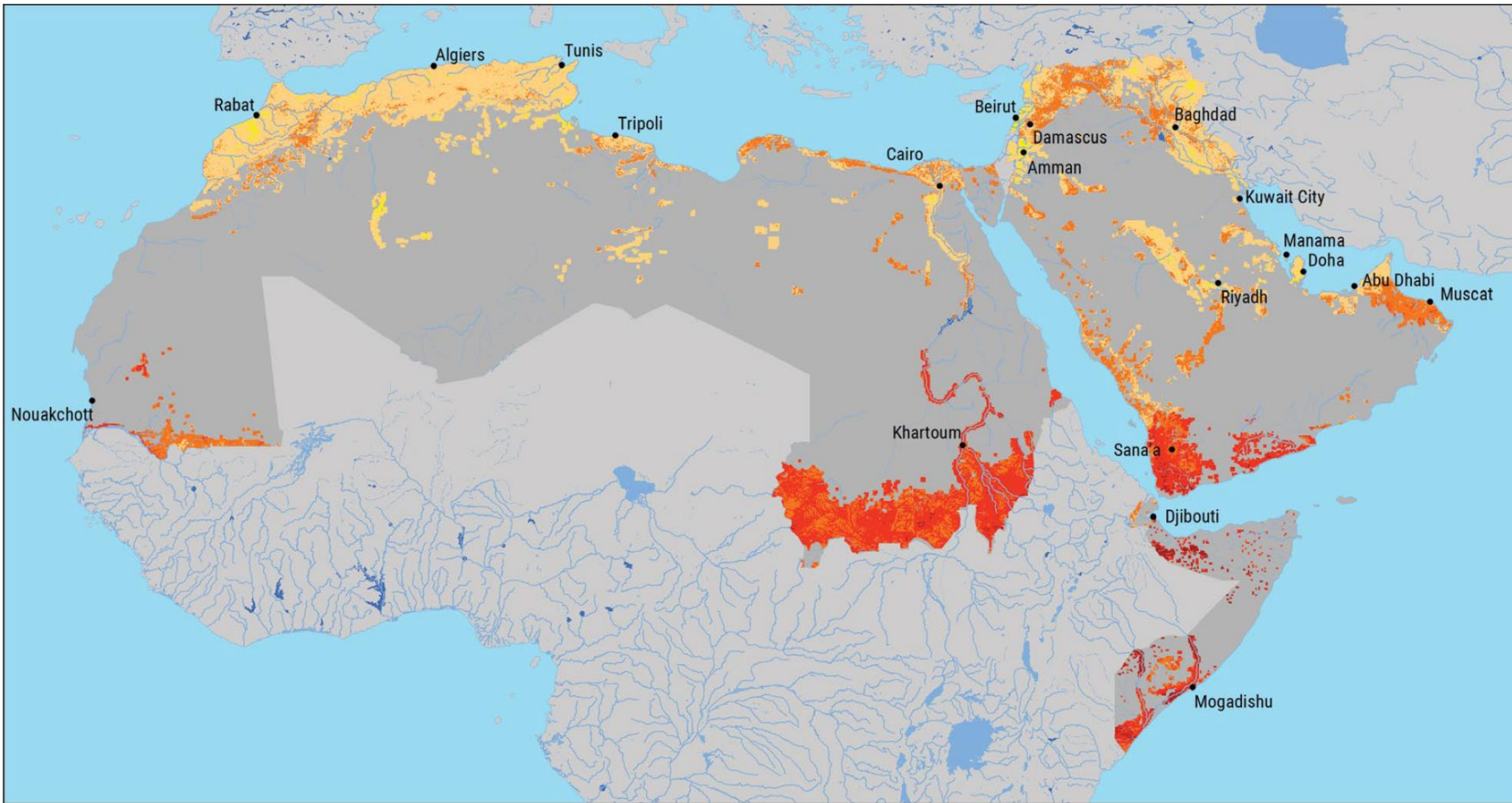
- Lakes
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- Major cities
- Area not relevant to subsector





WATER AVAILABLE FOR CROPS VULNERABILITY

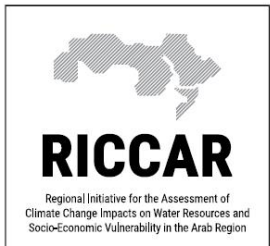
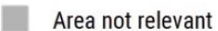
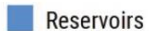
Mid-Century RCP 4.5



AGRICULTURE: WATER AVAILABLE FOR CROPS

VULNERABILITY: RCP4.5 MID-CENTURY (2046-2065)

