

Vulnerability to climate change in the key sectors Arab region



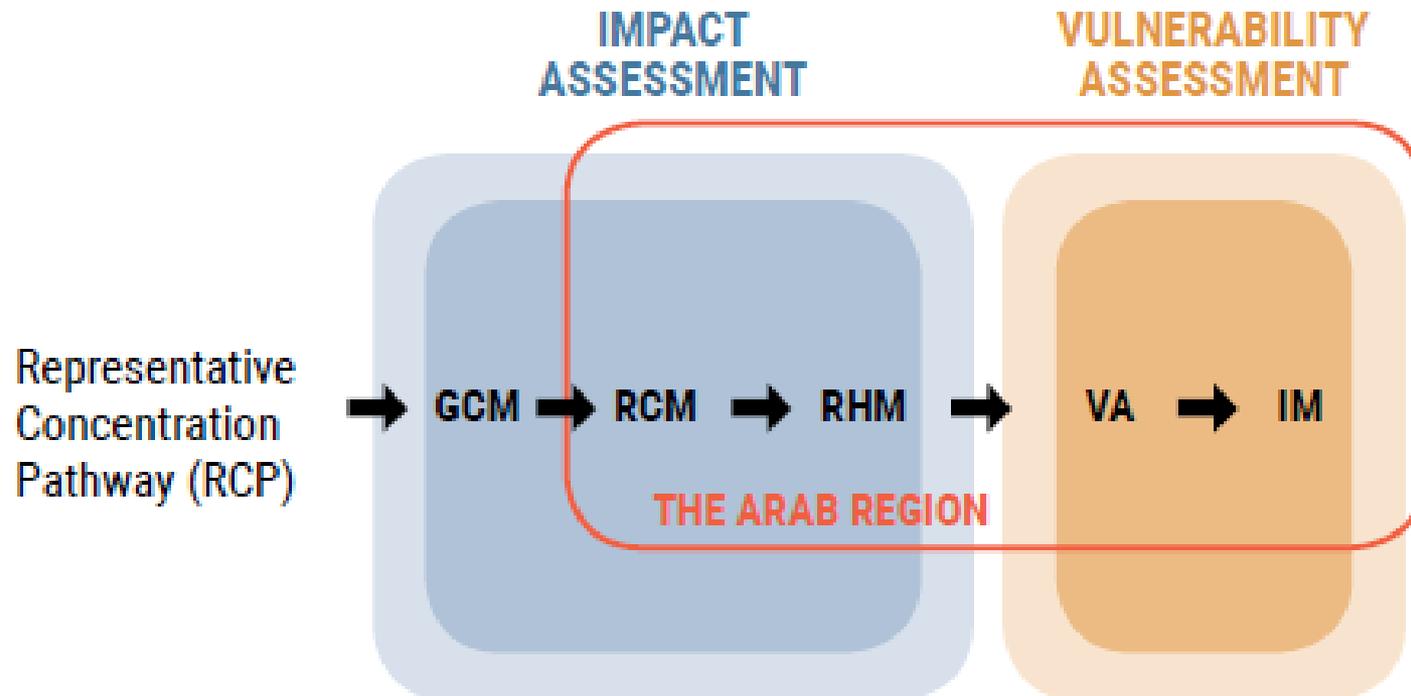
Ihab Jnad

The Arab Center for the
Studies of
Arid Zones and Dry Lands
(ACSAD)

