

ESCWA Committee on Water Resources – 11th Session
Amman, 26-27 March 2015

Progress achieved in Implementing the Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR)

Economic and Social Commission for Western Asia



UNITED NATIONS

الاسكوا
ESCWA

40
YEARS

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.

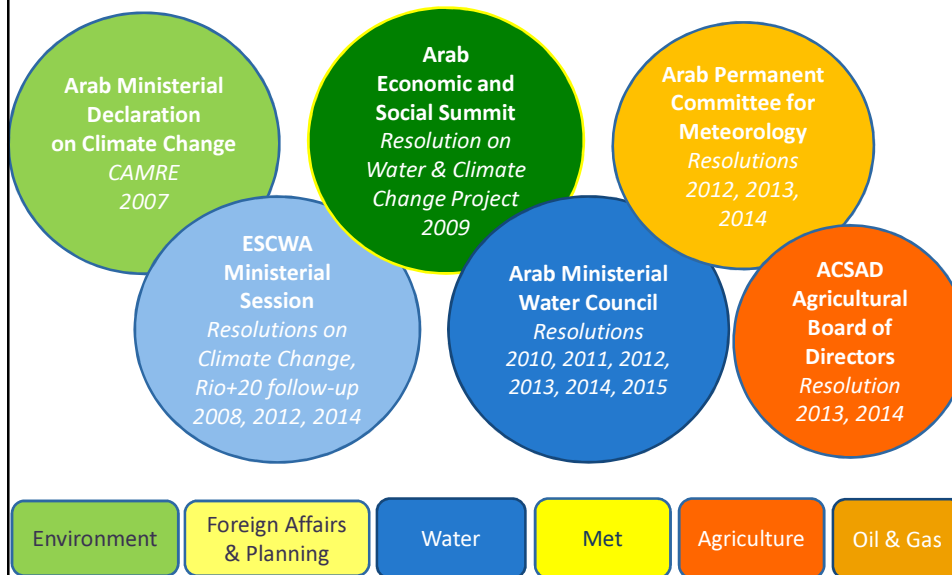
Assessment

Adaptation

Mitigation

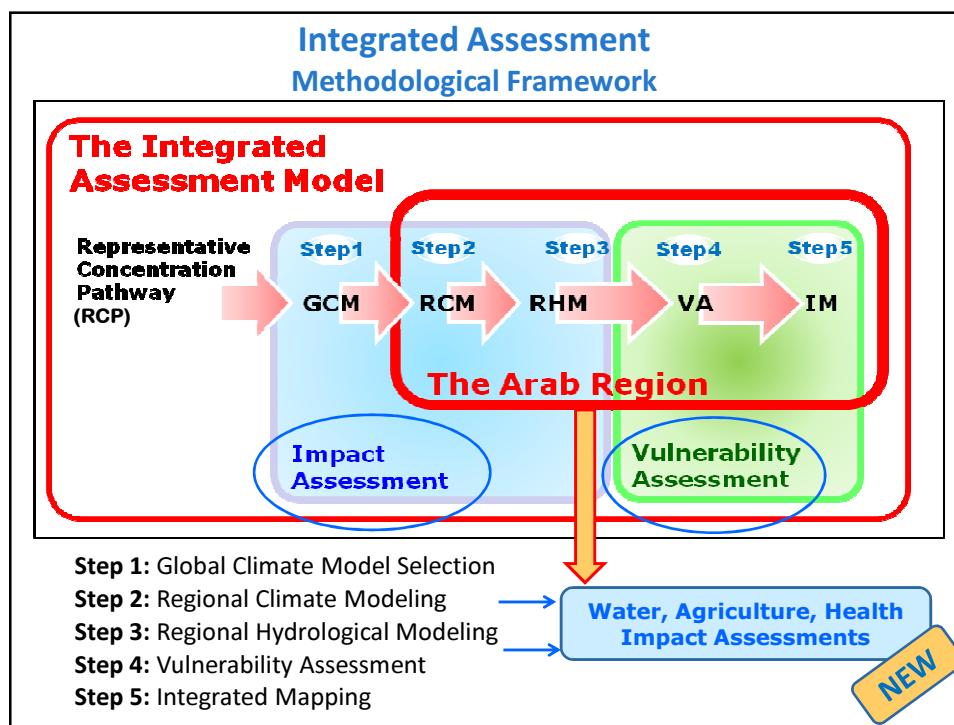
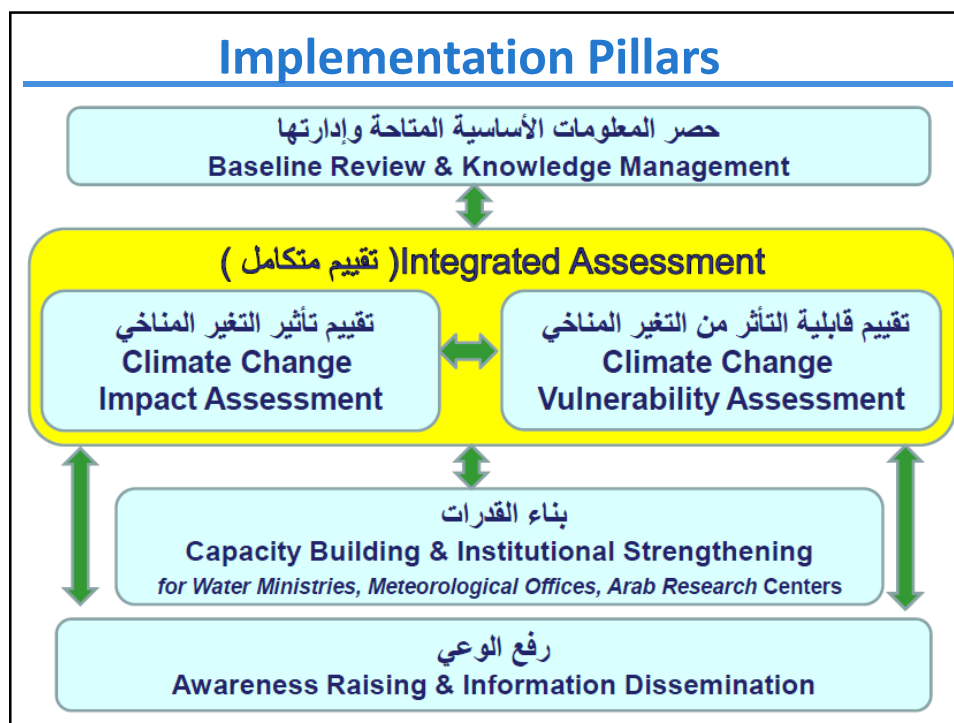
Negotiations

