



Vulnerability of forests and wetlands to climate change

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Area covered by forests: Study area



**Biodiversity
and Ecosystems**

Area covered by forests

Area covered by wetlands

Study area based on *change in forest cover* indicator

Tree canopy closure over 5 m
in height for year 2000

Does not include cropland
areas



EXPOSURE (0.50)

RCM

- Change in temperature (0.25)
- Change in precipitation (0.25)

EXTREME EVENTS INDICES

- Change in maximum length of dry spell (0.25)

RHM

- Change in evapotranspiration (0.25)

4
Exposure
indicator
s

SENSITIVITY (0.50)

POPULATION (0.25)

- Population density (0.60)
- Refugee population (0.40)

NATURAL (0.50)

- Soil storage capacity (0.12)
- Degradation of vegetation cover (0.13)
- Livestock density (0.11)
- Change in forest cover (0.50)
- Threatened forested areas (0.13)

MANMADE (0.25)

- Floodprone areas (0.35)
- Urban extent (0.36)
- Road network (0.29)

10
Sensitivity
indicator
s

ADAPTIVE CAPACITY (0.50)

KNOWLEDGE & AWARENESS (0.10)

- E-Government development (0.38)
- Tertiary enrollment (0.31)
- Adult literacy rate (0.31)

TECHNOLOGY (0.10)

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

INSTITUTIONS (0.11)

- Governance index (0.32)
- Area under nature protection (0.37)
- Disaster risk reduction committees (0.31)

INFRASTRUCTURE (0.50)

WATER & SANITATION (0.26)

- 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)

TRANSPORT (0.24)

- Density of road network (1.0)

ECONOMIC RESOURCES (0.11)

- GDP per capita (0.53)
- ODA (0.47)

EQUITY (0.07)

- Female-to-male unemployment rate (0.40)
- Female-to-male literacy ratio (0.60)