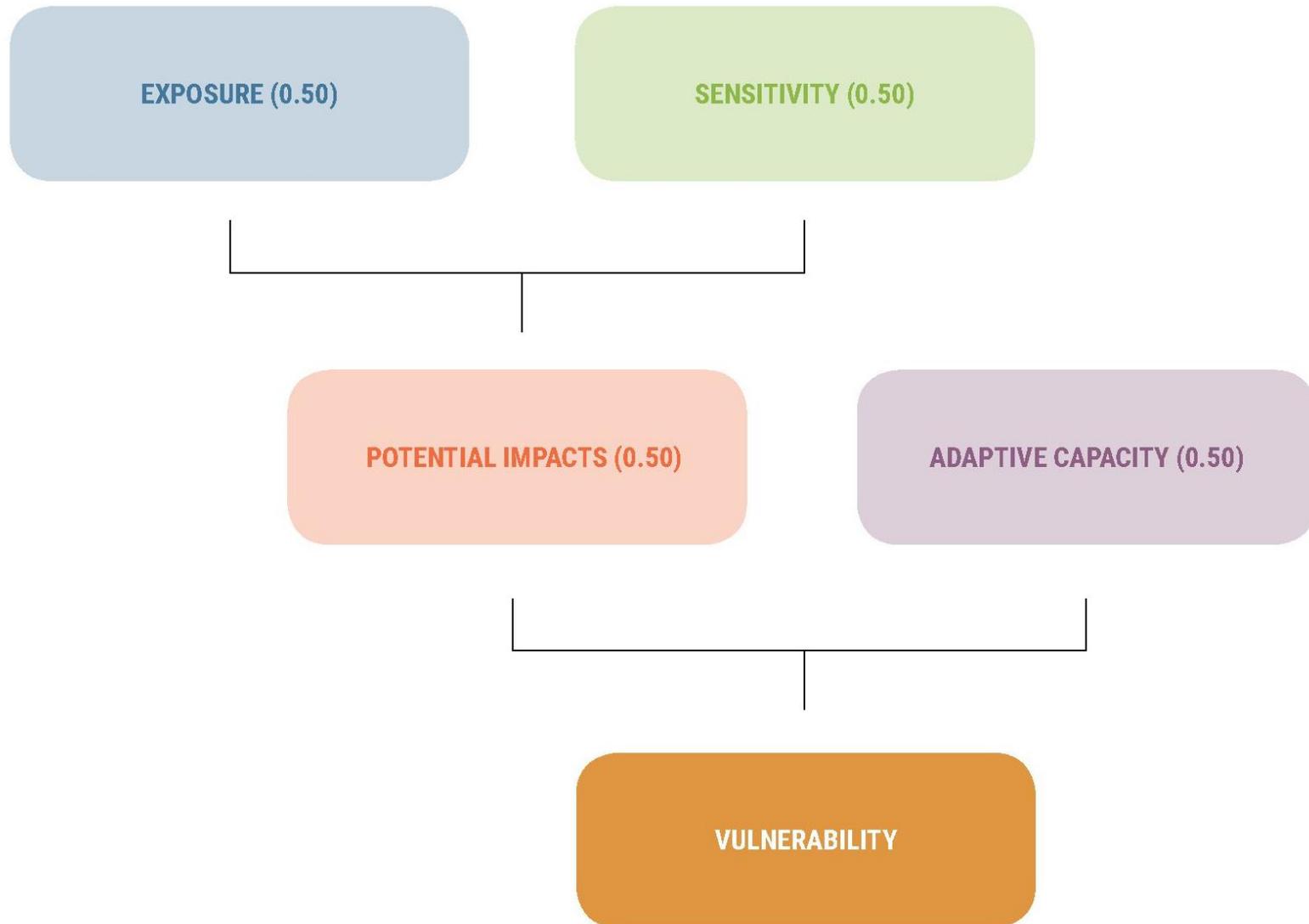
إيهاب جناد

مدير إدارة المياه
المركز العربي لدراسات المناطق الجافة و الأراضي القاحلة
(أكساد)

The integrated Assessment model



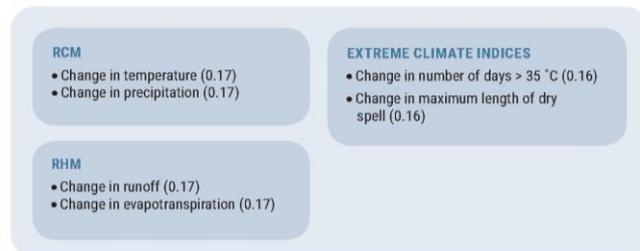
Components of vulnerability



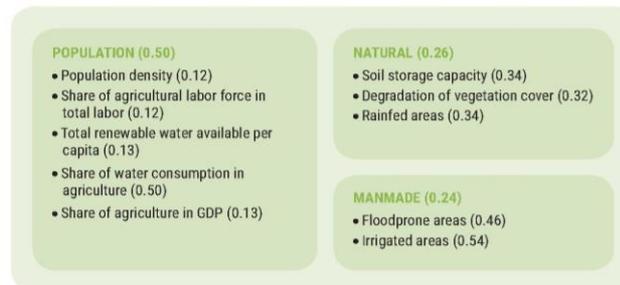
	SECTORS	SUBSECTORS
	Water	Water availability
	Biodiversity and Ecosystems	Area covered by forests Area covered by wetlands
	Agriculture	Water available for crops Water available for livestock
	Infrastructure and Human Settlements	Inland flooding area
	People	Water available for drinking Health conditions due to heat stress Employment rate for the agricultural sector