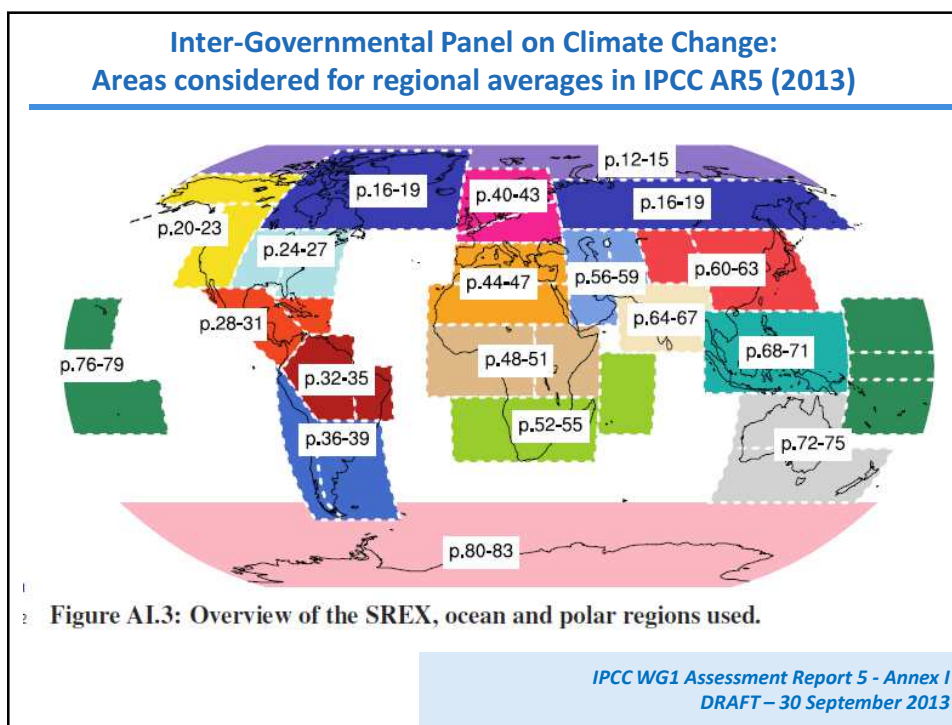
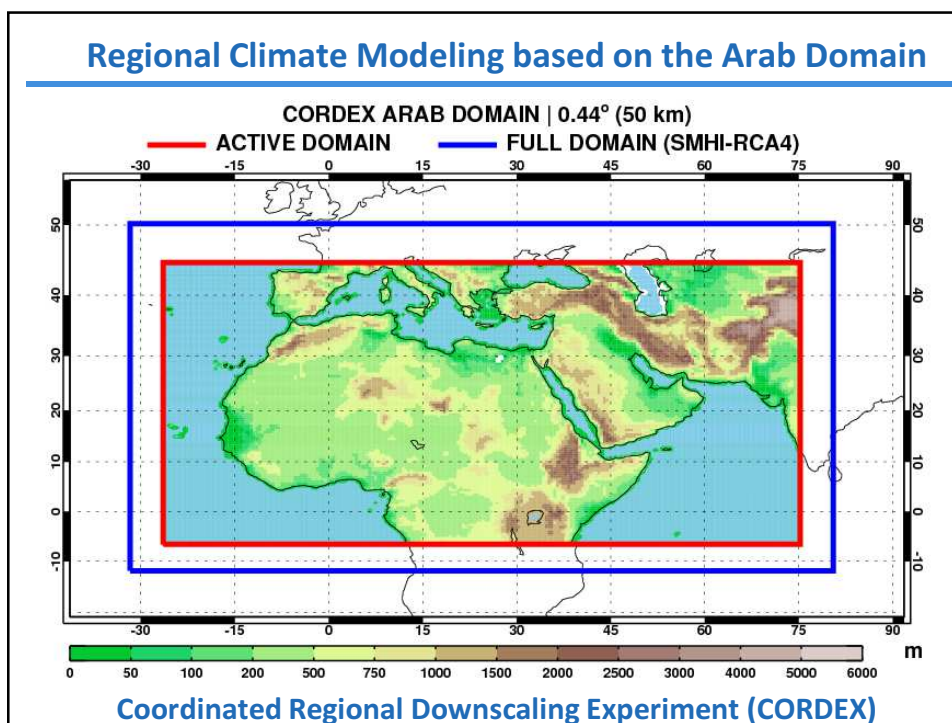
UN & LAS Inter-Governmental Mandates calling for Climate Change Assessment in the Arab Region & Mandating RICCAR