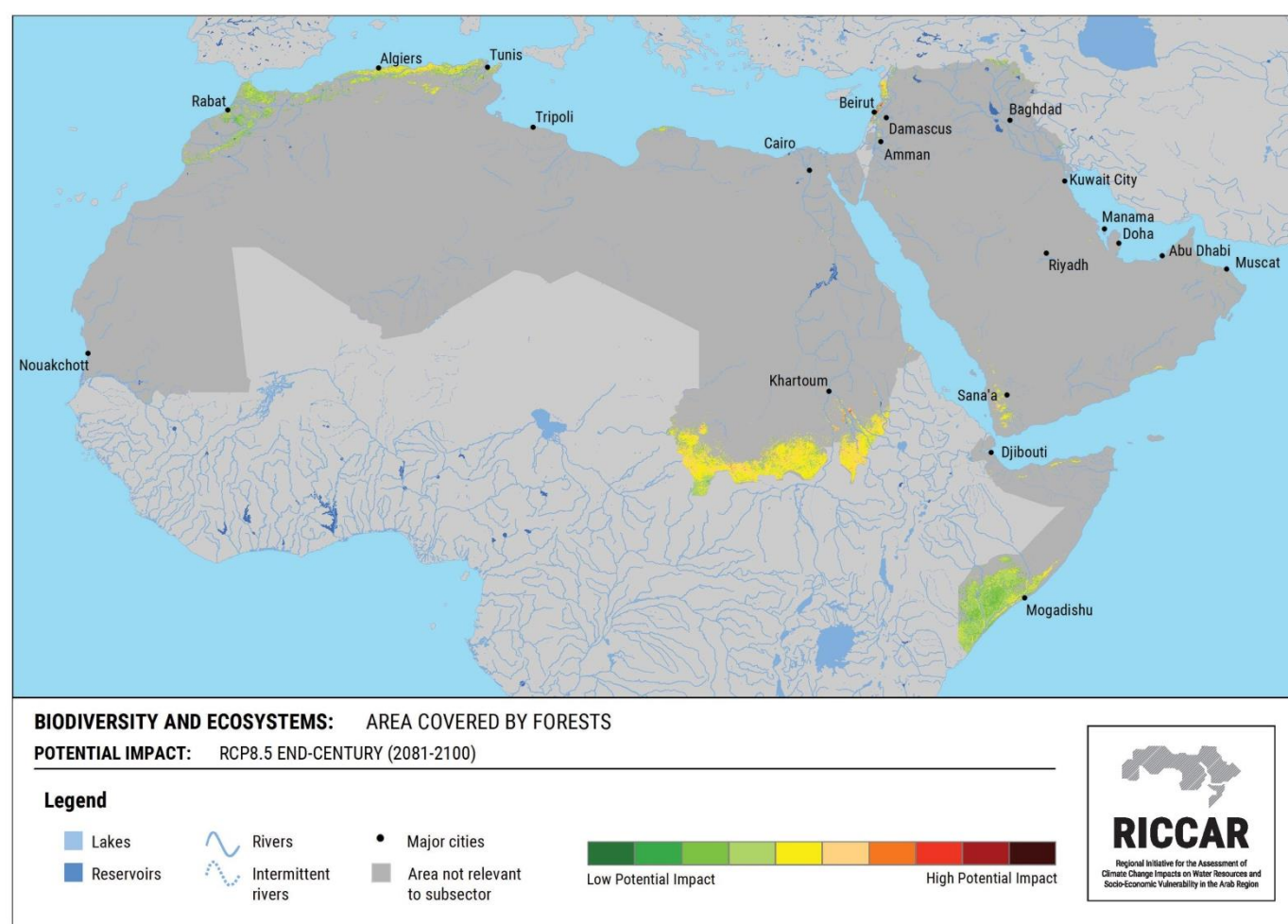
20
Adaptive
Capacity
indicator
s

POTENTIAL IMPACT
(0.50)

VULNERABILITY
ASSESSMENT



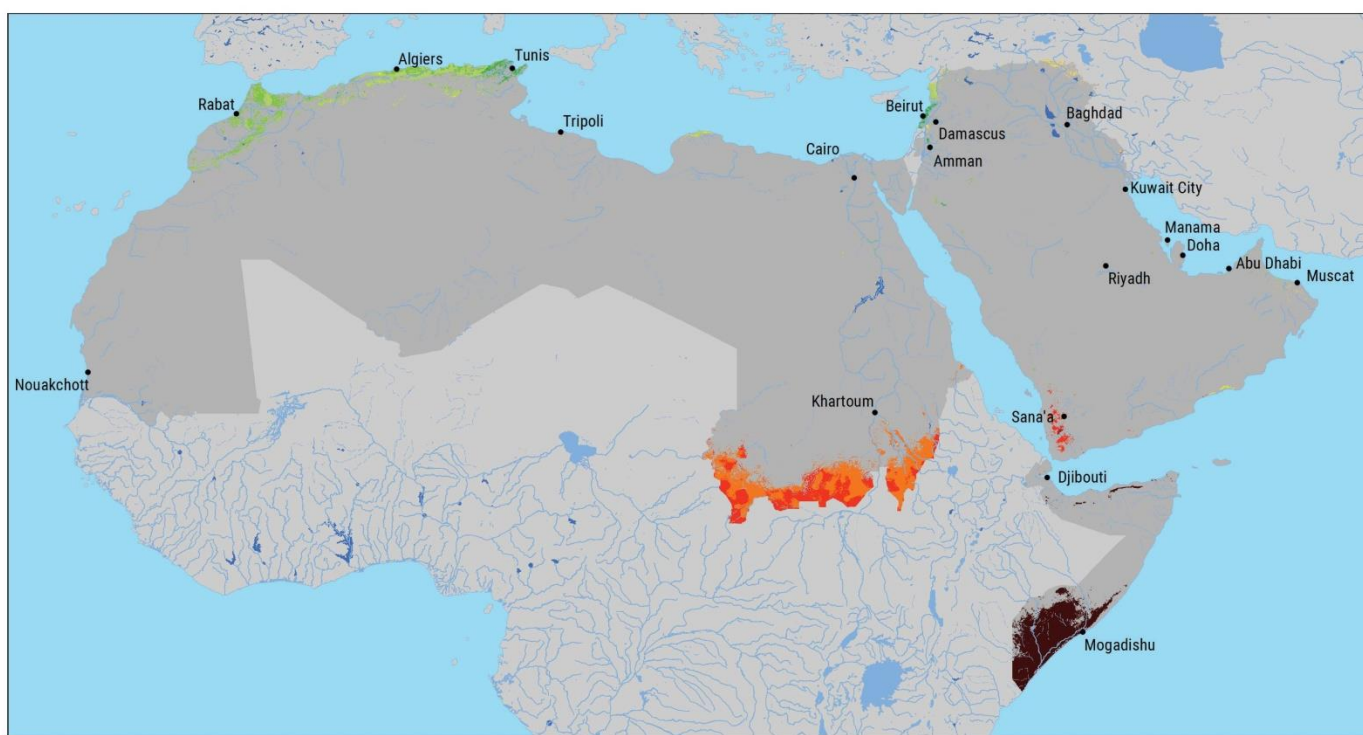
Impact chain:
Area
covered by
forests



Areas with highest potential impact:

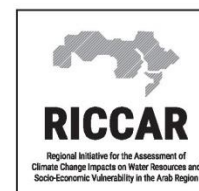
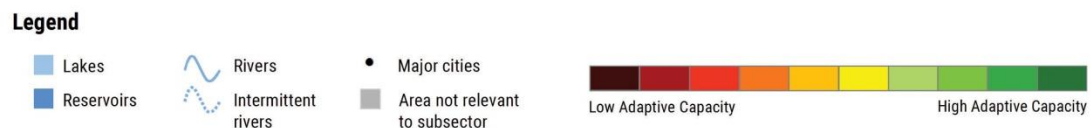
- Forests of the Levant
- Acacia nilotica plantations along banks of the Blue Nile south of Khartoum
- Taza Biosphere Reserve in the Tell Atlas region