Impact chain

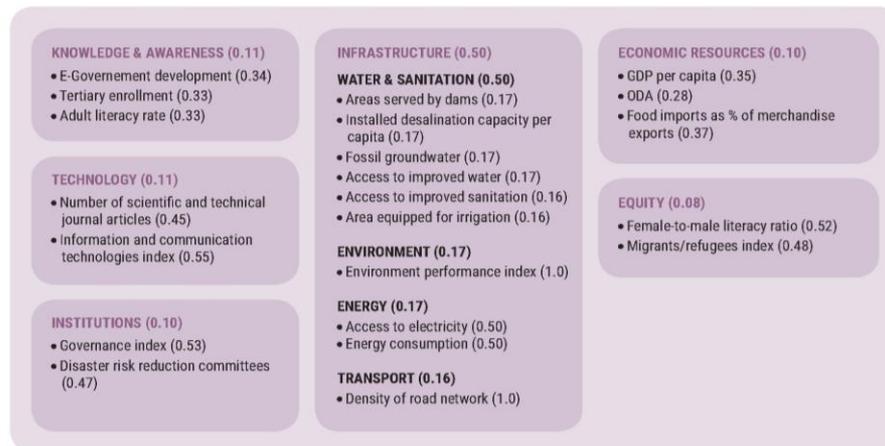
EXPOSURE (0.50)

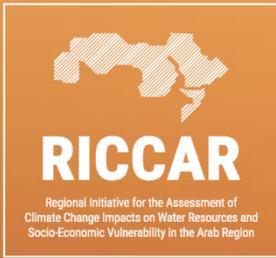


SENSITIVITY (0.50)



ADAPTIVE CAPACITY (0.50)





Vulnerability of Water Availability to climate change

The water availability Study area

- The water availability study area represents 49% of the Arab Region and is defined by selected indicators and water users, as reflected by the areas drawing upon fresh water resources:
 - Populated areas (greater than 2 inhabitants per sq km)
 - Irrigated cropland areas
 - Rainfed cropland areas
 - Livestock areas (greater than 10 heads per sq km)
 - Forested areas
 - Wetland areas





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Climate Change Impact
Socio-Economic Vulnerability

Impact chain of water sector

CHANGE IN THE WATER AVAILABLE FOR CROPS - IMPACT CHAIN

6
Exposure indicators

EXPOSURE (0.50)

RCM

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

EXTREME CLIMATE INDICES

- Change in number of days > 35 °C (0.16)
- Change in maximum length of dry spell (0.16)

RHM

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

SENSITIVITY (0.50)

POPULATION (0.50)

- Population density (0.12)
- Share of agricultural labor force in total labor (0.12)
- Total renewable water available per capita (0.13)
- Share of water consumption in agriculture (0.50)
- Share of agriculture in GDP (0.13)

NATURAL (0.26)

- Soil storage capacity (0.34)
- Degradation of vegetation cover (0.32)
- Rainfed areas (0.34)

MANMADE (0.24)

- Floodprone areas (0.46)
- Irrigated areas (0.54)

10
Sensitivity indicators

POTENTIAL IMPACT
(0.50)

VULNERABILITY ASSESSMENT

ADAPTIVE CAPACITY (0.50)

KNOWLEDGE & AWARENESS (0.11)

- E-Government development (0.34)
- Tertiary enrollment (0.33)
- Adult literacy rate (0.33)

TECHNOLOGY (0.11)

- Number of scientific and technical journal articles (0.45)
- Information and communication technologies index (0.55)

INSTITUTIONS (0.10)

- Governance index (0.53)
- Disaster risk reduction committees (0.47)

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 (0.17)

- Environment performance index (1.0)

ENERGY (0.17)

- Access to electricity (0.50)
- Energy consumption (0.50)

TRANSPORT (0.16)

- Density of road network (1.0)

ECONOMIC RESOURCES (0.10)

- GDP per capita (0.35)
- ODA (0.28)
- Food imports as % of merchandise exports (0.37)

EQUITY (0.08)

- Female-to-male literacy ratio (0.52)
- Migrants/refugees index (0.48)

20
Adaptive Capacity indicators



Exposure indicators

8 indicators

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- Change in precipitation (0.17)

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Adaptive capacity indicators

