


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

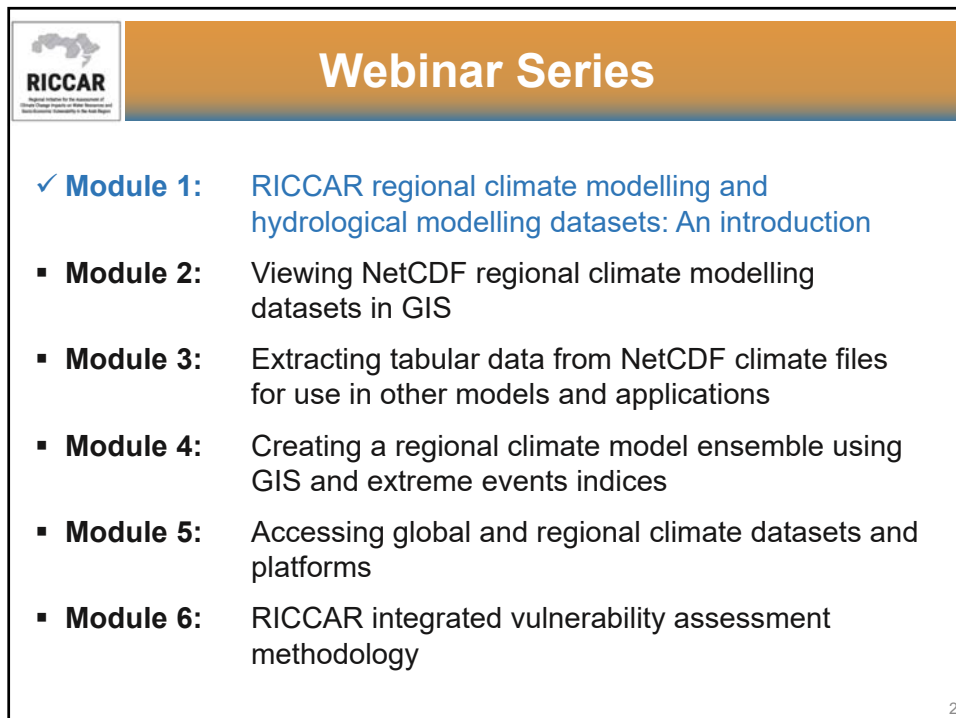
Regional Initiative for the Assessment of Climate Change Impacts on Water Resources & Socio-Economic Vulnerability in the Arab Region

**WEBINAR SERIES ON
CLIMATE CHANGE ANALYSIS USING GIS TOOLS**

Module 1:
RICCAR regional climate modelling and hydrological modelling datasets: An introduction



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RICCAR
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Climate Change Impacts on Water Resources and
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Webinar Series

- ✓ **Module 1:** RICCAR regional climate modelling and hydrological modelling datasets: An introduction
- **Module 2:** Viewing NetCDF regional climate modelling datasets in GIS
- **Module 3:** Extracting tabular data from NetCDF climate files for use in other models and applications
- **Module 4:** Creating a regional climate model ensemble using GIS and extreme events indices
- **Module 5:** Accessing global and regional climate datasets and platforms
- **Module 6:** RICCAR integrated vulnerability assessment methodology

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Module 1: Contents

- RICCAR mandate and the Arab/MENA Domain
- Understanding climate scenarios and the IPCC AR5 representative concentration pathways (RCPs)
- Regional or global: Advantages of regional climate modelling and hydrological modelling projections and datasets
- Climate parameters and climate indices for land-based models
- Key findings from RICCAR regional climate modelling and hydrological modelling
- Linking to the integrated vulnerability assessment
- The RICCAR Regional Knowledge Hub

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

Arab Ministerial Declaration on Climate Change
CAMRE
2007

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

Arab Permanent Committee for Meteorology
Resolutions
2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019

ESCWA 30th Ministerial Session
Resolution sets up Arab Centre for Climate Change Policies
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, 2018, 2019

ACSAD Board of Directors
Resolution
2013, 2018

Environment


Foreign Affairs & Planning

Water

Met

Agriculture

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RICCAR Objective

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

*RICCAR aims 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

5



RICCAR Partnerships



UNITED NATIONS
الاستشهاد
ESGWA



UN
environment



WMO



THE LEAGUE OF ARAB STATES
THE ARAB CENTER FOR THE STUDIES OF ADOPTED AND LOCAL KNOWLEDGE
1968
ACSAD



LAS



SMHI



United Nations
Educational, Scientific and
Cultural Organization
Cairo Office
مكتب
القاهرة
منظمة الأمم المتحدة
للتربية والعلم والثقافة



UNITED NATIONS
UNIVERSITY
UNU-INWEH
Institute for Water,
Environment and Health



FAO
FIAT PANIS



Sweden
Sverige



german
cooperation
DEUTSCHE ZUSAMMENARBEIT



giz
Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



UNDRR
UN Office for Disaster Risk Reduction



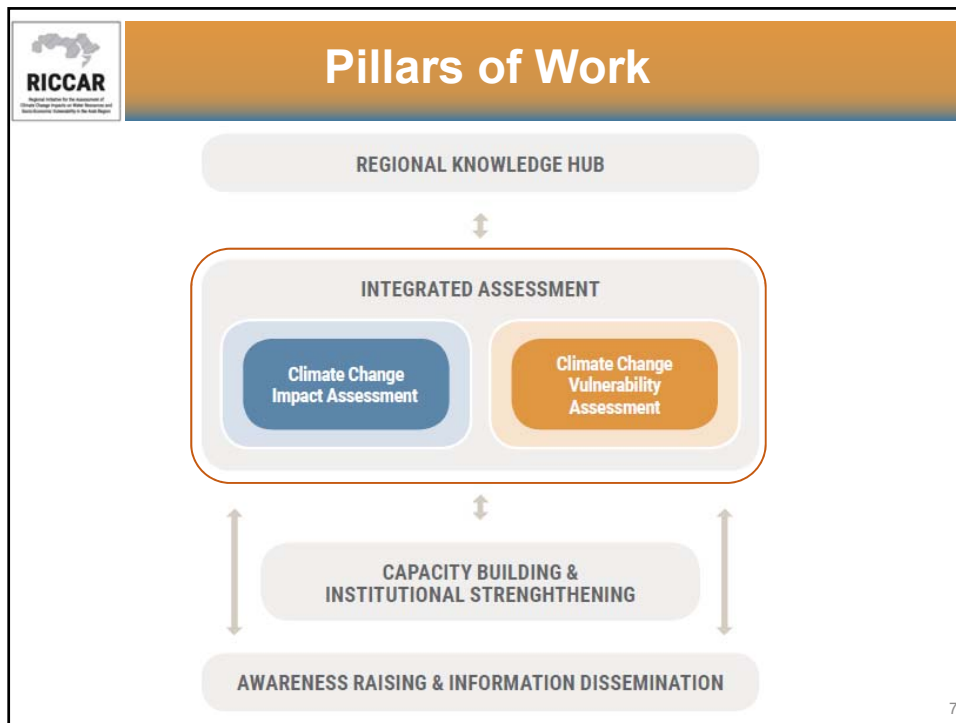
ACCWaM

CORDEX-MENA Domain hosted by
The Cyprus Institute

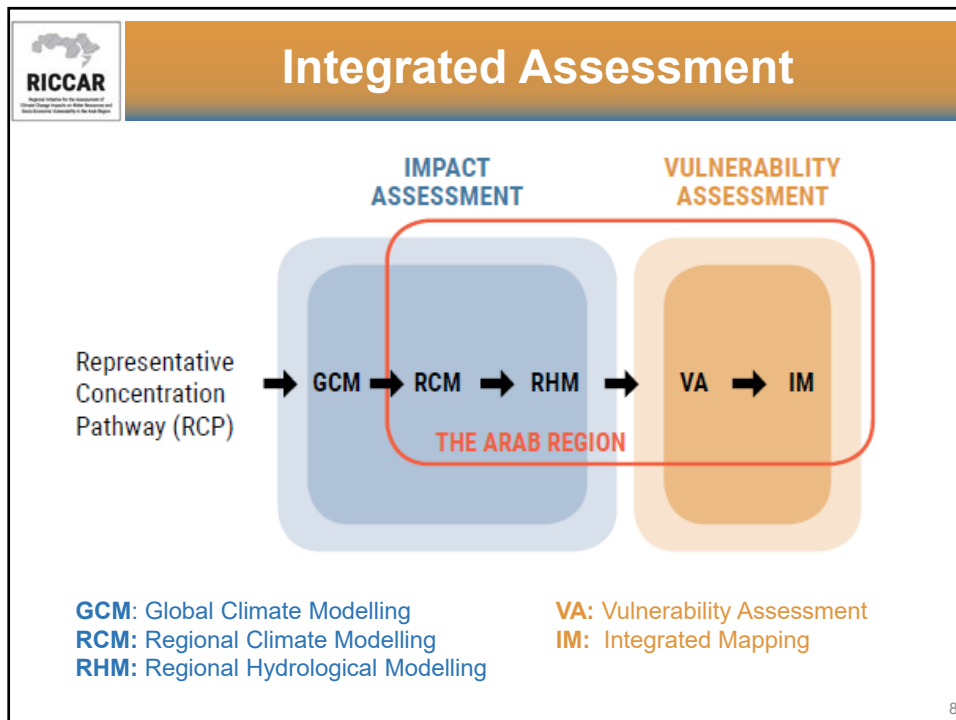
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www.riccar.org
www.unescwa.org