Scenario	Percentage of study area		
	Low PI	Moderate PI	High PI
RCP 4.5 Mid-century	35%	65%	0%
RCP 8.5 Mid-century	25%	74%	0%
RCP 4.5 End-century	33%	67%	0%
RCP 8.5 End-century	17%	81%	2%



BIODIVERSITY AND ECOSYSTEMS: AREA COVERED BY FORESTS

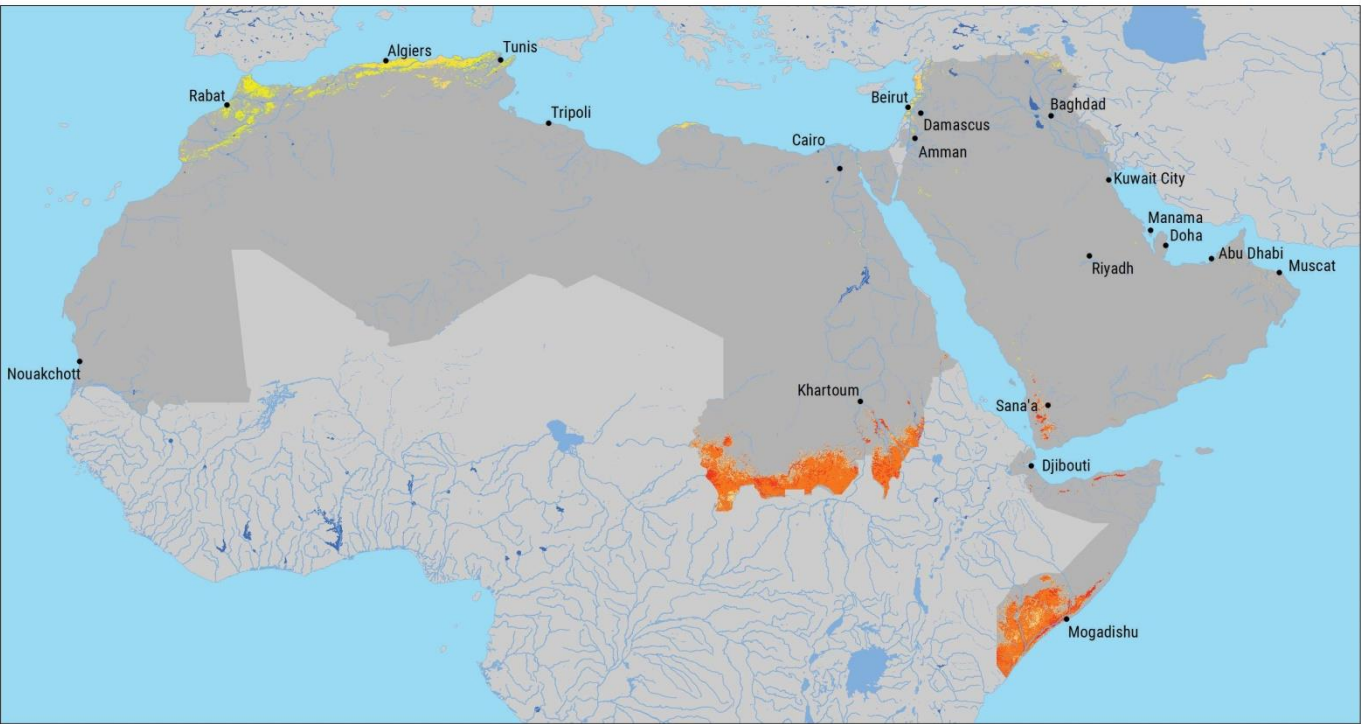
ADAPTIVE CAPACITY



Areas with lowest adaptive capacity:

- Selected savannah woodlands in Eastern Sahel
- Jabal Bura Valley forest
- Riverine forests of Jubba River Valley

Scenario	Percentage of study area		
	Low AC	Moderate AC	High AC
All climate scenarios	46%	31%	23%

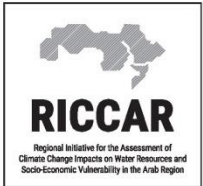


BIODIVERSITY AND ECOSYSTEMS: AREA COVERED BY FORESTS

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

Legend

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



Areas with highest vulnerability:

- Tropical dry forest and tropical shrubland in sub-Saharan Africa
- Tropical mountain system forests of SW Arabian Peninsula

Areas with lowest vulnerability:

- Subtropical dry forest in Rif region (NW Africa)
- Forests of Ichkeul National Park (central N African coastline)

Scenario	Percentage of study area		
	Low Vul	Moderate Vul	High Vul
RCP 4.5 Mid-century	0%	59%	41%
RCP 8.5 Mid-century	0%	42%	58%
RCP 4.5 End-century	0%	50%	50%
RCP 8.5 End-century	0%	36%	64%