22 indicators

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

Exposure

RCM

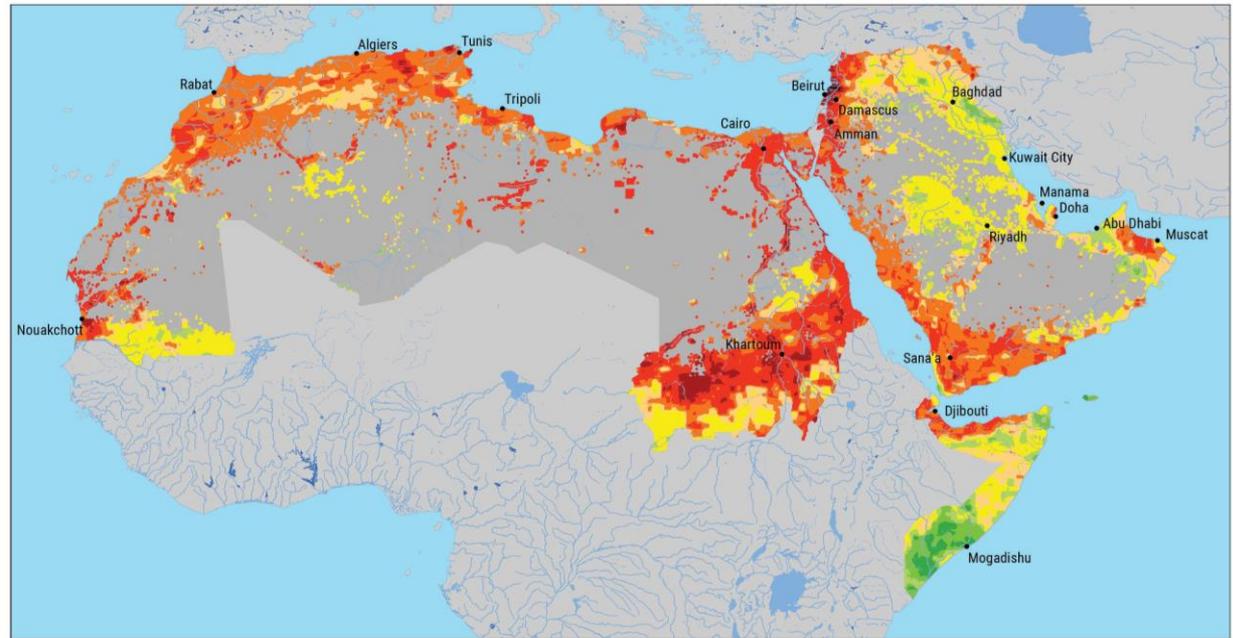
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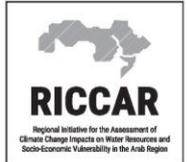


WATER: WATER AVAILABILITY

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

Legend

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



Scenario	Percentage of study area		
	Low EX	Moderate EX	High EX
RCP 4.5 Mid-century	5%	88%	7%
RCP 8.5 Mid-century	2%	64%	33%
RCP 4.5 End-century	5%	68%	27%
RCP 8.5 End-century	3%	39%	58%



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Sensitivity

SENSITIVITY (0.50)

POPULATION (0.50)

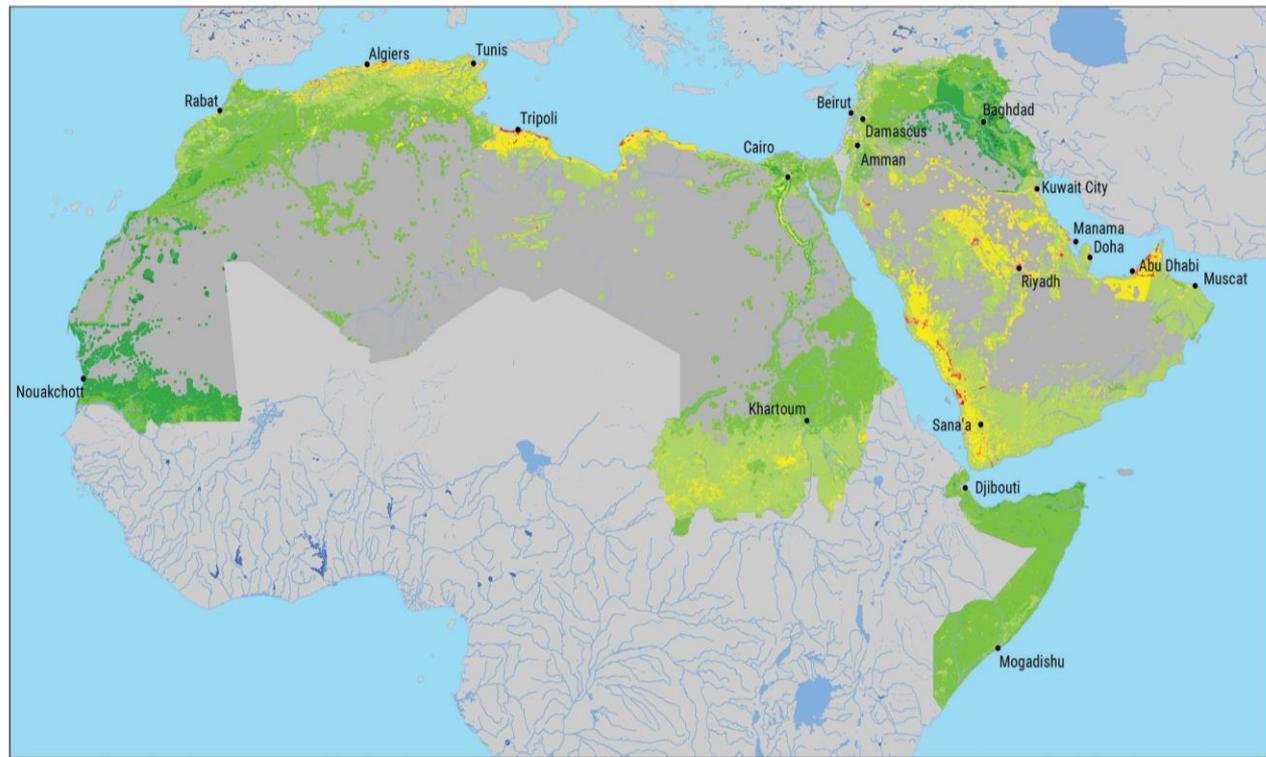
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WATER: WATER AVAILABILITY