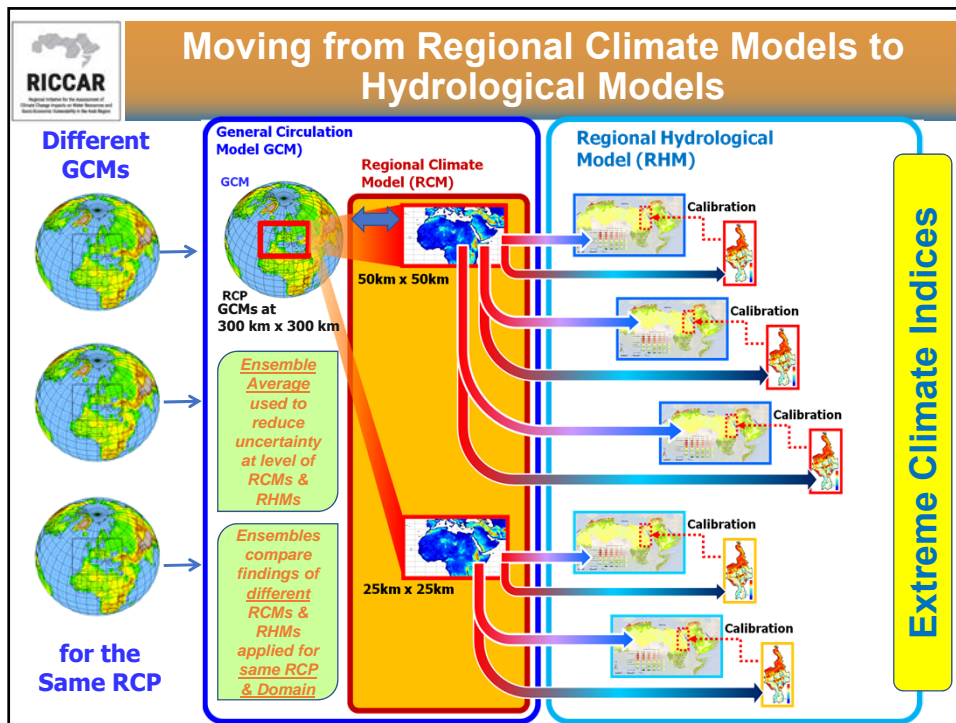
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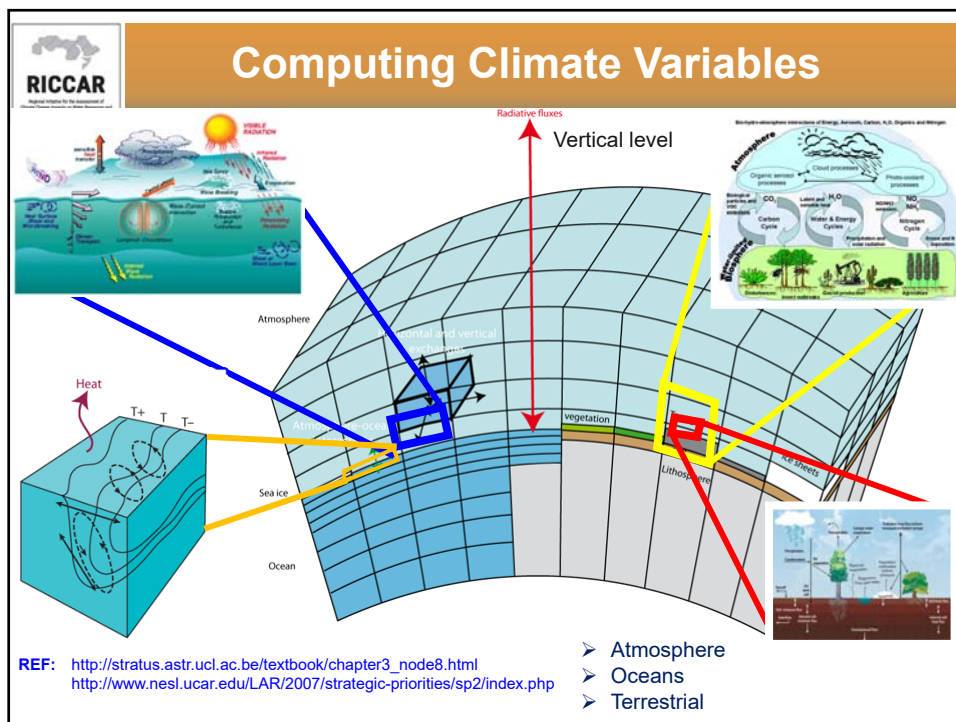
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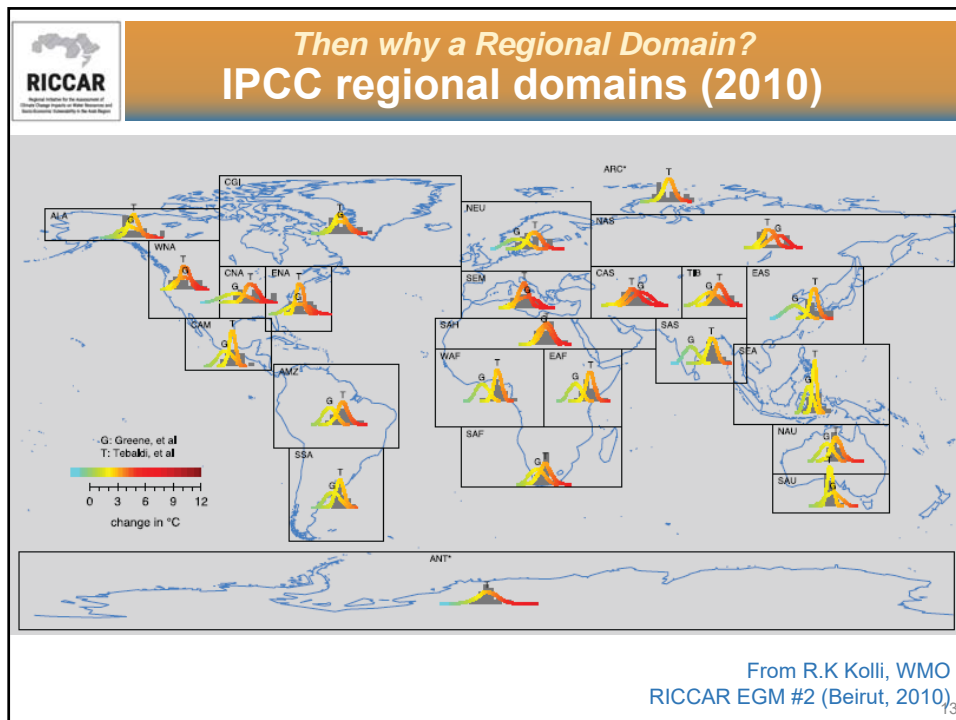
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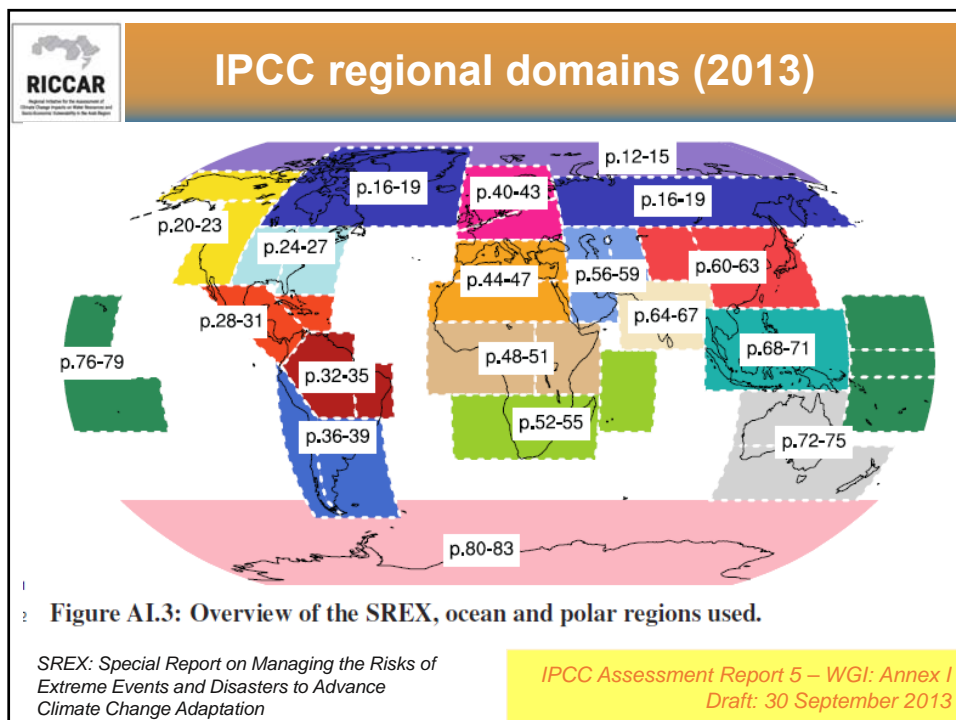
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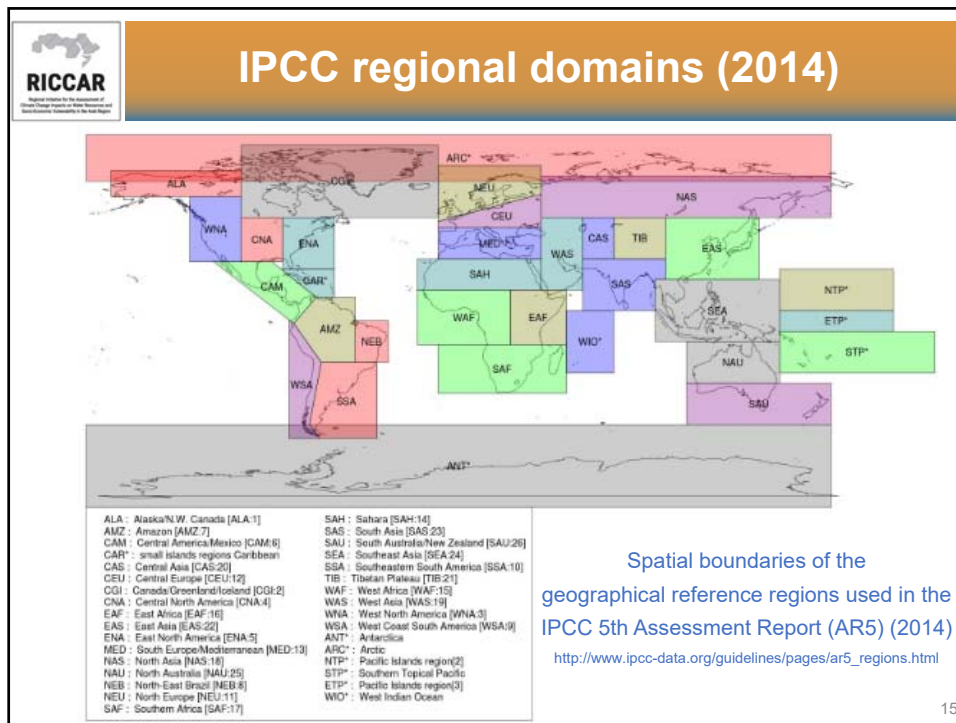
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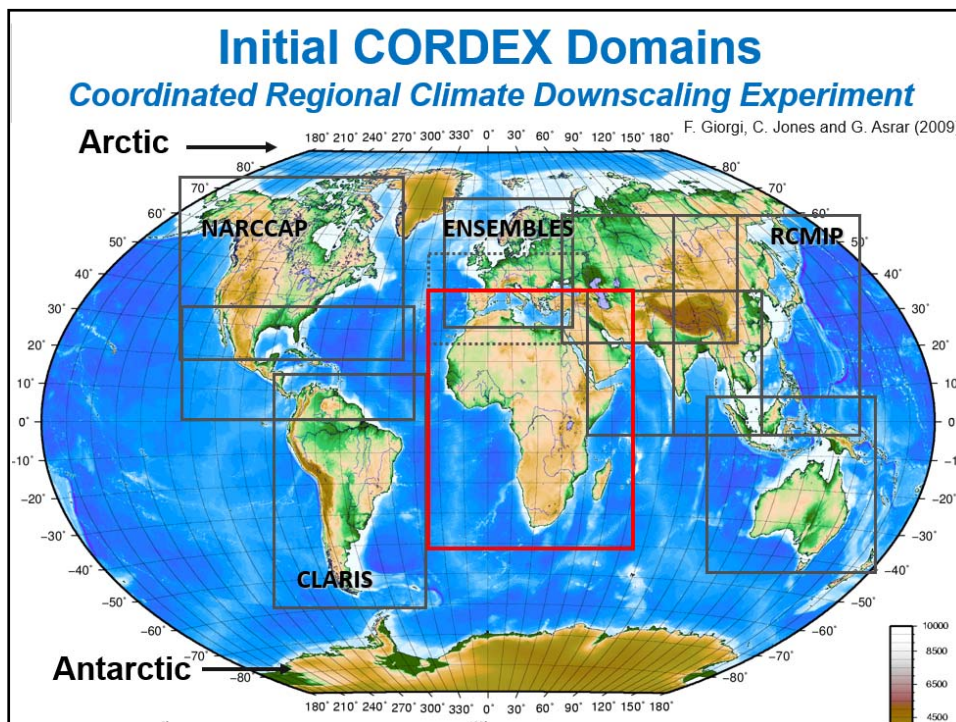
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CORDEX-MENA Working Group

- Preliminary RCM Ensemble Meeting convened by SMHI (Brussels, 2013)
- First CORDEX MENA-CA Meeting (Nicosia, Nov 2014)
- Organized by CORDEX (WMO via World Climate Research Programme) with SMHI & hosted by The Cyprus Institute.

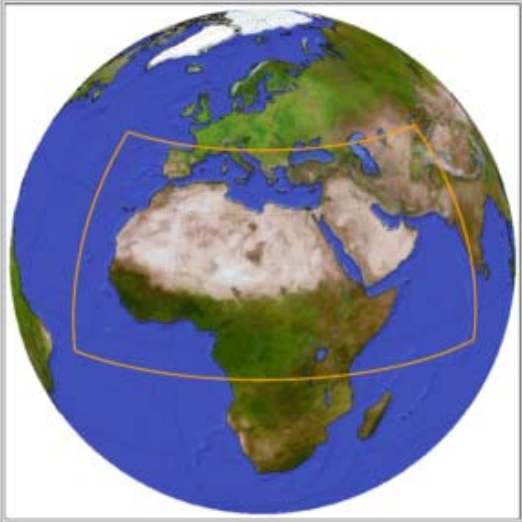
Consulted Institutions:

<ul style="list-style-type: none"> King Abdulaziz University (KAU) – (Saudi Arabia) King Abdullah University of Science and Technology (KAUST) – (Saudi Arabia) Istanbul Technical University (Turkey) Bogazici University (Turkey) Cairo University (Egypt) Jet Propulsion Laboratory (USA) Max Plank Institute for Chemistry (Germany) Italian Aerospace Research Center (CIRA) Qatar Meteorology Department (Qatar) 	<ul style="list-style-type: none"> SMHI ACSAD Maroc Meteo Cyprus Institute ESCWA WMO UNESCO/Cairo Office
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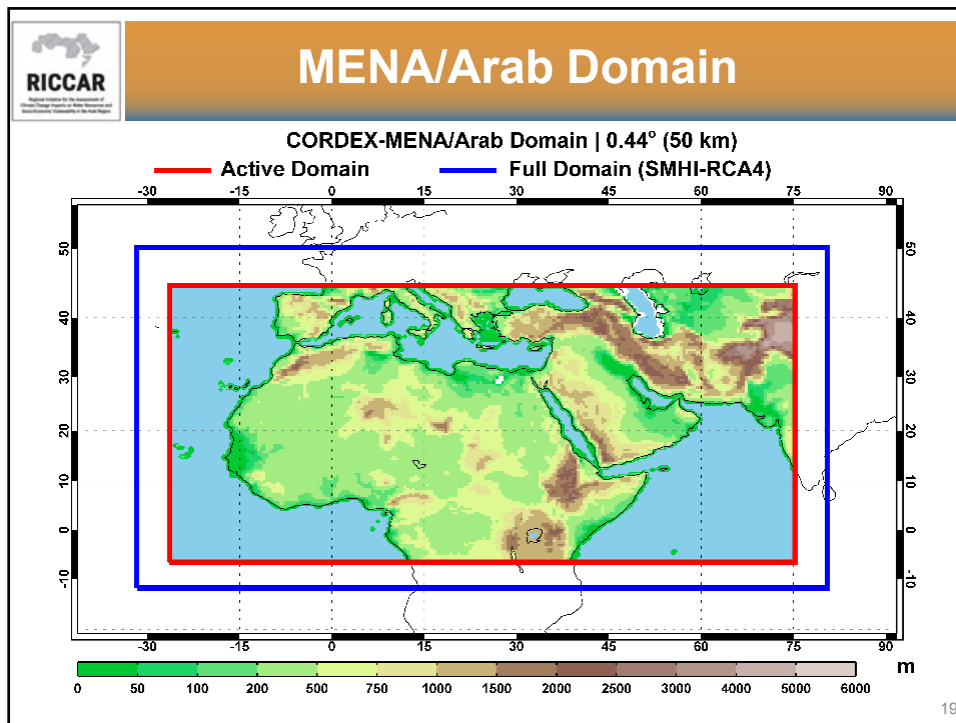
CORDEX-MENA/Arab Domain