Vulnerability trends:

Area covered by forests

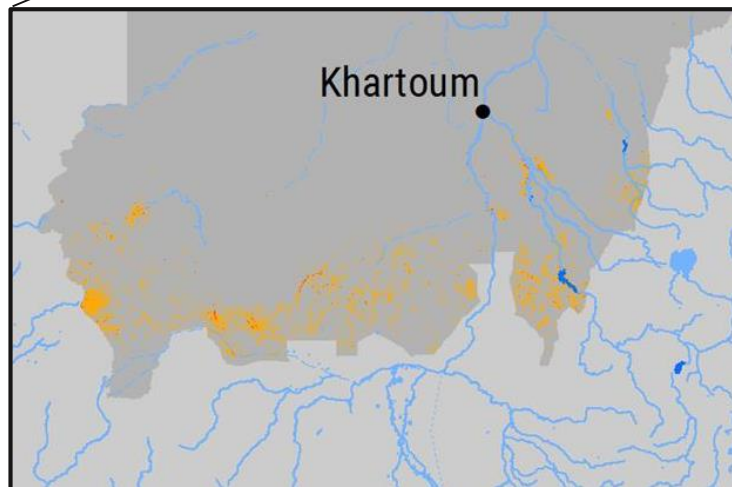
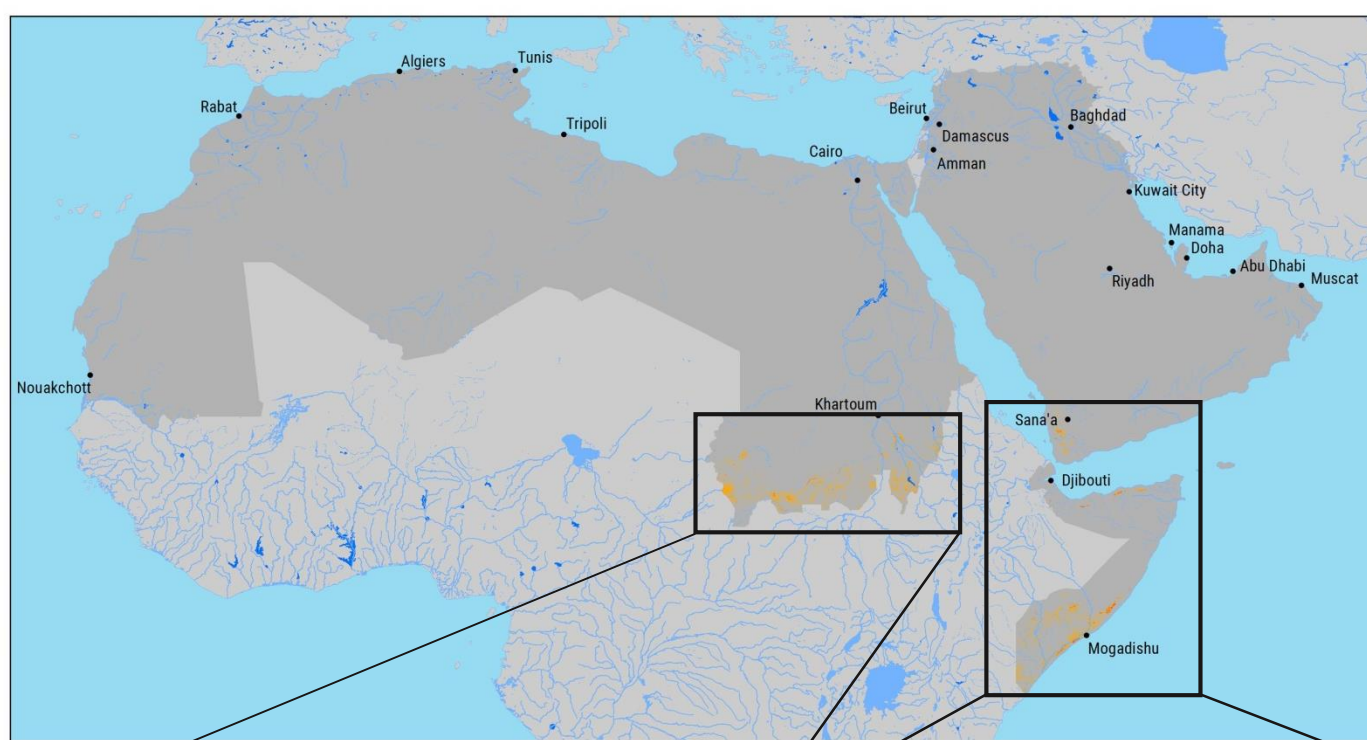


- Most forests in Arab region exhibiting increasing vulnerability for RCP 4.5, but nearly constant vulnerability for RCP 8.5
- Woodland savannah forests near Radom National Park largest increase from mid- to end-century (RCP4.5)



- Forests of southern Horn of Africa indicate decreasing vulnerability from mid- to end-century





Vulnerability

hotspots:

- Golis mountain range
- Lag Badana National Park
- El-Rawashda and Wad Kabo natural forest reserves
- Khartoum Sunt Forest
- Jabal Bura Valley forest



RICCAR

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

Area covered by wetlands: Study area



**Biodiversity
and Ecosystems**

Area covered by forests

Area covered by wetlands

Study area based on *wetlands*
indicator

Ramsar sites (and their buffers)

Coastal wetlands

Riverine wetlands

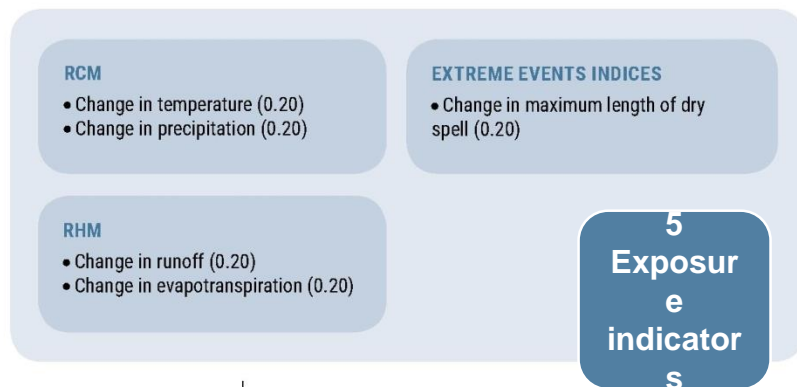
Oases

Sabkhas

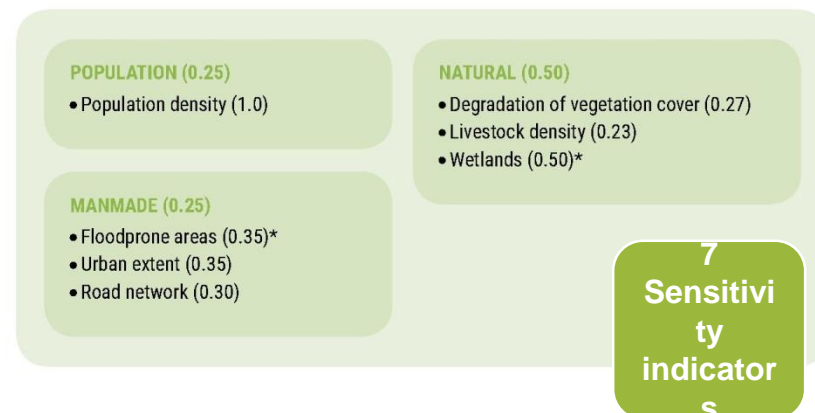
Saltpans



EXPOSURE (0.50)



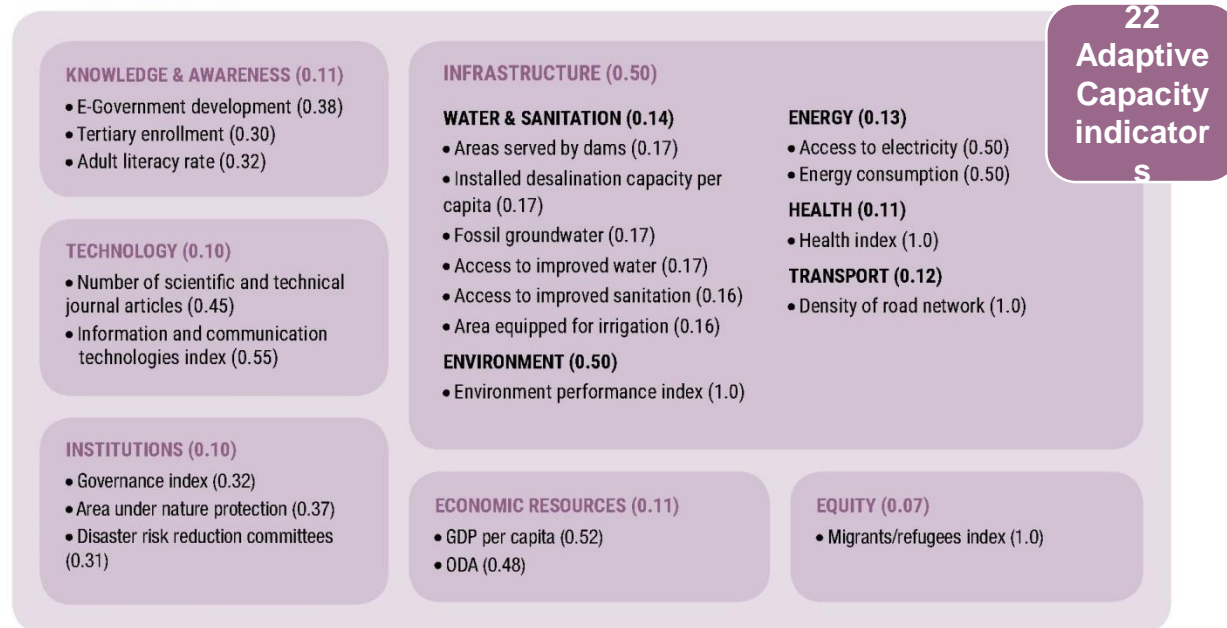
SENSITIVITY (0.50)