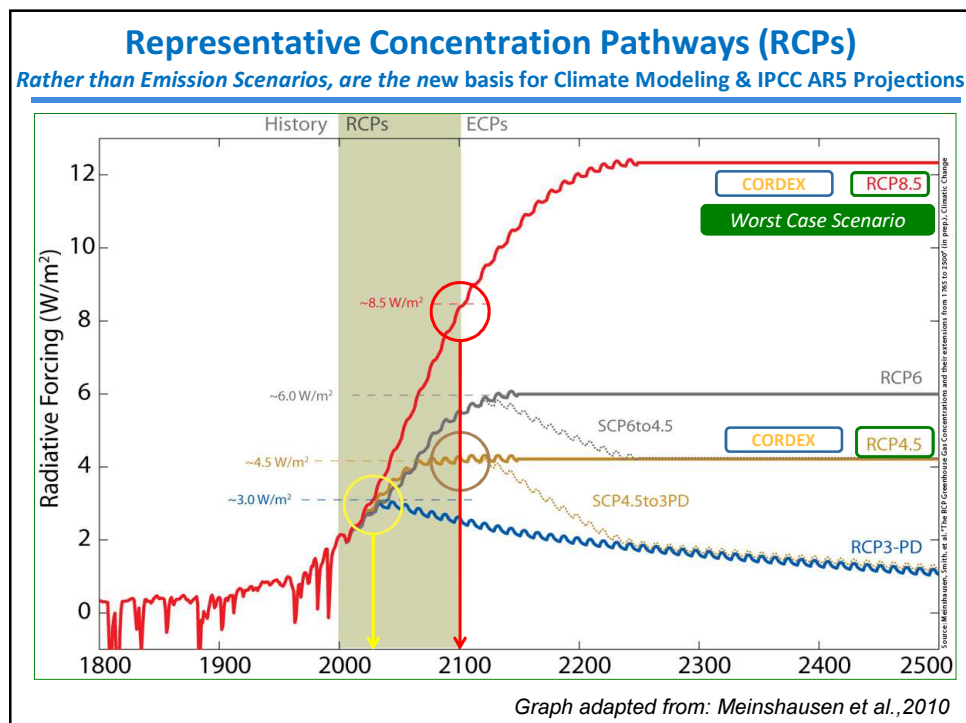
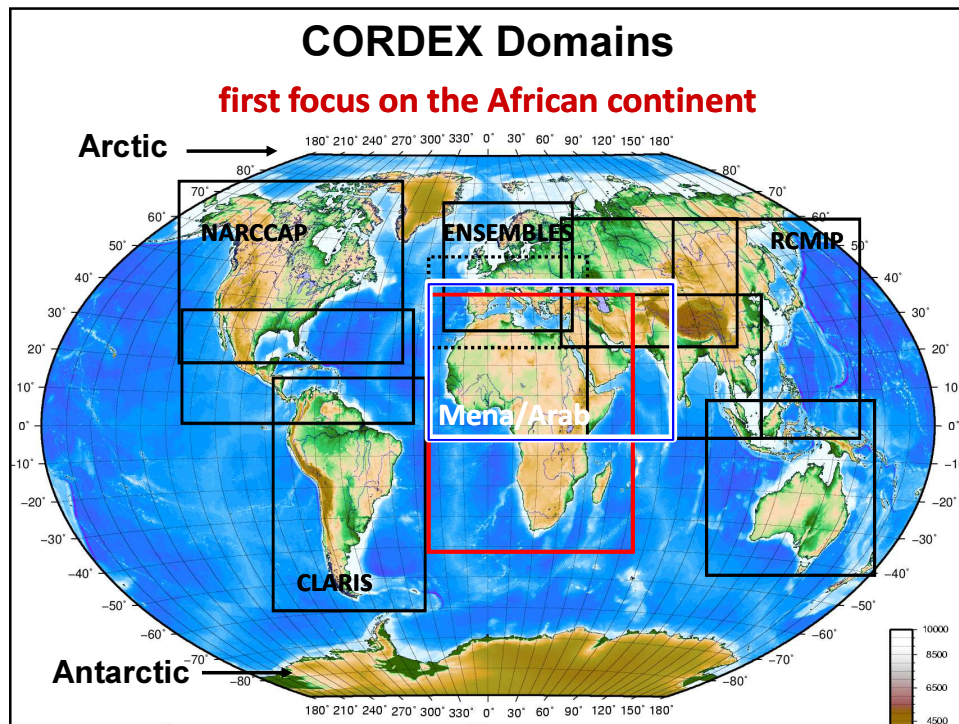