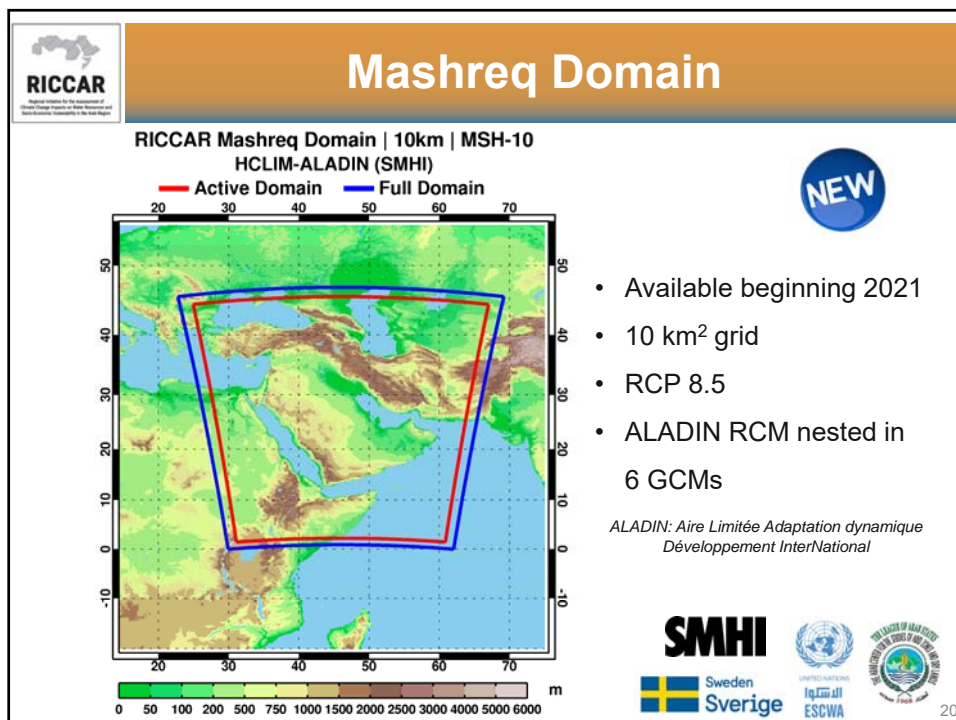
**CORDEX Domain
Region 13**
Middle East/
North Africa

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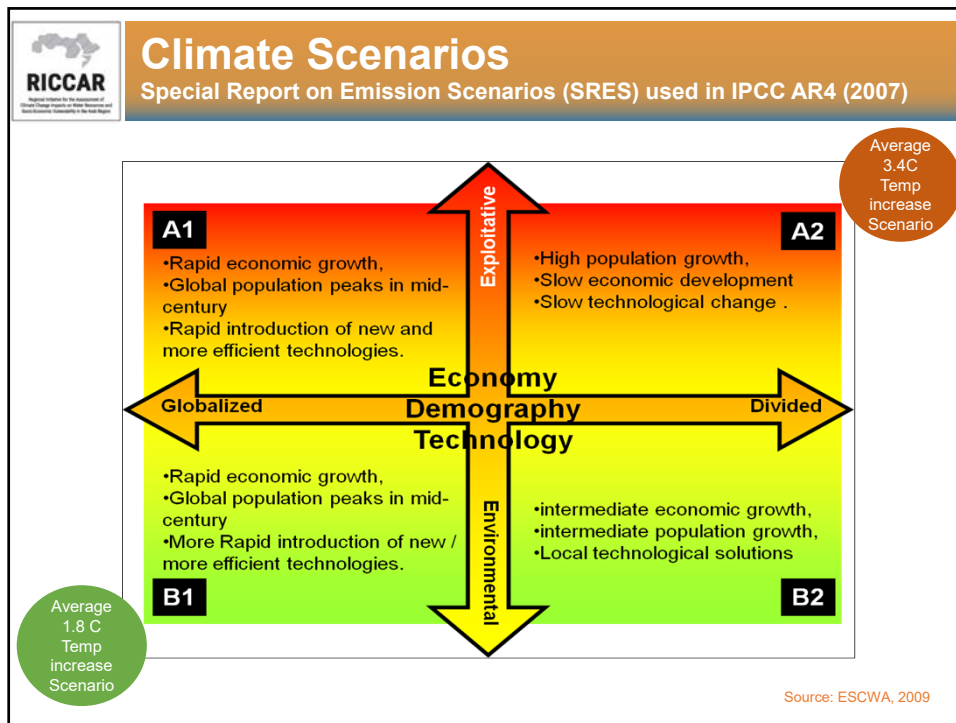
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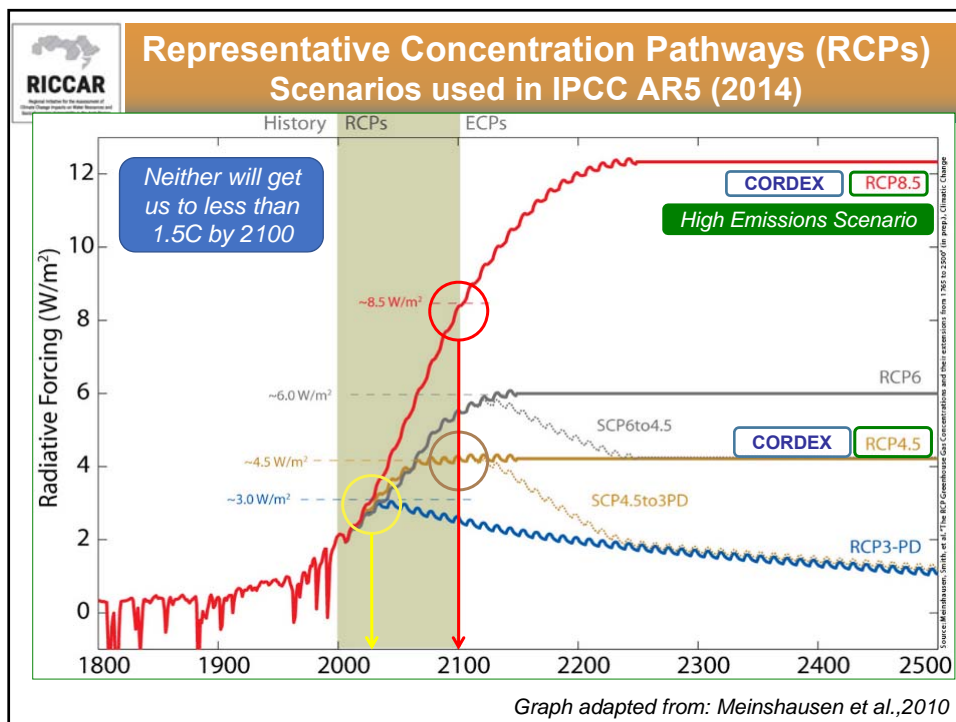
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MENA/Arab Domain

RCM Simulations for RICCAR Ensembles




RCM	Driving GCM/ Reanalysis	Evaluation 1979-2010	Historical 1986-2005	RCP 2.6 2006-2100	RCP 4.5 2006-2100	RCP 8.5 2006-2100	RESOLUTION (km)
RCA4	ERA-INTERIM	X					50
RCA4	EC-Earth		X	X	X	X	50
RCA4	EC-Earth		X			X	25
RCA4	CNRM-CM5		X		X	X	50
RCA4	GFDL-ESM2M		X		X	X	50
RCA4	GFDL-ESM2M		X			X	25
HIRAM	GFDL-ESM2M		X				25
REMO	MPI-ESM-LR		X				50



RCA4: SMHI Rossby Centre regional atmospheric model HIRAM: High Resolution Atmospheric Model; REMO: RCM Climate Service Center (Germany)

RICCAR Main Report (2017) findings for MENA/Arab Domain presented Ensembles for **RCP 4.5 & RCP 8.5** for the **Historical Period; Mid-Century; End-Century**, but data can be customized for daily/monthly/yearly time periods for smaller areas

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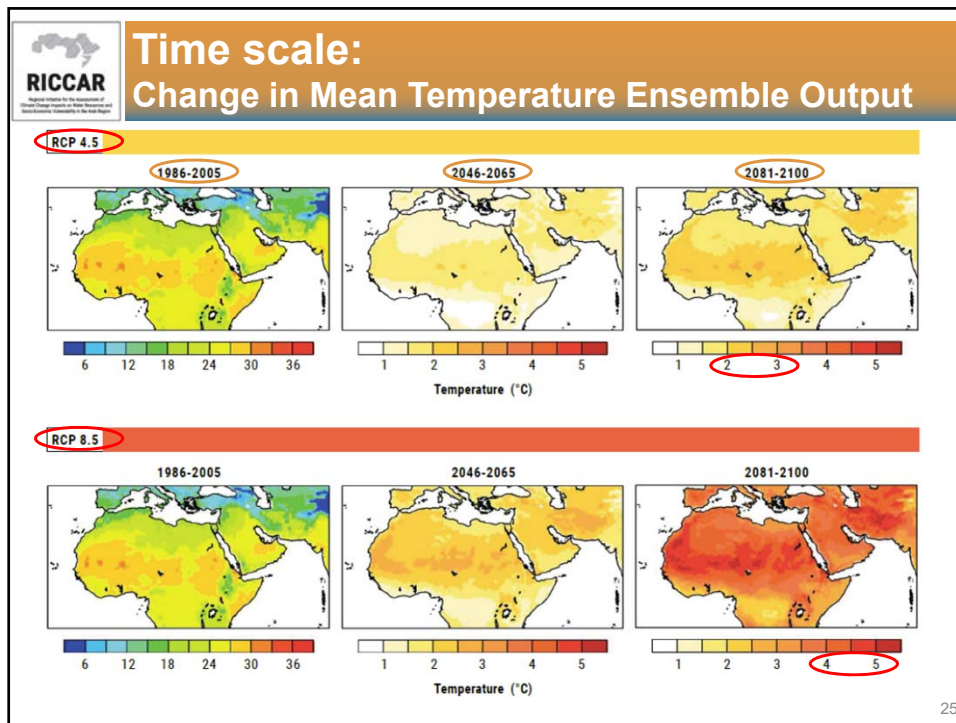


Accessibility to MENA-CORDEX Simulations

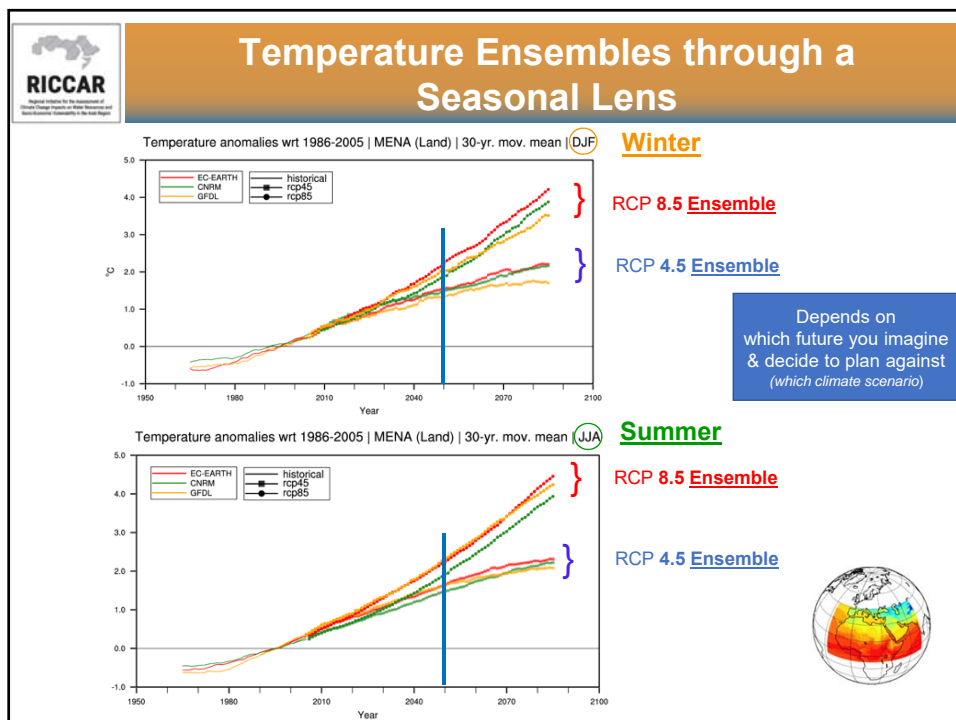
Acronym	Contributor	City, Country	Terms of use
BOUN	Bogazici University	Istanbul, Turkey	<ul style="list-style-type: none"> Unrestricted Available on ESGS
CLMcom	CLM Community – Centro EuroMediterraneo sui Cambiamenti Climatici (CMCC)	Caputa, Italy	<ul style="list-style-type: none"> Restricted
GERICS	Climate Service Center	Hamburg, Germany	<ul style="list-style-type: none"> Restricted
Cyl	The Cyprus Institute*  *Hosts MENA-CORDEX 	Nicosia, Cyprus	<ul style="list-style-type: none"> Restricted Non-commercial use only
DMN	Direction de la Météorologie Nationale	Casablanca, Morocco	<ul style="list-style-type: none"> Restricted
ICBA	International Centre for Biosaline Agriculture	Dubai, United Arab Republic	<ul style="list-style-type: none"> Restricted
SMHI	Swedish Meteorological and Hydrological Institute – Rossby Centre	Norrköping, Sweden	<ul style="list-style-type: none"> Unrestricted Available on ESGS Bias-corrected data available on RICCAR RKH in NetCDF & GIS