SENSITIVITY

Legend

Lakes

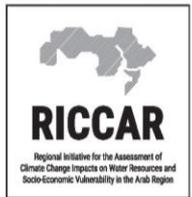
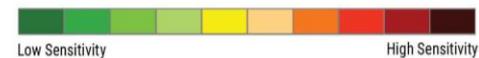
Reservoirs

Rivers

Intermittent rivers

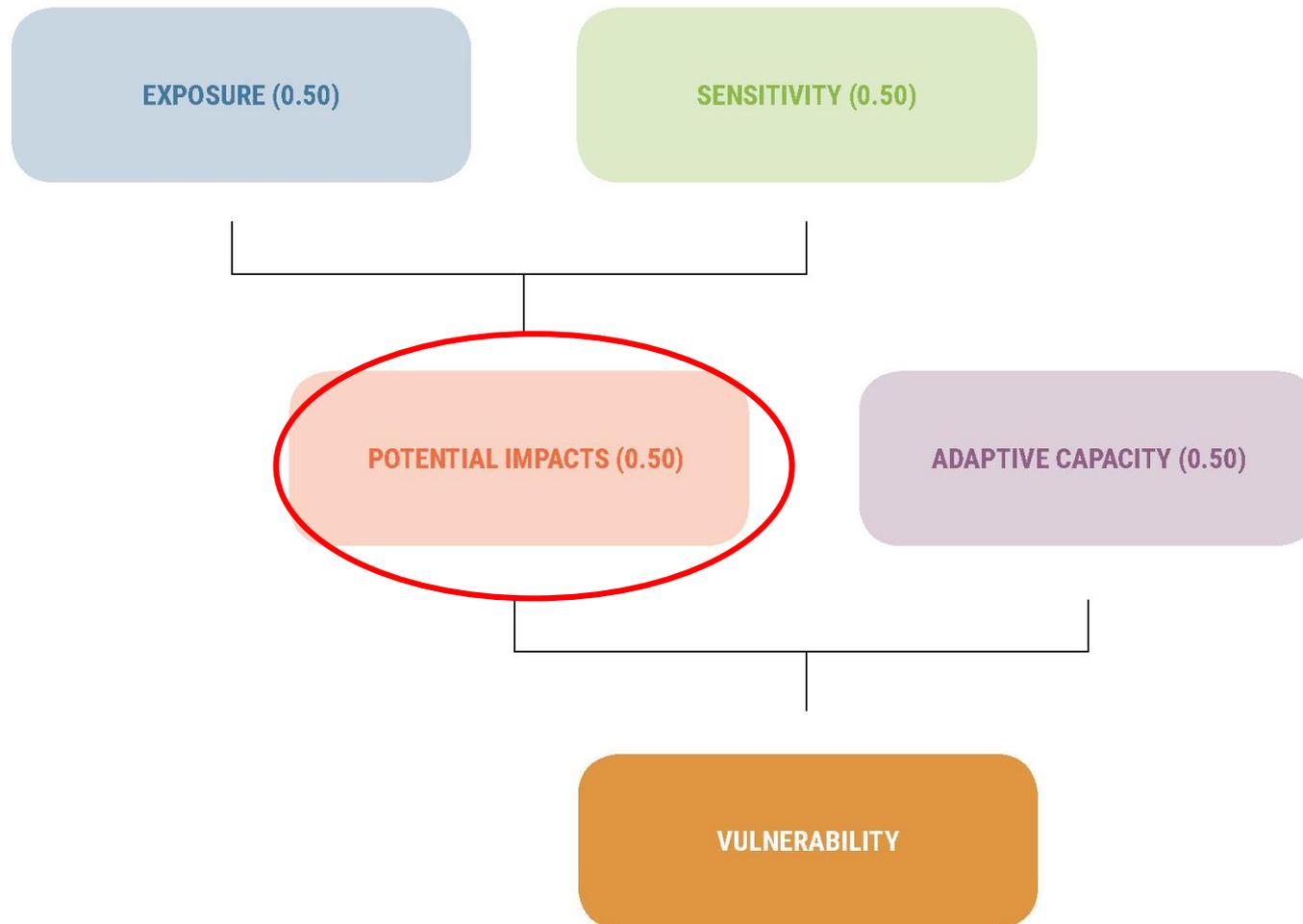
Major cities

Area not relevant to subsector



Scenario	Percentage of study area		
	Low SE	Moderate SE	High SE
All climate scenarios	43%	52%	4%