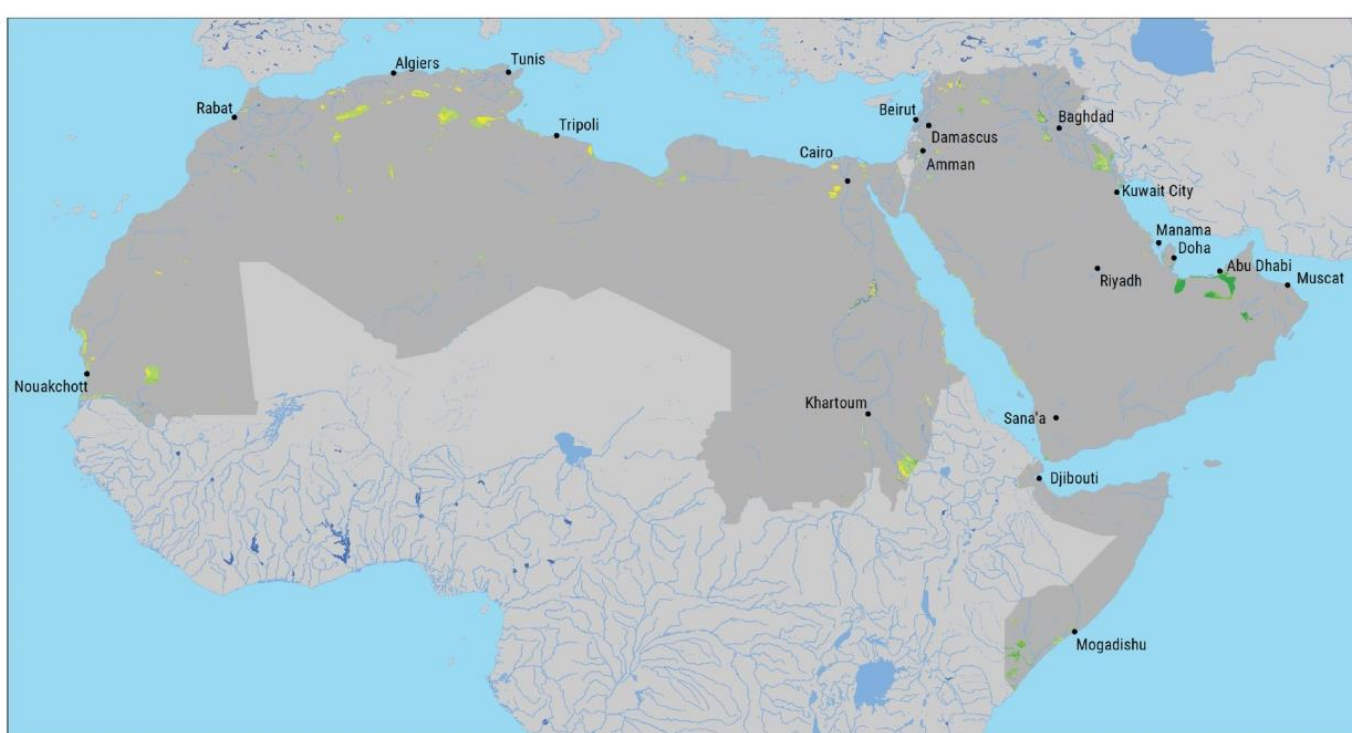
POTENTIAL IMPACT
(0.50)

VULNERABILITY ASSESSMENT

ADAPTIVE CAPACITY (0.50)

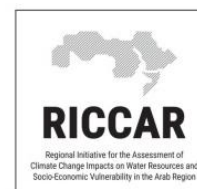
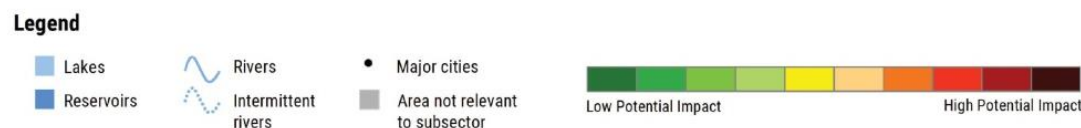


Impact chain:
Area covered by wetlands



BIODIVERSITY AND ECOSYSTEMS: AREA COVERED BY WETLANDS

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



Areas with highest potential impact:

- Wetlands of the Levant
 - Ammiq Wetland
 - Azraq Oasis
 - Wadi Mujib
- Nile Delta wetlands
 - Lake Qarun Protected Area
- Wetlands of northern Maghreb
 - Marais de la Macta
 - Mejerda Delta
 - Shott Merrouane et Oued Khrouf
 - Sebkha d'Oran
 - Marais de la Mekhada
 - Sebkha Monastir