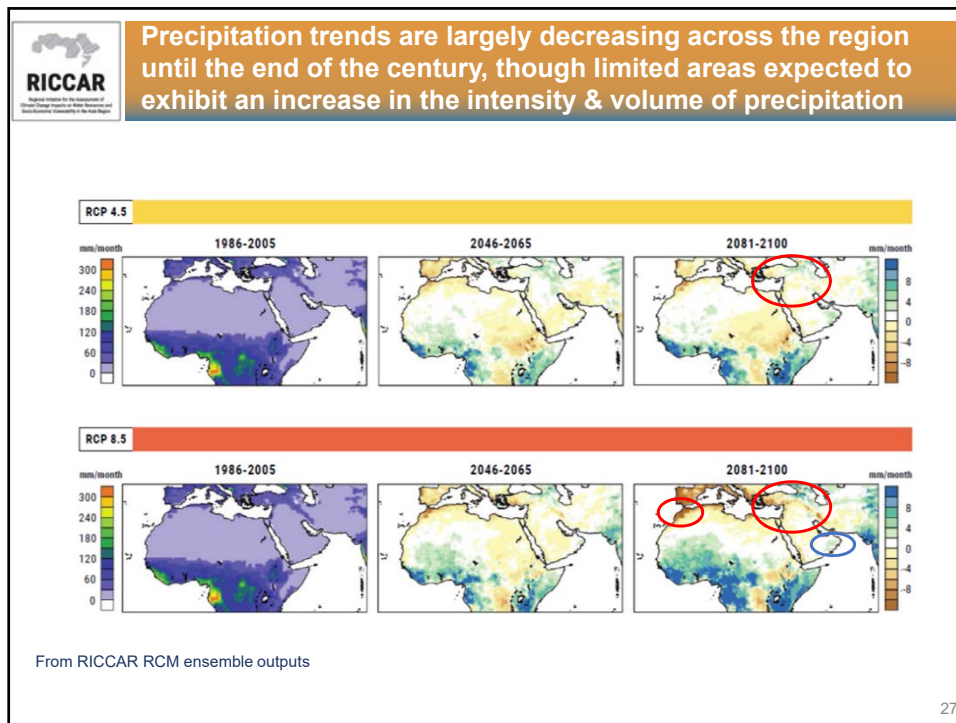
ESGS: **Earth System Grid Federation** is an international collaboration consisting of federated data centres with data nodes with **harmonized metadata & in NetCDF**.²⁴

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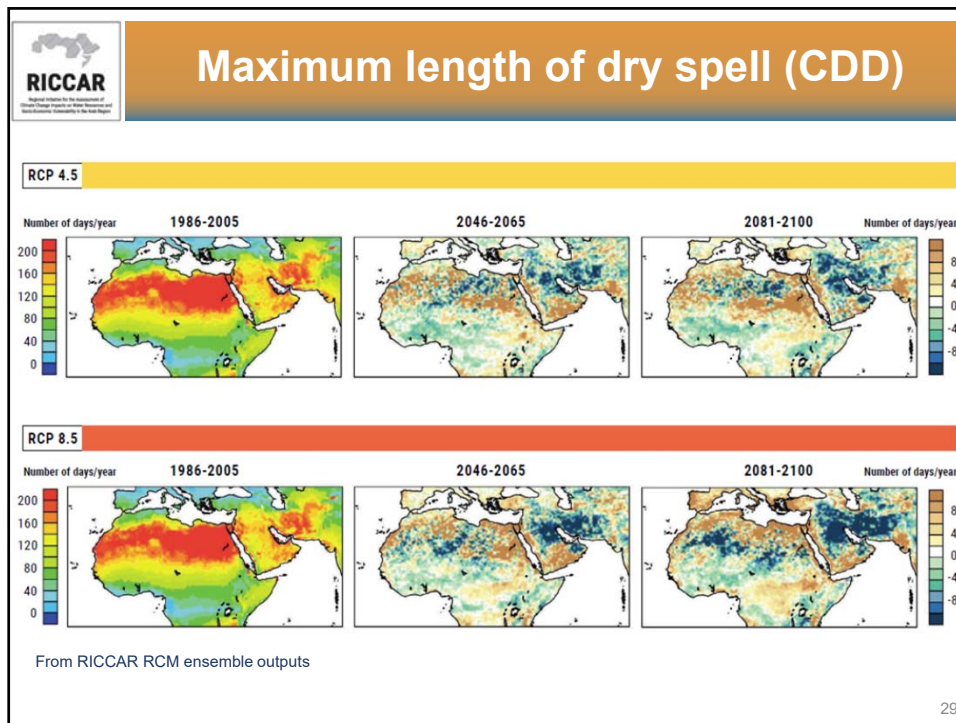
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Extreme Climate Indices

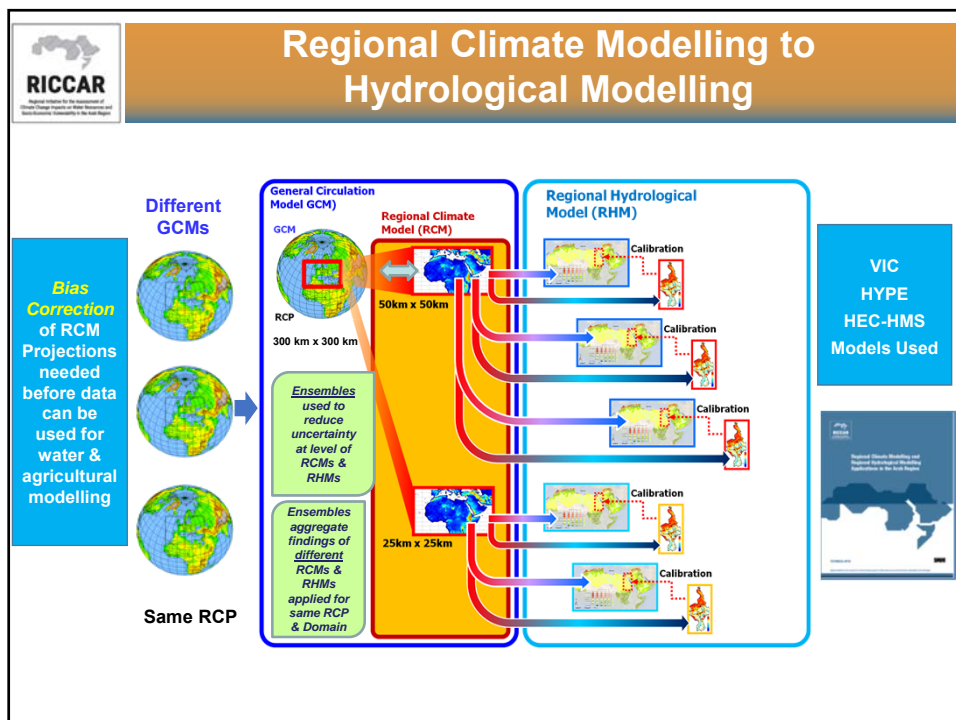
Extreme temperature indices		Extreme precipitation indices	
Index	Full name	Index	Full name
SU	Number of summer days	CDD	Maximum length of dry spell
SU35	Number of hot days	CWD	Maximum length of wet spell
SU40	Number of very hot days	R10	Annual count of 10 mm precipitation days
TR	Number of tropical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