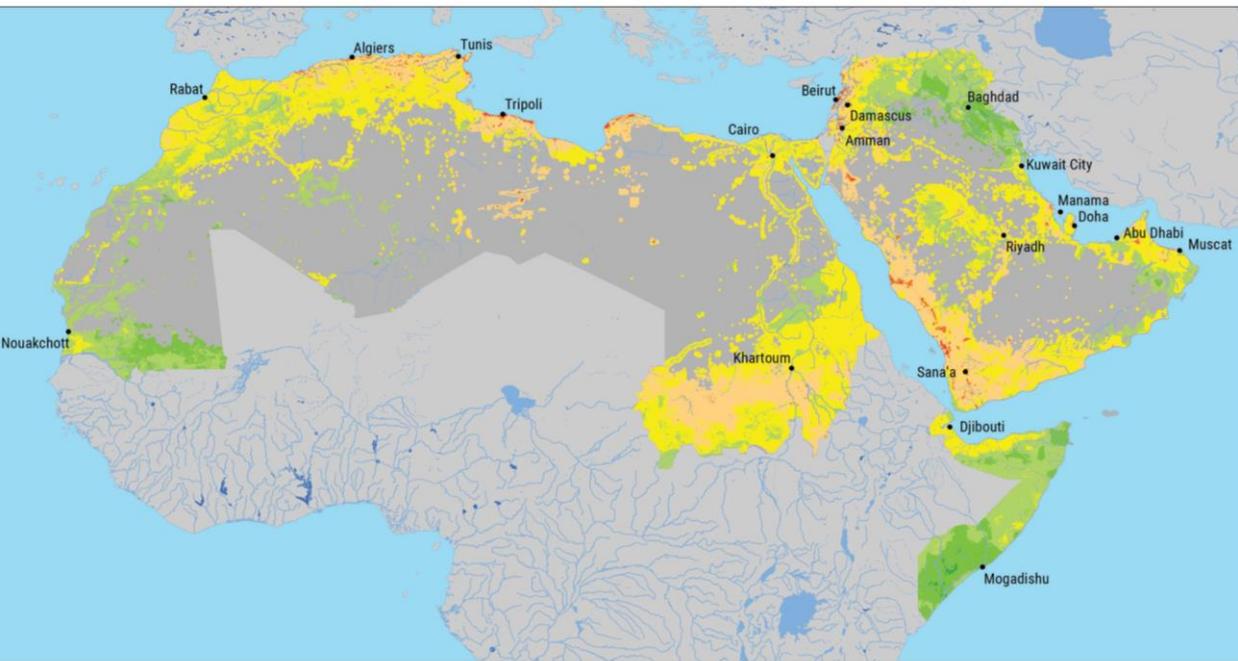
Components of vulnerability



potential impact

Areas with highest potential impact:

- the Asir Mountains,
- the Green Mountains, and
- the eastern Jafara Plain Basin.
- **Areas with lowest potential impact**
- the southern Horn of Africa, the central Tigris-Euphrates Basin