Scenario	Percentage of study area		
	Low PI	Moderate PI	High PI
RCP 4.5 Mid-century	47%	53%	0%
RCP 8.5 Mid-century	30%	70%	0%
RCP 4.5 End-century	34%	65%	0%
RCP 8.5 End-century	29%	70%	1%

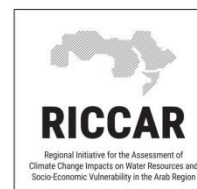


BIODIVERSITY AND ECOSYSTEMS: AREA COVERED BY WETLANDS

ADAPTIVE CAPACITY

Legend

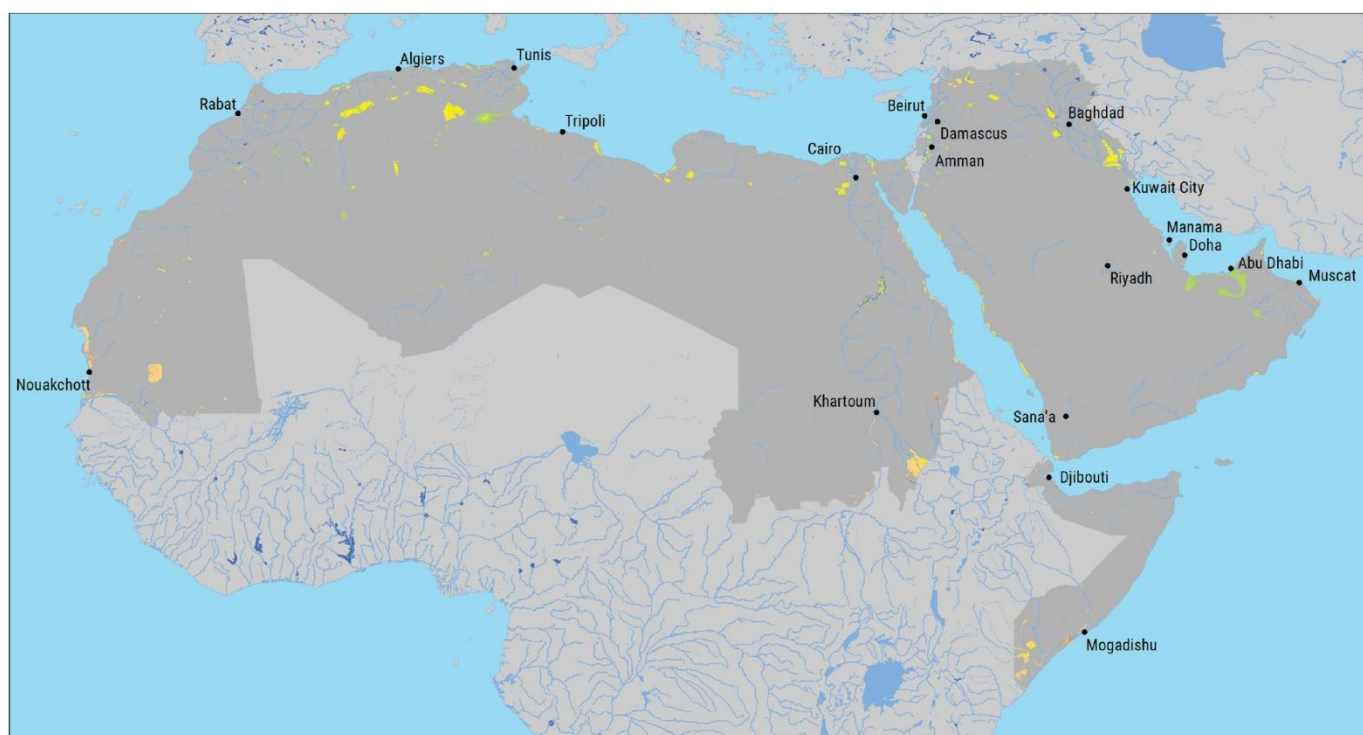
- Lakes
- Reservoirs
- ~ Rivers
- ~ Intermittent rivers
- Major cities
- Area not relevant to subsector



Areas with lowest adaptive capacity:

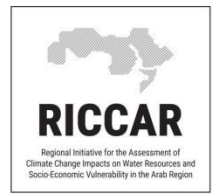
- Tidal wetlands adjacent to the Gulf of Aden
- Freshwater marshes of the Shabelle River and Jubba River

Scenario	Percentage of study area		
	Low AC	Moderate AC	High AC
All climate scenarios	21%	53%	26%