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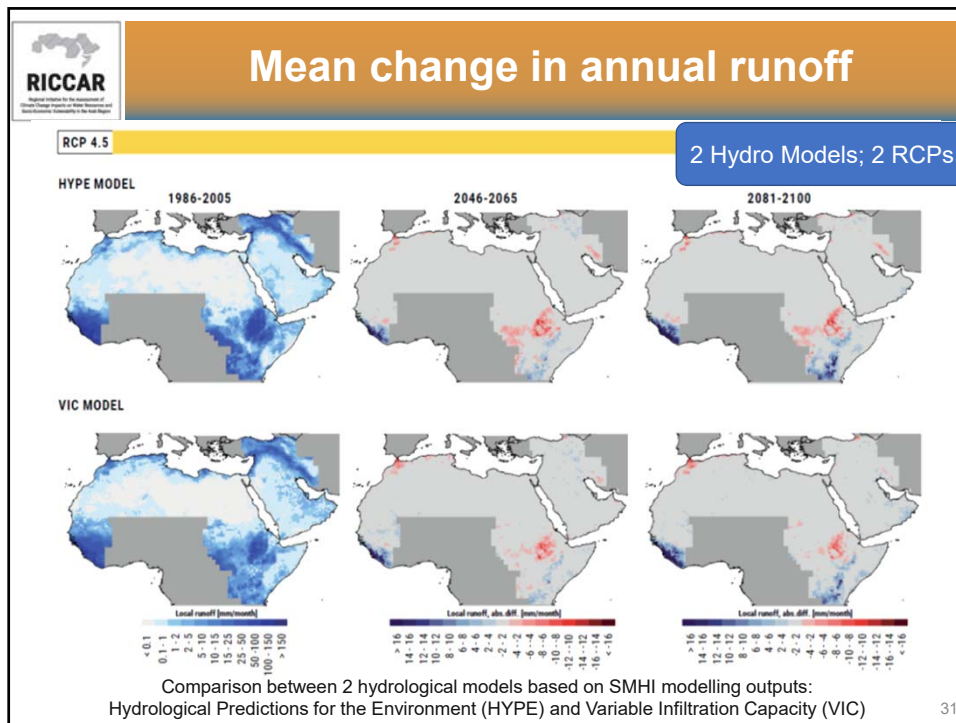
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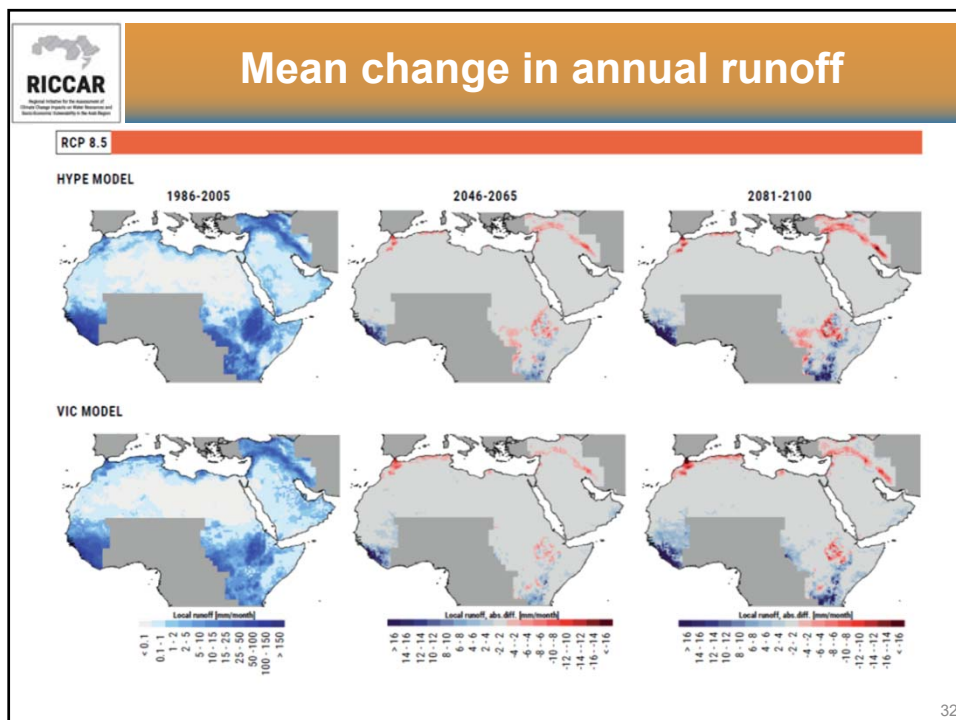
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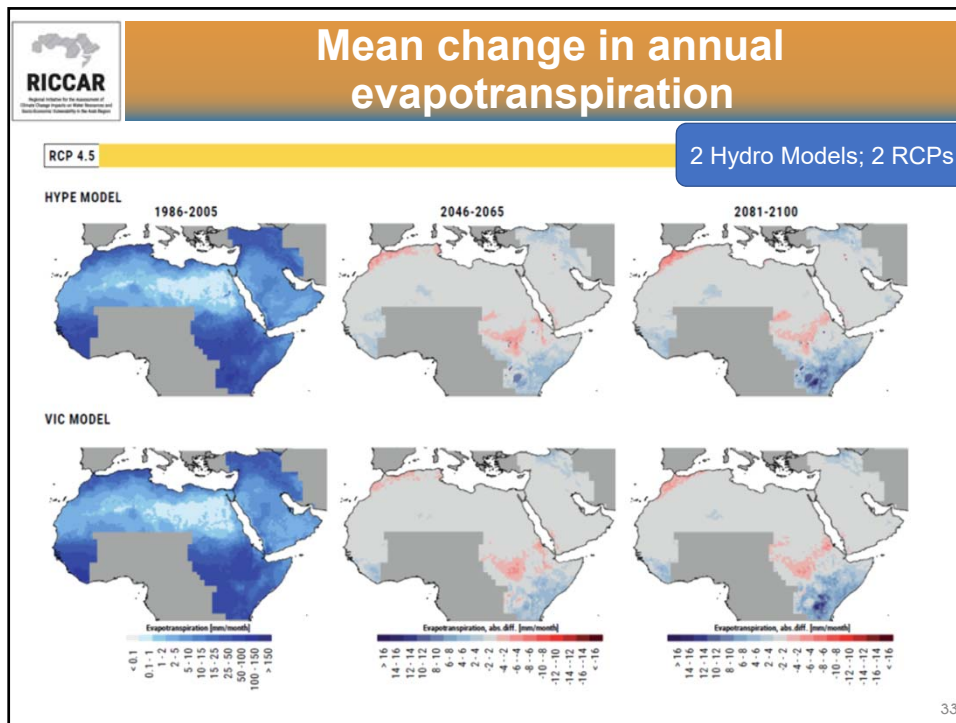
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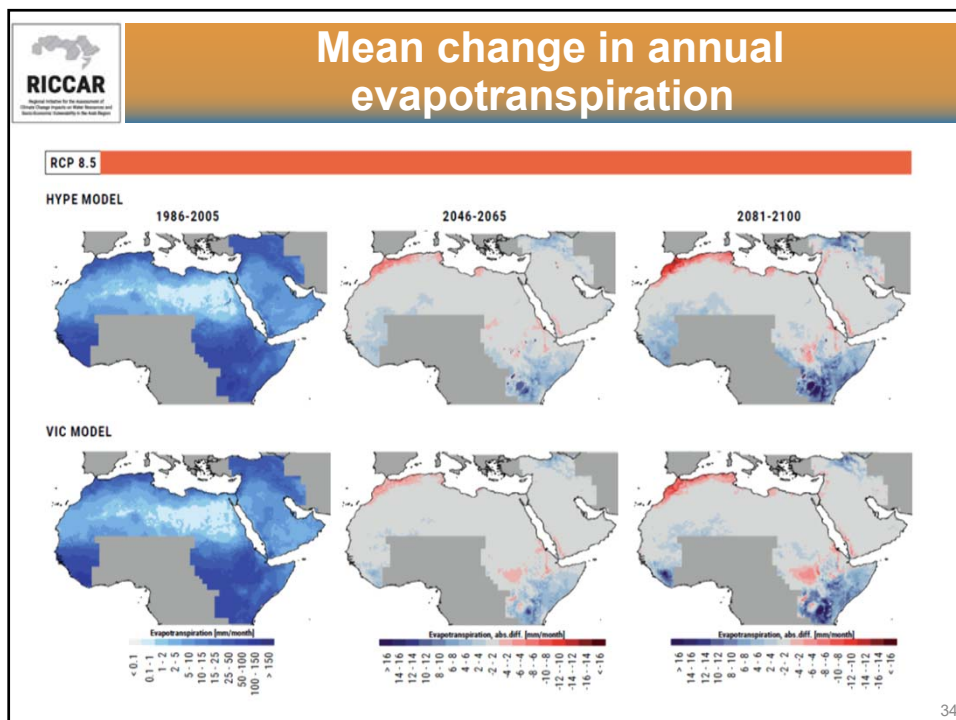
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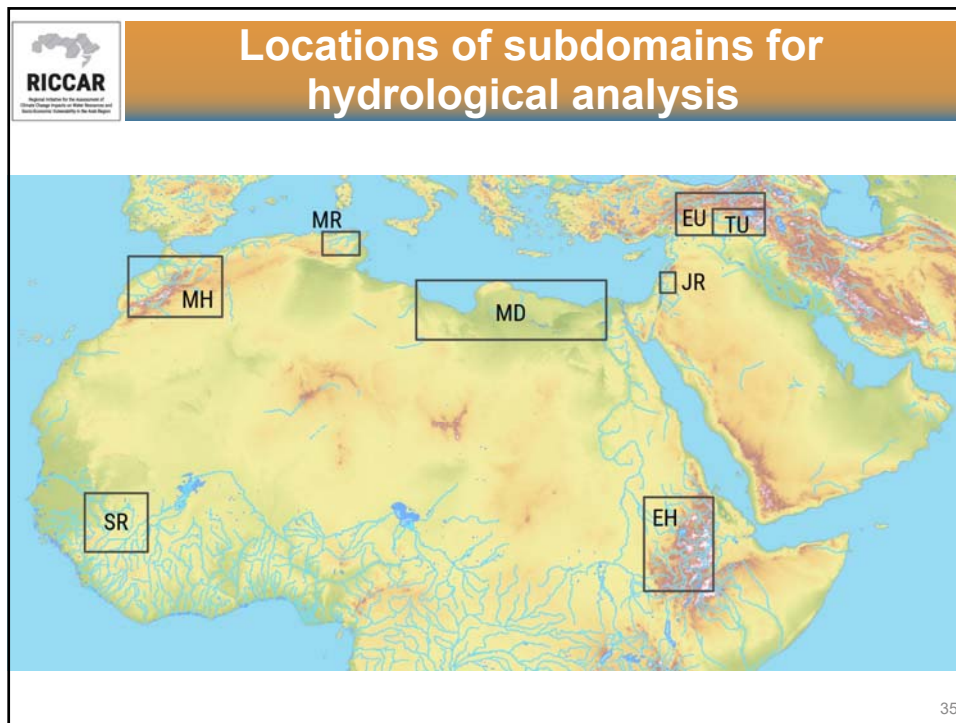
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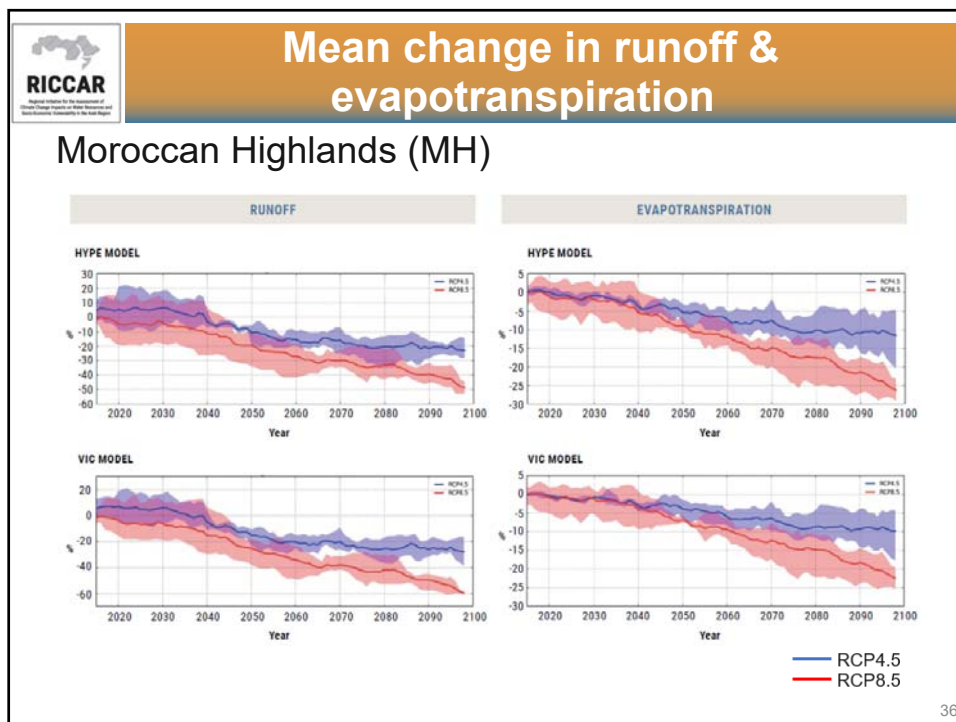
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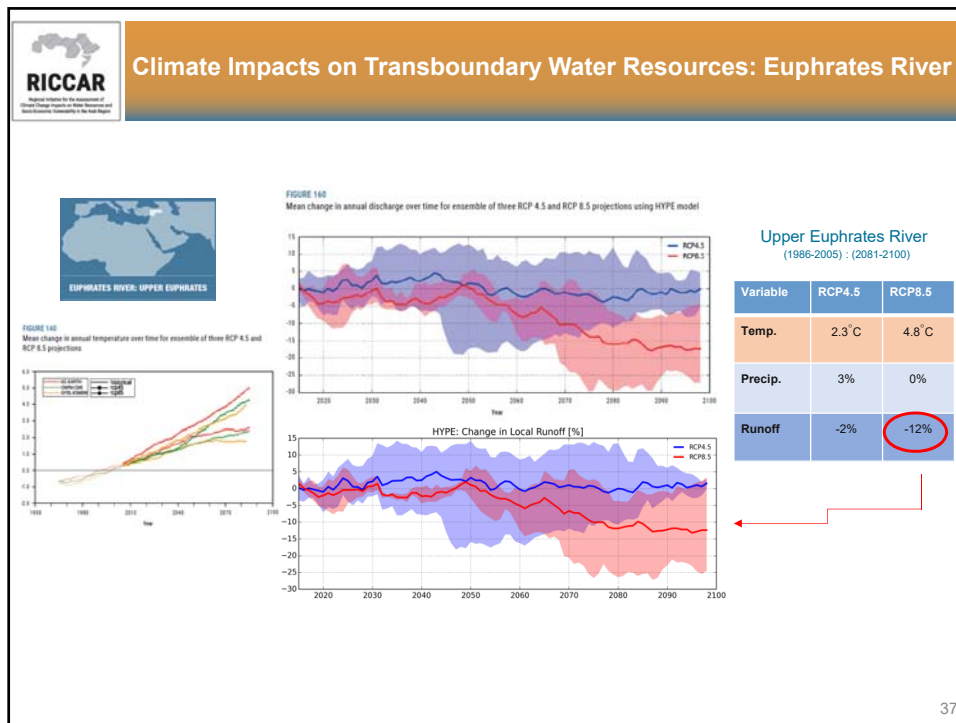