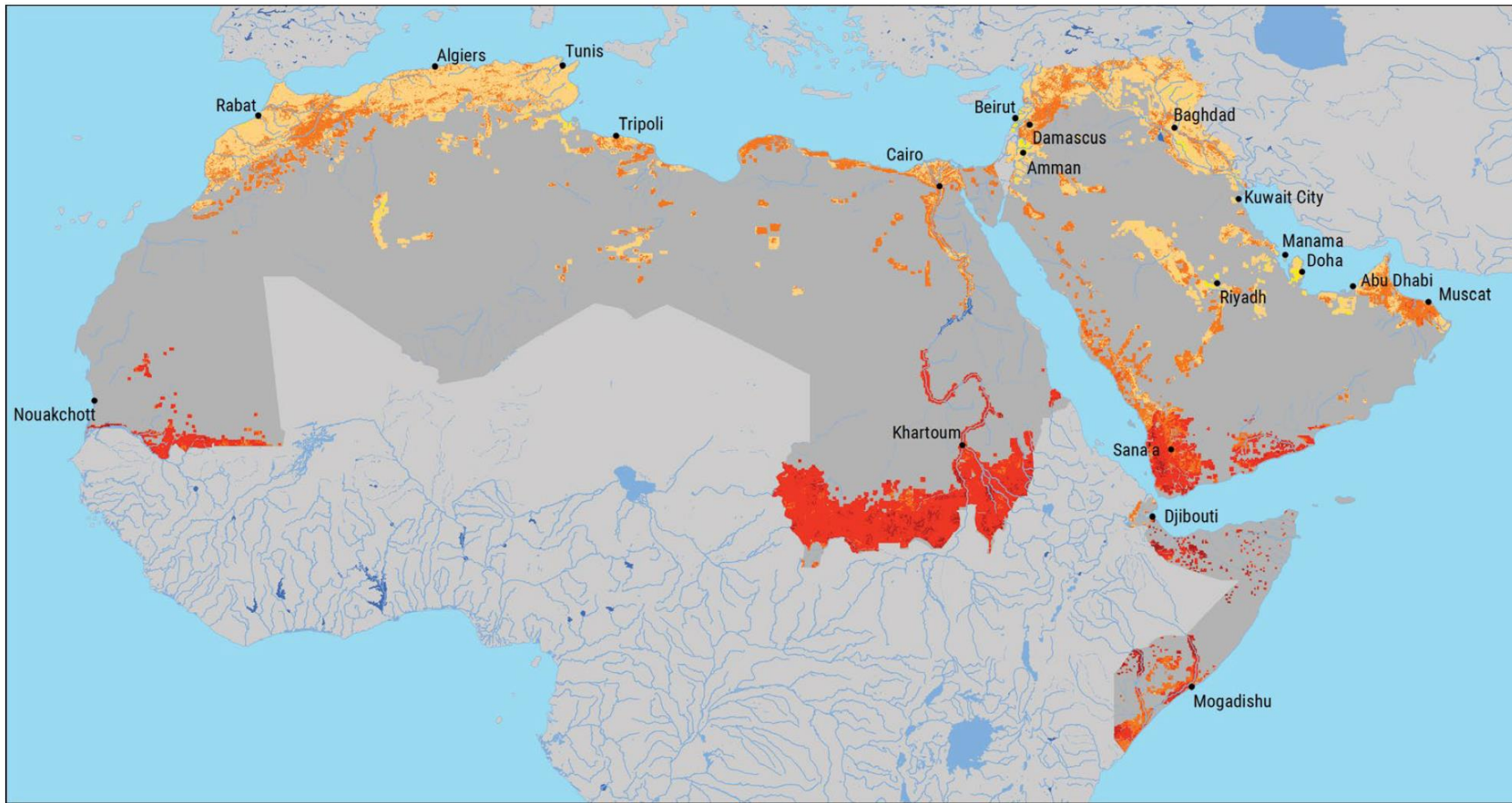
Legend





WATER AVAILABLE FOR CROPS VULNERABILITY

End-Century RCP 4.5



AGRICULTURE: WATER AVAILABLE FOR CROPS

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

Legend



Lakes



Rivers



Major cities



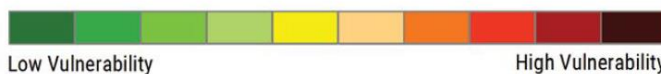
Reservoirs



Intermittent rivers



Area not relevant to subsector



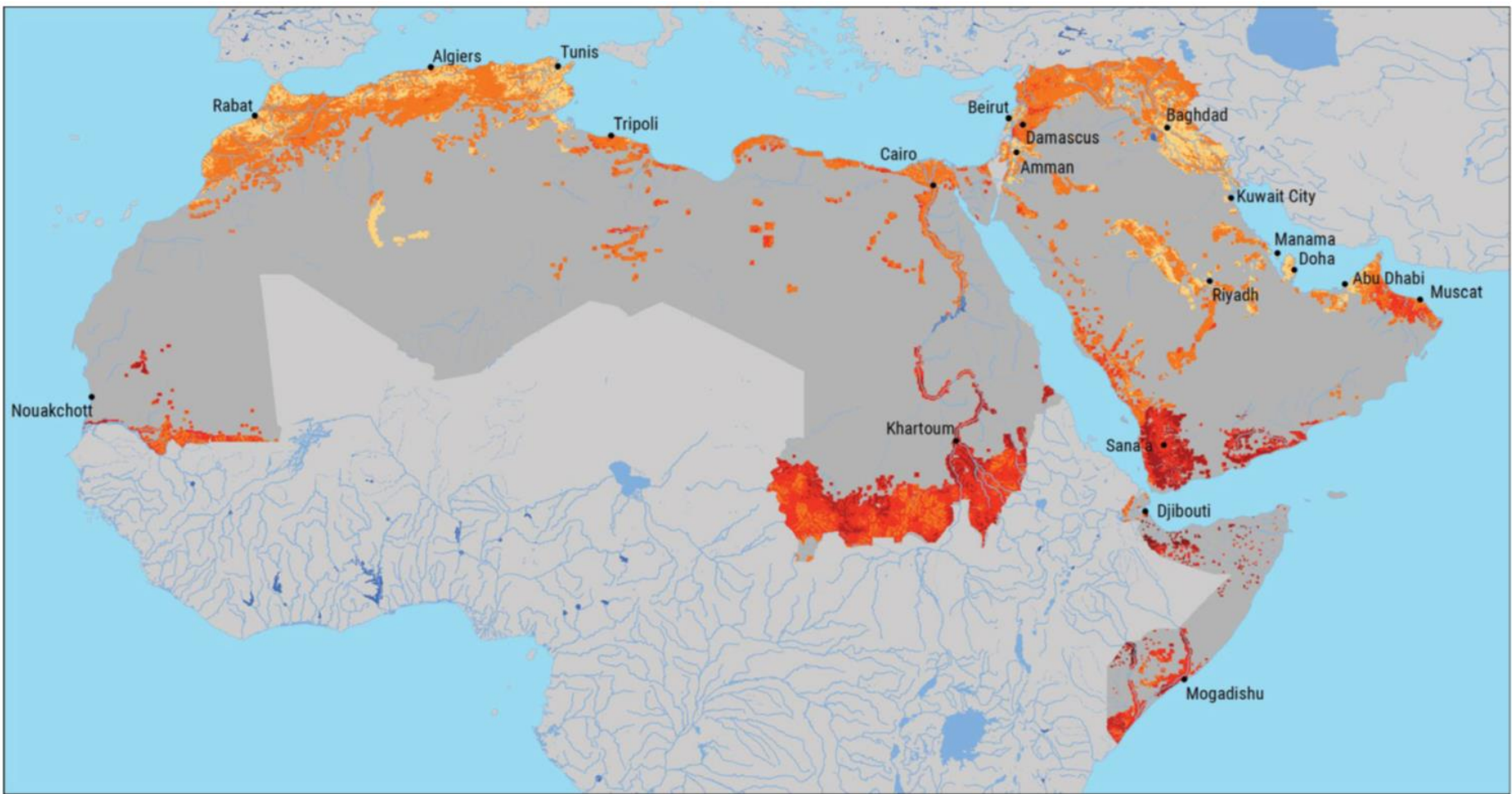
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WATER AVAILABLE FOR CROPS VULNERABILITY

End-Century RCP 8.5



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

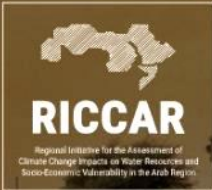
Legend

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



RICCAR findings used to inform:

- **Jordan – Ministry of Water and Irrigation:** Climate Change Policy for a Resilient Water Sector Policy issued as part of Jordan’s National Water Strategy issued in 2016.
- **Lebanon – Ministry of Environment:** Lebanon’s Third National Communication to the UNFCCC submitted in 2016.
- **Lebanon / Tunisia / Sudan – Ministries of Agriculture:** Using RICCAR data and integrated vulnerability assessment tools for assessing climate change impacts on water resources and agricultural sector.
- **State of Palestine – Environment Quality Authority:** State of Palestine Initial National Communication Report to the UNFCCC submitted in 2016.
- **Basin-level analyses:** The Collaborative Programme on the Euphrates and Tigris builds on RICCAR’s regional climate modelling and hydrological modelling outputs to support more detailed analyses at the basin level.
- **Egypt (MWRI), Kuwait (KISR), Morocco (groundwater):** Using RICCAR modelling outputs to inform national/sub-national studies.



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REGIONAL INITIATIVE FOR THE ASSESSMENT OF CLIMATE CHANGE IMPACTS ON WATER RESOURCES AND SOCIO-ECONOMIC VULNERABILITY IN THE ARAB REGION



Overview



Partners



Meetings & Events



Data Portal

REGIONAL KNOWLEDGE NODES



Adaptation



ArabCOF



Water



Climate
Negotiations



Agriculture



Disaster Risk
Reduction

CLIMATE

LEGEND

TAS - Change in Annual Temperature (R)

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

More options



ANALYSIS



LOCATE



LAYERS



CATALOG

1000 km



Thank You

chouchanicherfane@un.org

www.riccar.org

www.unescwa.org

www.unescwa.org/our-work/climate-change