Vulnerability of forests and wetlands to climate change

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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
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 vs. Percentage of study area

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Low PI</th>
<th>Moderate PI</th>
<th>High PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCP 4.5 Mid-century</td>
<td>35%</td>
<td>65%</td>
<td>0%</td>
</tr>
<tr>
<td>RCP 8.5 Mid-century</td>
<td>25%</td>
<td>74%</td>
<td>0%</td>
</tr>
<tr>
<td>RCP 4.5 End-century</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
</tr>
<tr>
<td>RCP 8.5 End-century</td>
<td>17%</td>
<td>81%</td>
<td>2%</td>
</tr>
</tbody>
</table>
Areas with lowest adaptive capacity:
- Selected savannah woodlands in Eastern Sahel
- Jabal Bura Valley forest
- Riverine forests of Jubba River Valley
### 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)

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<td></td>
<td>Low Vul</td>
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<tr>
<td>RCP 4.5 Mid-century</td>
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<tr>
<td>RCP 8.5 Mid-century</td>
<td>0%</td>
</tr>
<tr>
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</tr>
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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
Study area based on *wetlands* indicator

- Ramsar sites (and their buffers)
- Coastal wetlands
- Riverine wetlands
- Oases
- Sabkhas
- Saltpans
Impact chain:
Area covered by wetlands

EXPOSURE (0.50)
- RCM
  - Change in temperature (0.20)
  - Change in precipitation (0.20)
- RHM
  - Change in runoff (0.20)
  - Change in evapotranspiration (0.20)

EXTREME EVENTS INDICES
- Change in maximum length of dry spell (0.20)

SENSITIVITY (0.50)
- POPULATION (0.25)
  - Population density (1.0)
- NATURAL (0.50)
  - Degradation of vegetation cover (0.27)
  - Livestock density (0.23)
  - Wetlands (0.50)*
- MANMADE (0.25)
  - Flood prone areas (0.35)*
  - Urban extent (0.35)
  - Road network (0.30)

ADAPTIVE CAPACITY (0.50)
- KNOWLEDGE & AWARENESS (0.11)
  - E-Government development (0.38)
  - Tertiary enrollment (0.30)
  - Adult literacy rate (0.32)
- TECHNOLOGY (0.10)
  - Number of scientific and technical journal articles (0.45)
  - Information and communication technologies index (0.55)
- INSTITUTIONS (0.10)
  - Governance index (0.32)
  - Area under nature protection (0.37)
  - Disaster risk reduction committees (0.31)
- INFRASTRUCTURE (0.50)
  - WATER & SANITATION (0.14)
    - 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)
  - HEALTH (0.11)
    - Health index (1.0)
  - ENERGY (0.13)
    - Access to electricity (0.50)
    - Energy consumption (0.50)
  - TRANSPORT (0.12)
    - Density of road network (1.0)
- ECONOMIC RESOURCES (0.11)
  - GDP per capita (0.52)
  - ODA (0.48)
- EQUITY (0.07)
  - Migrants/refugees index (1.0)
**Areas with highest potential impact:**

- **Wetlands of the Levant**
  - Ammigq 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
Areas with lowest adaptive capacity:

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

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<tr>
<td>RCP 4.5 Mid-century</td>
<td>5%</td>
<td>94%</td>
<td>1%</td>
</tr>
<tr>
<td>RCP 8.5 Mid-century</td>
<td>1%</td>
<td>97%</td>
<td>2%</td>
</tr>
<tr>
<td>RCP 4.5 End-century</td>
<td>6%</td>
<td>93%</td>
<td>1%</td>
</tr>
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<td>1%</td>
<td>97%</td>
<td>2%</td>
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**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
Vulnerability hotspots:

- Aftou es Sarieli
- 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