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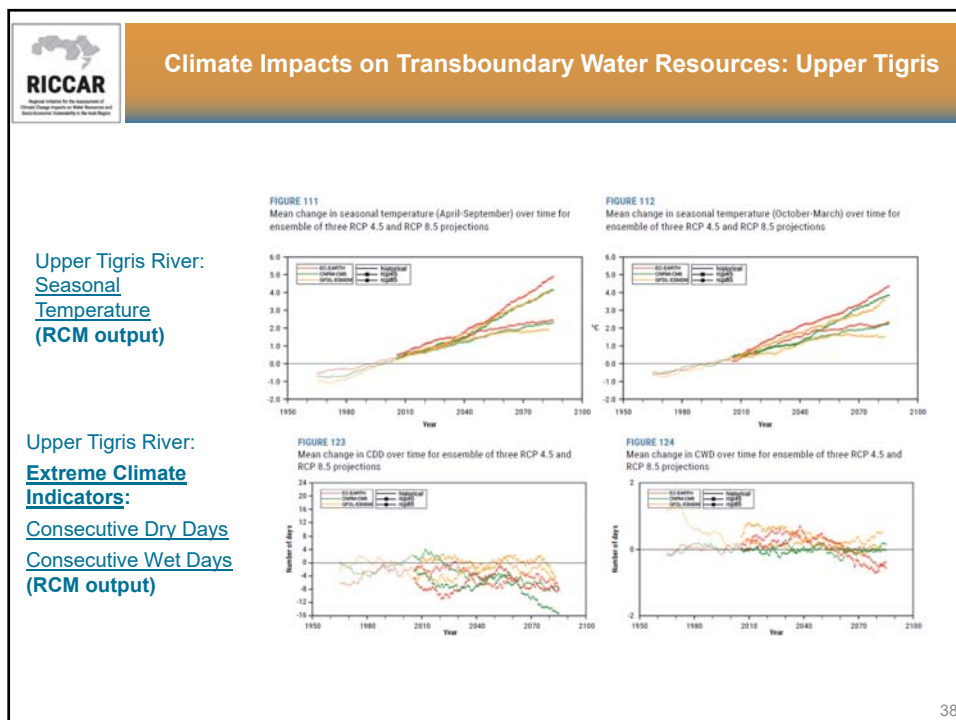
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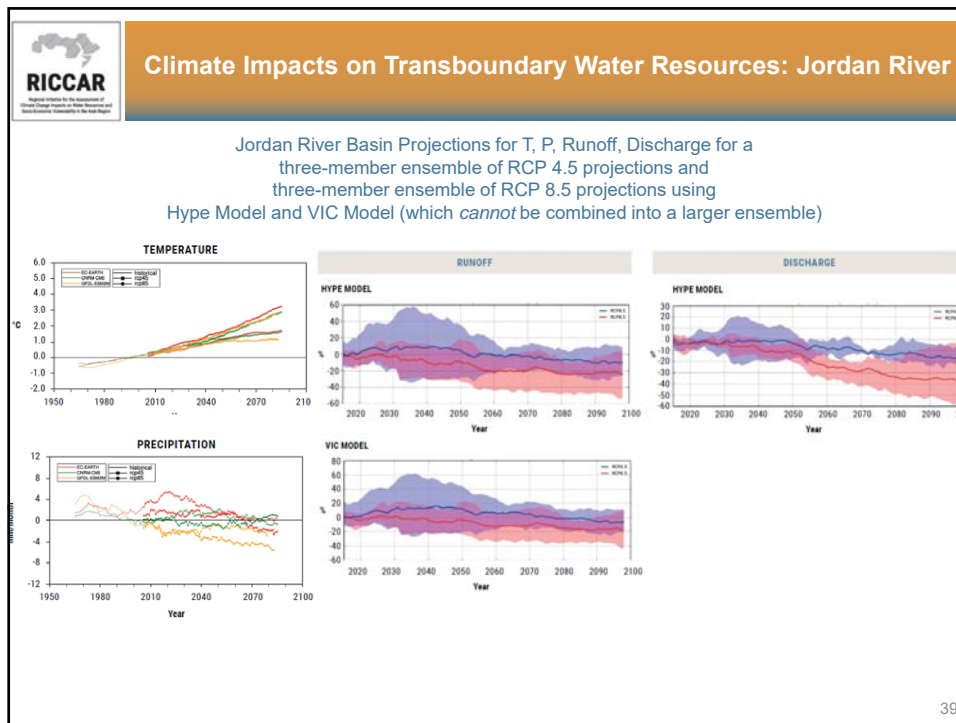
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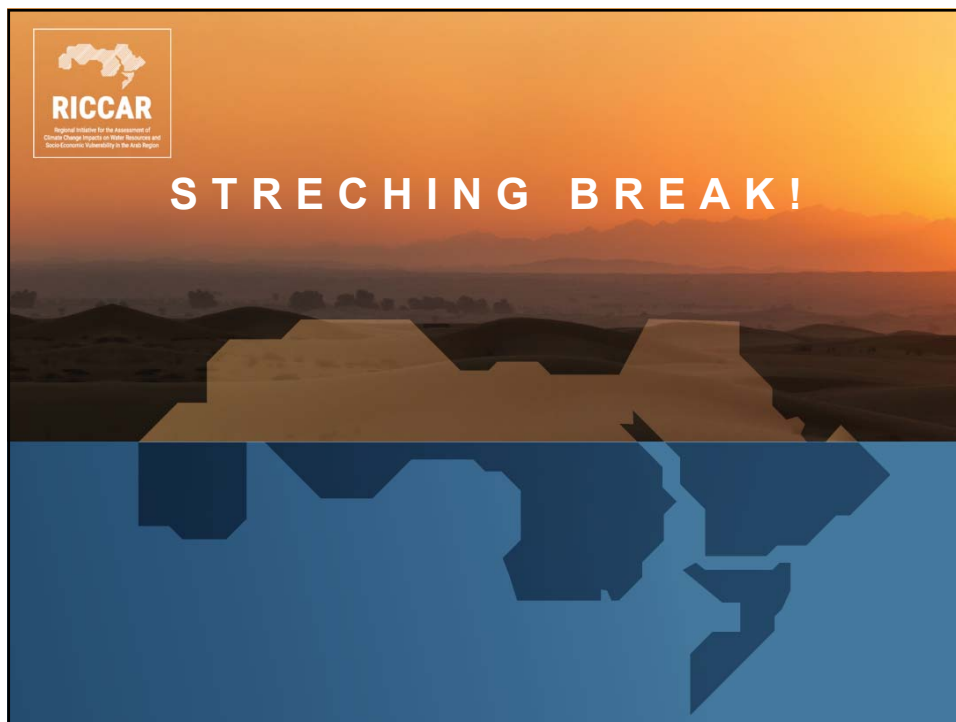
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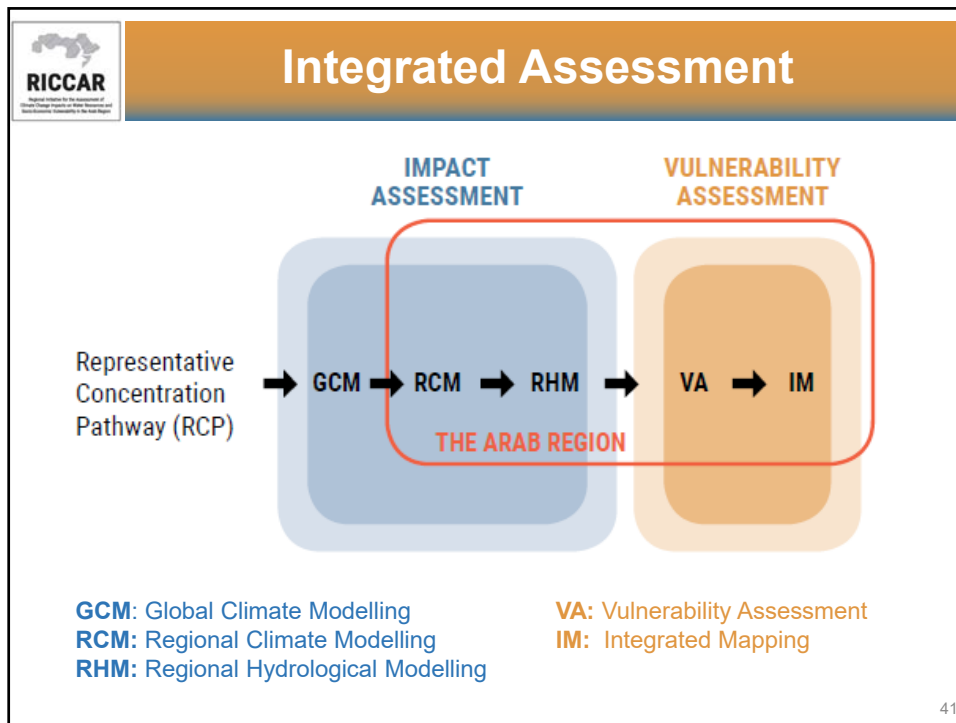
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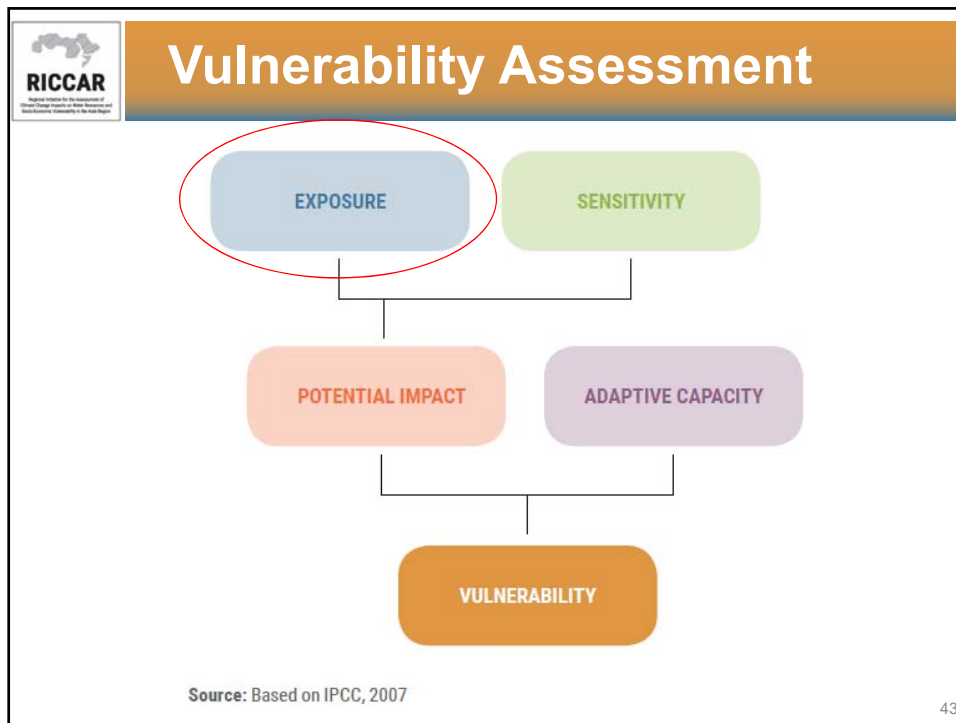
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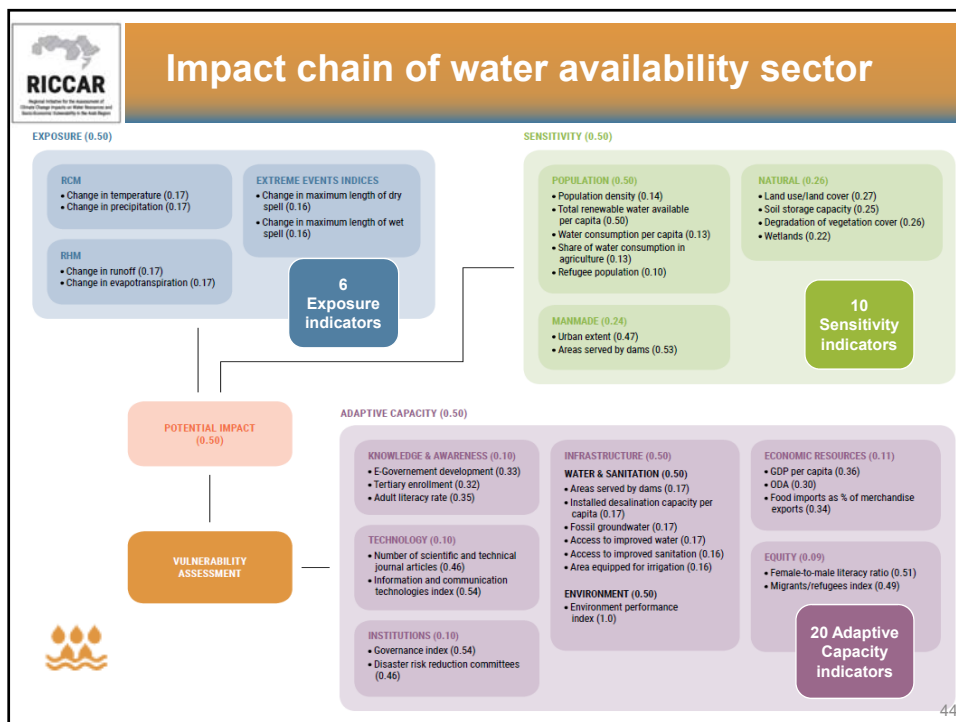
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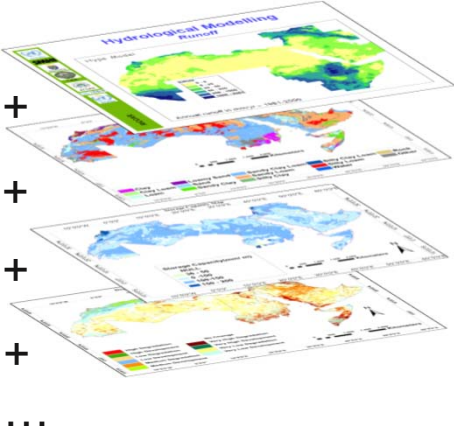
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Overall Vulnerability