WATER: WATER AVAILABILITY

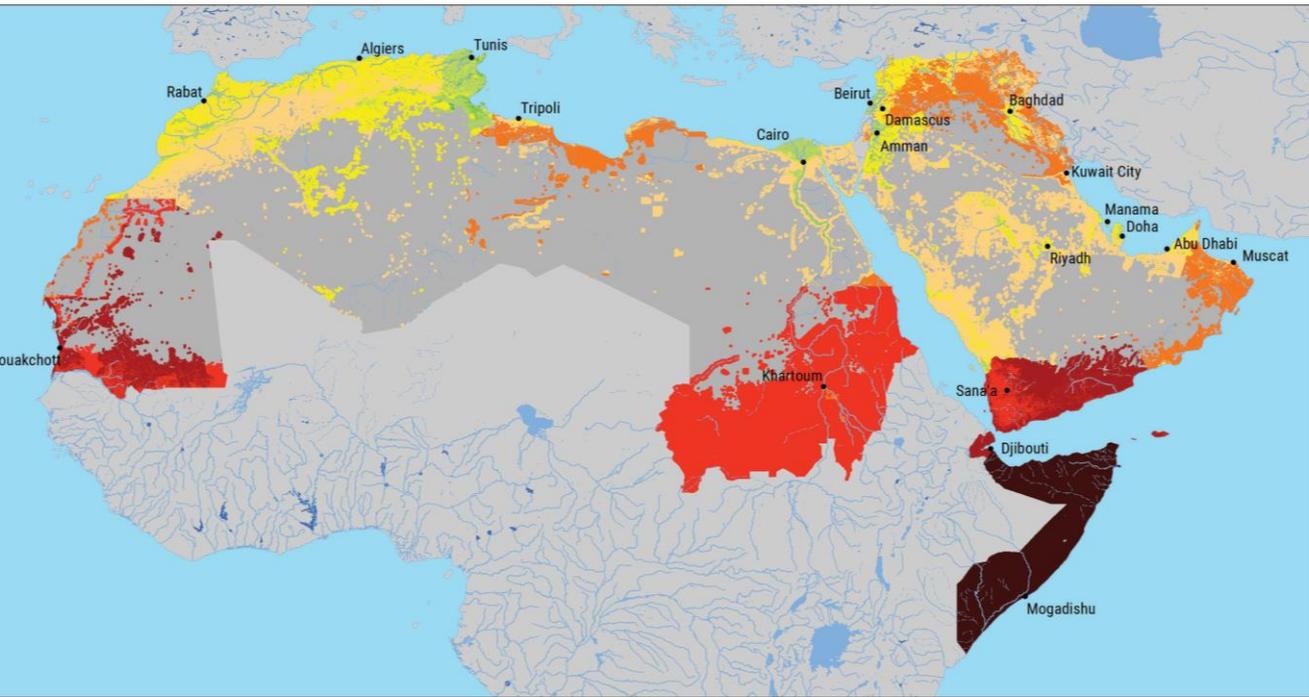
POTENTIAL IMPACT: RCP8.5 END-CENTURY (2081-2100)

Legend



Scenario	Percentage of study area		
	Low PI	Moderate PI	High PI
RCP 4.5 Mid-century	12%	88%	0%
RCP 8.5 Mid-century	6%	93%	1%
RCP 4.5 End-century	10%	90%	0%
RCP 8.5 End-century	7%	91%	2%