BIODIVERSITY AND ECOSYSTEMS: AREA COVERED BY WETLANDS

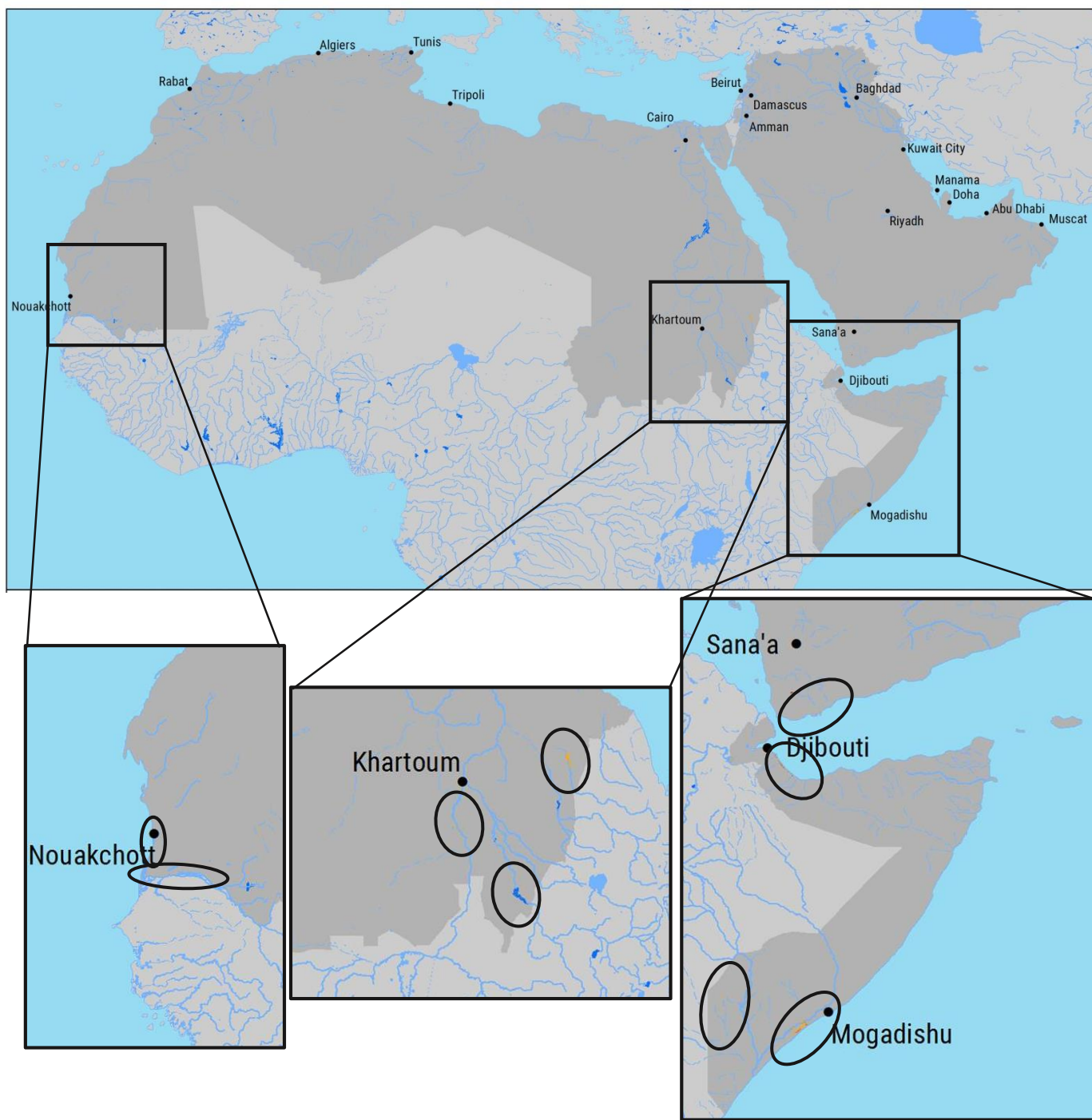
VULNERABILITY: RCP8.5 END-CENTURY (2081-2100)



Areas with lowest vulnerability:

- Wetlands in the eastern Atlas region
 - Shott el Djerid/Shott el Fedjadj Complex
 - Sebkhet Sidi el Hani
 - Sebkhet el Melah
- Wetlands in the southern Maghreb
 - Oasis de Tamantit et Sid Ahmed Timmi
- Wetlands near the Arabian Gulf
 - Sabkha Matti

Scenario	Percentage of study area		
	Low Vul	Moderate Vul	High Vul
RCP 4.5 Mid-century	5%	94%	1%
RCP 8.5 Mid-century	1%	97%	2%
RCP 4.5 End-century	6%	93%	1%
RCP 8.5 End-century	1%	97%	2%



Vulnerability hotspots:

- Aftout es Saheli
- Freshwater marshes in the Senegal River Valley
- Lac Gabou /Tagant Plateau
- Freshwater marshland along the White Nile River
- Er Rosieres Reservoir on the Blue Nile River
- Khawr Abu Muhhar
- Intermittent lakes fed by the Qash River
- Coastal wetlands of the southern Red Sea and Gulf of Aden
- Ta'izz wetlands



Thank you



**Biodiversity
and Ecosystems**

Area covered by forests
Area covered by wetlands