Preparation of a Vulnerability Index:

- Per Sector
 - Contains all indicators identified to assess a given sectors
 - Attribution of weights for each indicator dependent on impact chains and expert judgment
 - As sector level, aggregated by component: Exposure, Sensitivity, Adaptive Capacity
- Overall Vulnerability
 - Aggregates vulnerability of each sector to generate an Overall VA
 - Supports identification of VA Hotspots









Slide graphics: adelphi
Source of maps: ACSAD, SMHI

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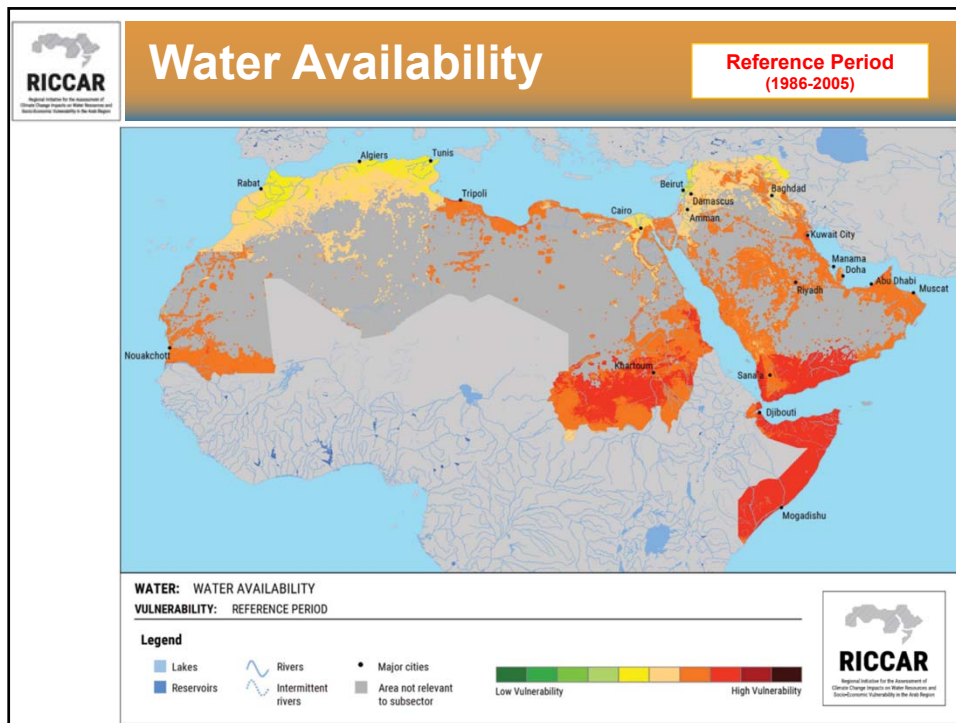


Vulnerability Assessment

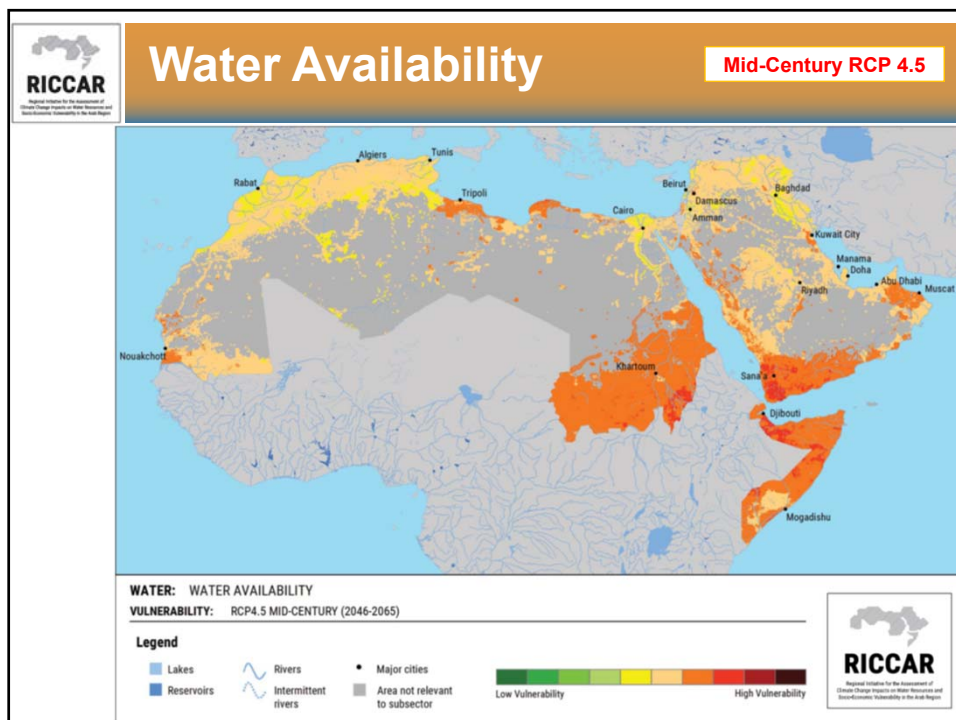
	SECTORS	SUBSECTORS
	Water	Water availability
	Biodiversity and Ecosystems	Area covered by forests Area covered by wetlands
	Agriculture	Water available for crops Water available for livestock
	Infrastructure and Human Settlements	Inland flooding area
	People	Water available for drinking Health conditions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