Adaptive capacity

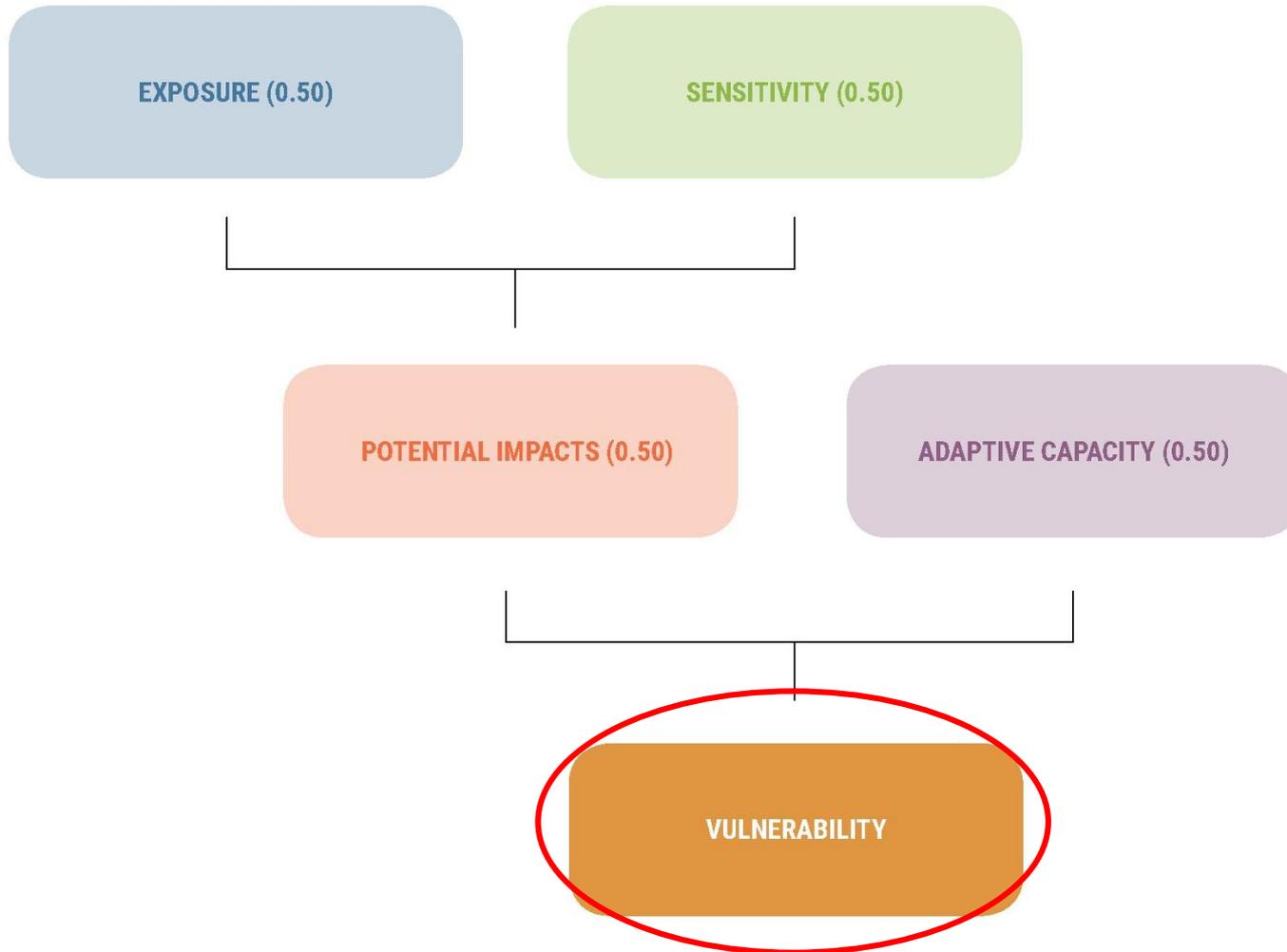


WATER: WATER AVAILABILITY
ADAPTIVE CAPACITY

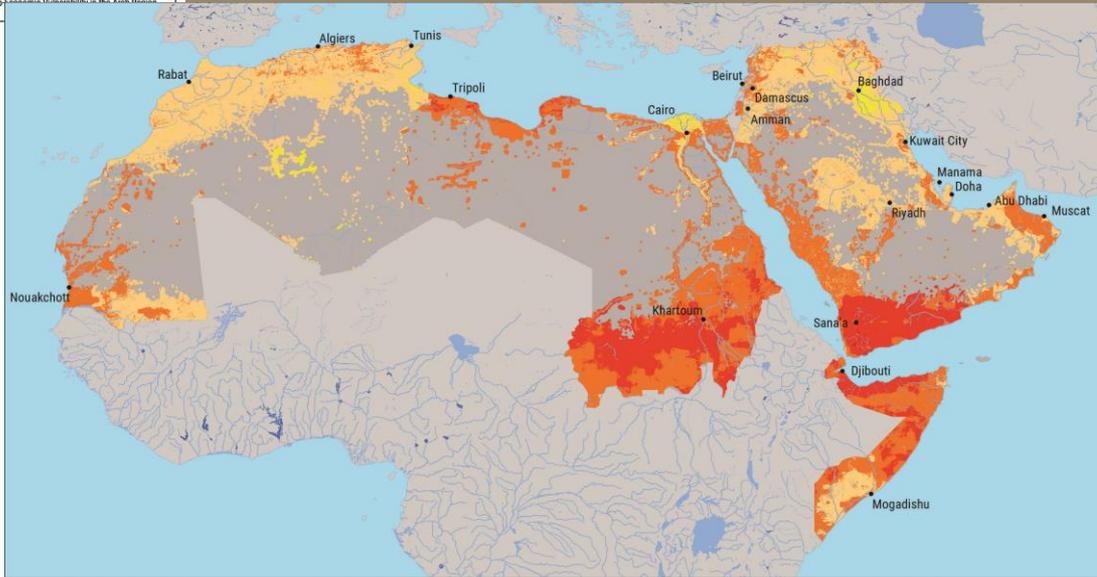


Scenario	Percentage of study area		
	Low AC	Moderate AC	High AC
All climate scenarios	43%	52%	4%

Components of vulnerability



Vulnerability



WATER: WATER AVAILABILITY

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

Legend



Areas with highest vulnerability:

- the upper Nile Valley,
- the southwestern Arabian Peninsula, and
- the northern Horn of Africa

Areas with lowest vulnerability:

- the Tigris-Euphrates Basin and
- the lower Nile Valley, including the Nile Delta

Scenario	Percentage of study area		
	Low Vul	Moderate Vul	High Vul
RCP 4.5 Mid-century	0%	57%	43%
RCP 8.5 Mid-century	0%	48%	52%
RCP 4.5 End-century	0%	52%	48%
RCP 8.5 End-century	0%	43%	57%



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Thank you