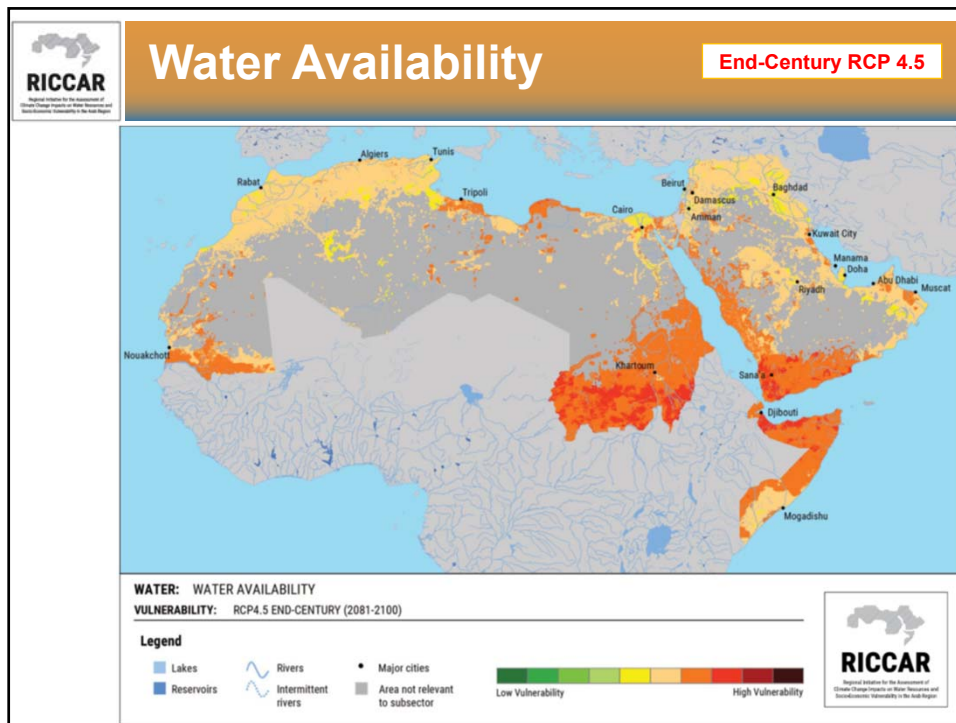
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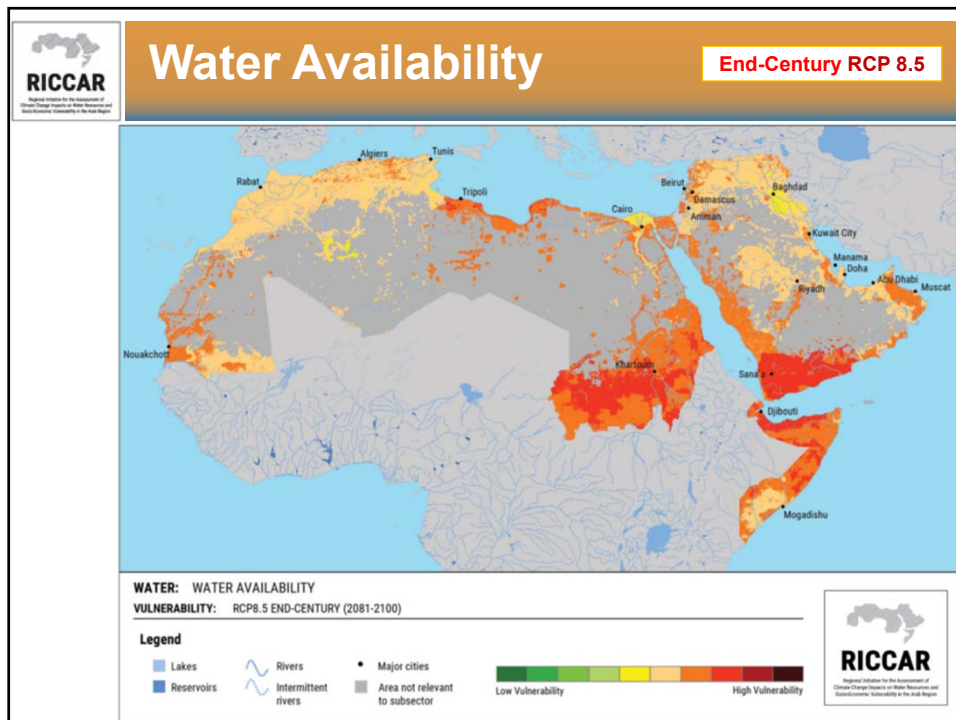
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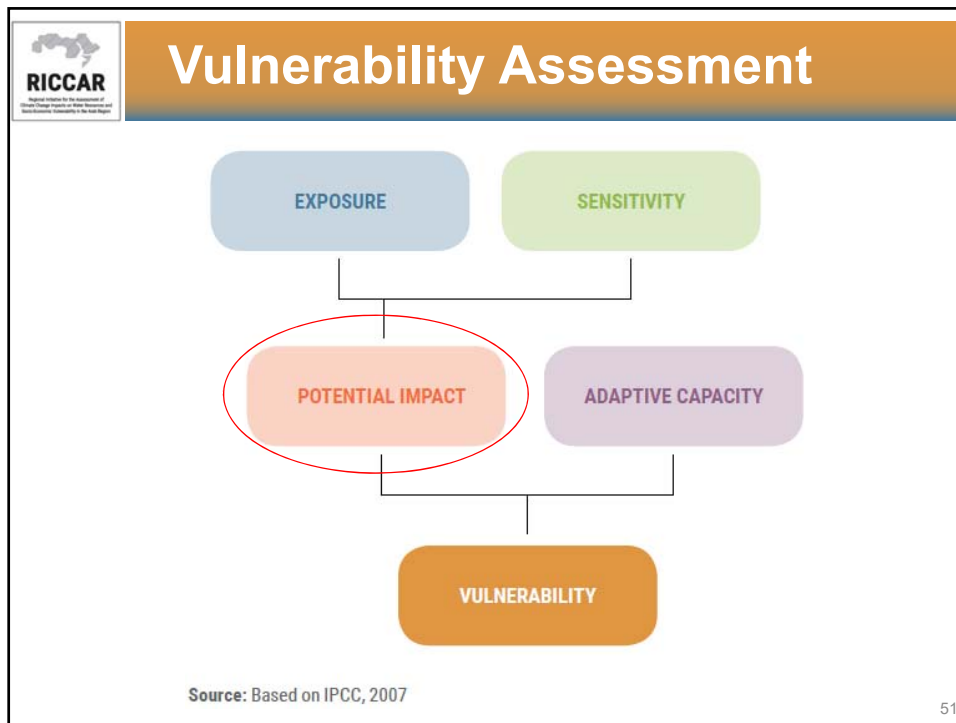
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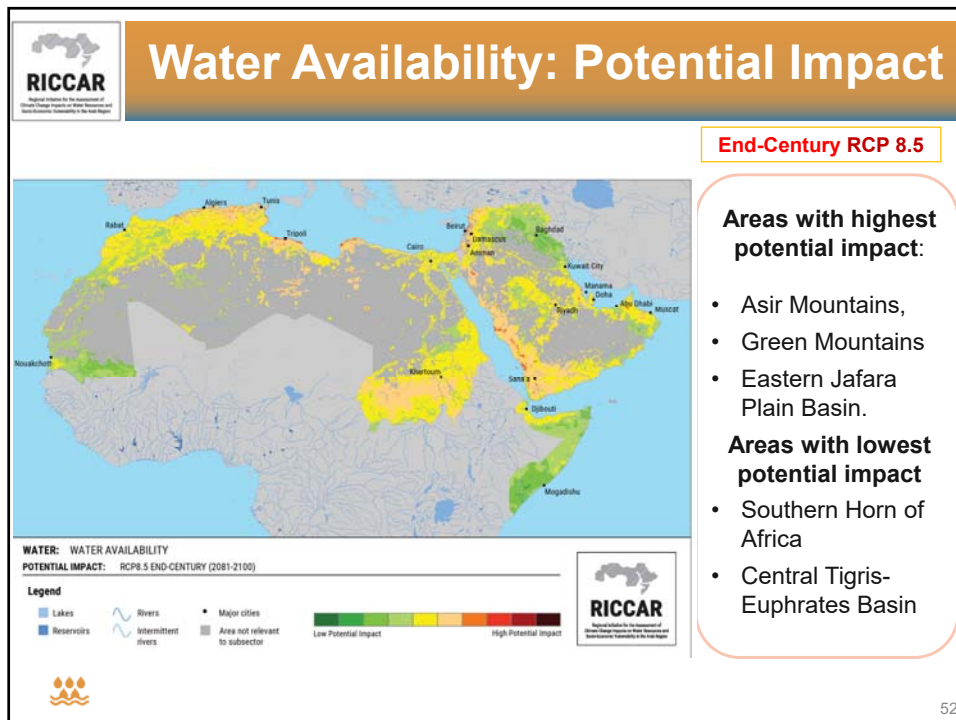
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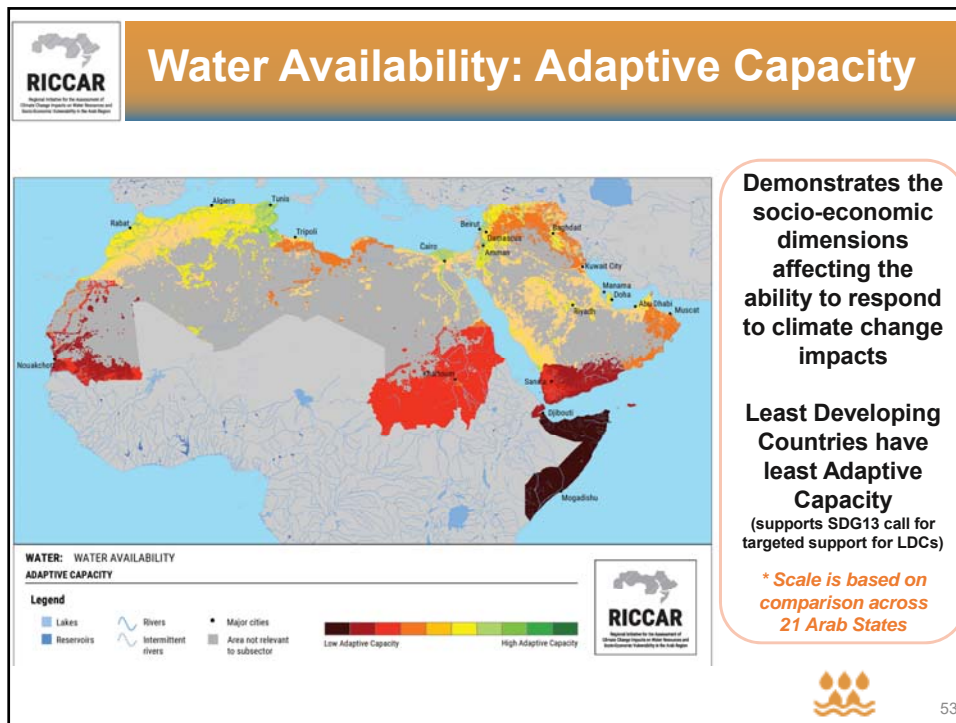
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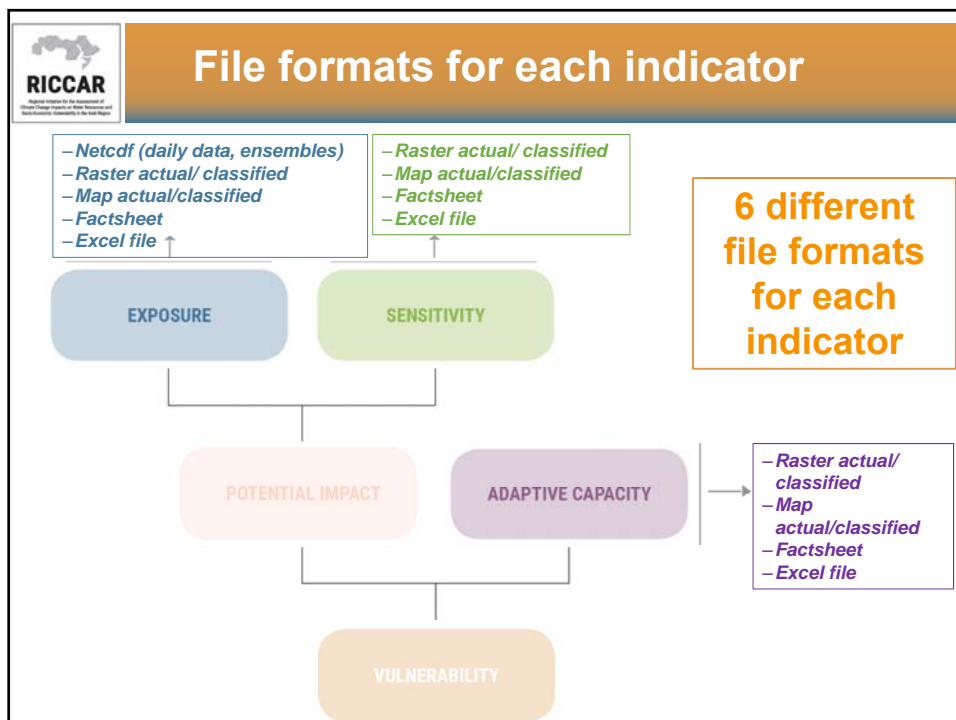
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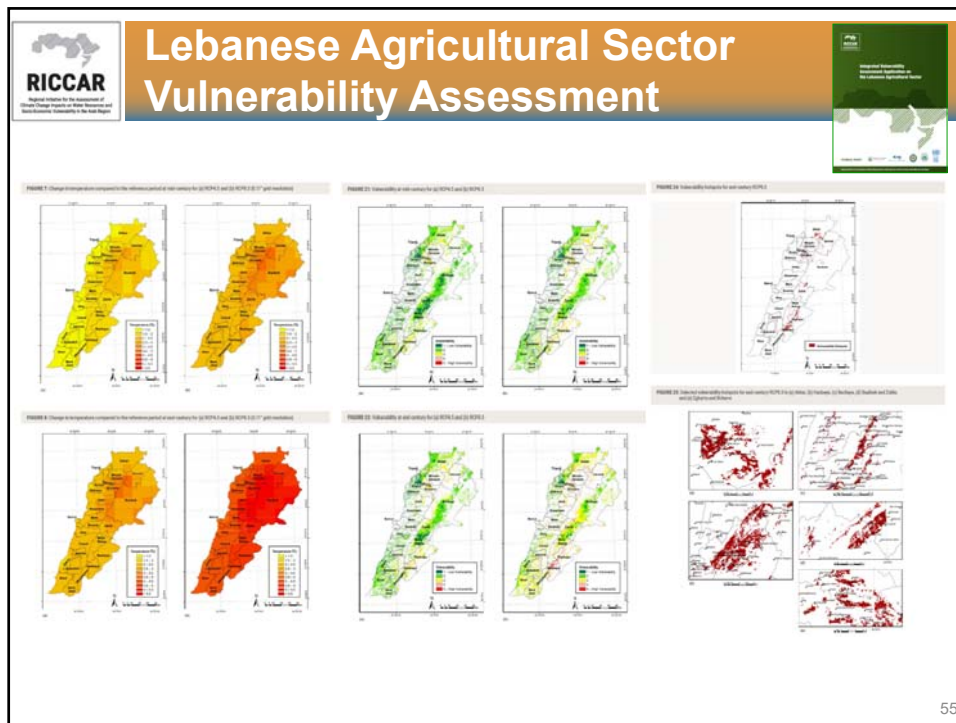
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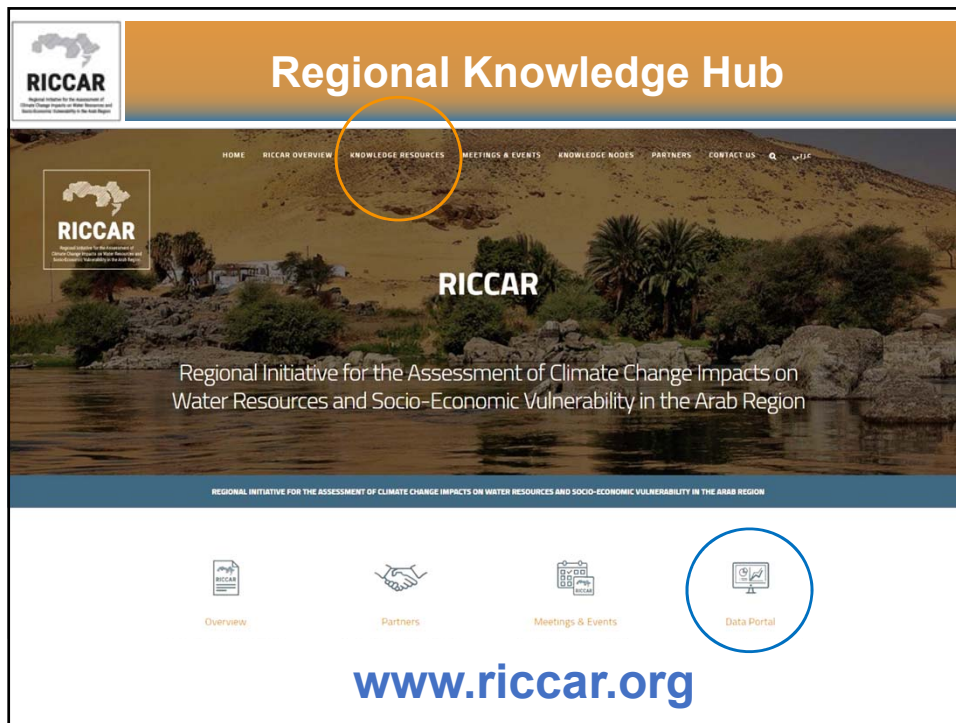
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Regional Knowledge Nodes

Adaptation Node:

- Resources and analysis that draw upon RICCAR findings to inform other climate change work related to Arab States.
- Includes Case Studies and Training Materials

MOROCCO TUNISIA
IRAQ
YEMEN JORDAN
PALESTINE SUDAN
EGYPT LEBANON

Introduction - Developing the Capacities of the Arab Countries for Climate Change Adaptation Using Integrated Water Resources Management Tools
Lead Author: ESCWA
2017
This report introduces the different modules developed within the framework of the United Nations Development Account (UNDA) project on 'Developing the Capacities of the Arab Countries for Climate Change Adaptation by Applying WRRM Tools'. The modules build upon work conducted under the Regional Initiative for the Assessment of Climate Change Impacts on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) and seek to assist Arab countries in developing their adaptive capacity by applying WRRM tools in the strategic sectors, namely: agriculture, environment, health, human settlements and economic development.

Water-Energy Nexus Regional Policy Toolkit
Lead Author: ESCWA
2018
This toolkit has been developed as part of ESCWA's efforts to help member states achieve an integrated approach to the SDGs through a Water-Energy Nexus Development Account (WENDA) project on 'Developing the capacities of ESCWA member countries to address the water and energy needs for achieving Sustainable Development Goals'. This toolkit aims at offering capacities to high-level officials in ministries responsible for water and energy to incorporate the nexus in national and regional policies and strategies. It covers the following topics: 1. Knowledge and assessment; 2. Increasing policy coherence; 3. Examining the water-energy security nexus; 4. Increasing efficiency; 5. Informing technology choices; 6. Planning renewable energy; 7. Addressing climate change and natural disaster.

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Data Portal

Food and Agriculture Organization of the United Nations

RICCAR regional knowledge Hub Data Portal

Map

CLIMATE

TAS - Change in Annual Temperature (R)

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

<https://rkh.apps.fao.org/>

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RICCAR Regional Centre for the Assessment of Regional Climate Modelling, Hydrological Modelling and Vulnerability Assessments in the Arab Region

RKH linked to ACCCP

UNESCO ESCWA Shared Prosperity Dignified Life

ESCWA coordinates RICCAR within the framework of its **Arab Centre for Climate Change Policies (ACCCP)**

Support also provided to Arab Climate Outlook Forum

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RICCAR Regional Centre for the Assessment of Regional Climate Modelling, Hydrological Modelling and Vulnerability Assessments in the Arab Region

Framing YOUR Assessment

When drawing upon a Regional Climate Modelling, Hydrological Modelling or Vulnerability Assessments, consider:

- 1) Do you need projected **Outputs or Inputs** for use in other models?
- 2) What **Scale of Analysis** is relevant for your needs?
- 3) Which **Essential Climate Variables** can inform your analysis?
- 4) Which **Extreme Climate Indices** could strengthen your analysis?
- 5) What **Domain** to use or draw upon for regional climate modelling?
- 6) Which climate **Scenario** is relevant to your purpose?
- 7) When to use an **Ensemble** of projections for quantifying the range of uncertainty?
- 8) What **Time Period(s)** do you aim to cover in your analysis?

We look forward to helping you to pursue your own climate change analysis!

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ريكار
المعهد الإقليمي لتقييم الأثر المناخي على
الموارد المائية والقدرة على الصمود
الاقتصادية في المنطقة العربية

Thank You

Carol Chouchani Cherfane
RICCAR Coordinator
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