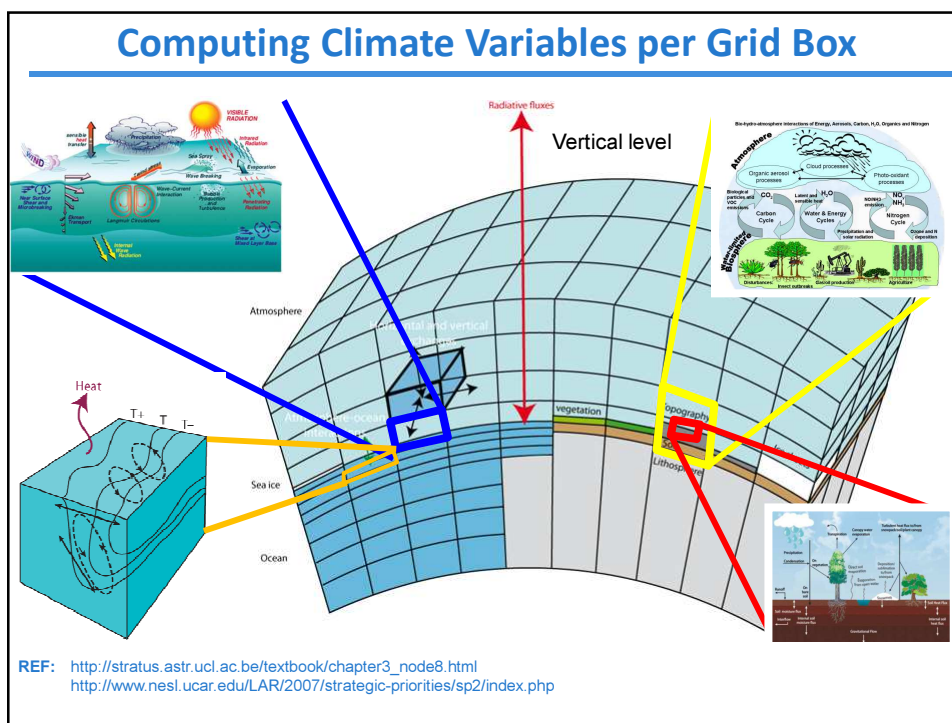
RICCAR Implementing Partners











Essential Climate Variables generated per Grid Box

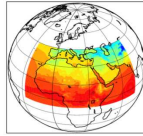
Table 1. LIST OF ESSENTIAL CLIMATE VARIABLES¹

Domain	Sub-domain	GCOS Essential Climate Variables	
Atmospheric (over land, sea and ice)	Surface ^a	<ul style="list-style-type: none"> Air temperature Wind speed and direction Water vapour 	<ul style="list-style-type: none"> Pressure Surface radiation budget
	Upper-air (up to the stratopause)	<ul style="list-style-type: none"> Temperature Wind speed and direction Water vapour 	<ul style="list-style-type: none"> Cloud properties Earth radiation budget (including solar irradiance)
	Composition	<ul style="list-style-type: none"> Carbon dioxide Methane and other long-lived greenhouse gases: nitrous oxide (N₂O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF₆), perfluorocarbons (PFCs) 	<ul style="list-style-type: none"> Ozone and aerosols, supported by their precursors, in particular nitrogen dioxide (NO₂), sulphur dioxide (SO₂), formaldehyde (HCHO), carbon monoxide (CO)
Oceanic	Surface ^b	<ul style="list-style-type: none"> Sea-surface temperature Sea-surface salinity Sea level Sea state Sea ice 	<ul style="list-style-type: none"> Surface current Ocean colour Carbon dioxide partial pressure Ocean acidity Phytoplankton
	Sub-surface	<ul style="list-style-type: none"> Temperature Salinity Ocean current Nutrients 	<ul style="list-style-type: none"> Carbon dioxide partial pressure Ocean acidity Oxygen Tracers
Terrestrial	Surface ^b	<ul style="list-style-type: none"> River discharge Water use Lakes Snow cover Glaciers and ice caps Ice sheets Permafrost Albedo 	<ul style="list-style-type: none"> Land cover (including vegetation type) Fraction of absorbed photosynthetically active radiation (FAPAR) Leaf area index (LAI) Above-ground biomass Fire disturbance
	Sub-surface	<ul style="list-style-type: none"> Groundwater 	<ul style="list-style-type: none"> Soil carbon Soil moisture

Notes: ^a Including measurements at standardized, but globally varying heights in close proximity to the surface.

^b Including measurements within the surface mixed layer, usually within the upper 15 m.

GCOS,2012


CORDEX-MENA/Arab Ensemble Matrix						
RCM (Institute)	GCM	Historical 1950-2005	RCP2.6 2006-2100	RCP4.5 2006-2100	RCP8.5 2006-2100	
RCA4 (SMHI)	EC-Earth 50km	✓	✓	✓	✓	
RCA4 (SMHI)	EC-Earth 25km	✓			✓	
RCA4 (SMHI)	CNRM 50km	✓			✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RCA4 (SMHI)	GFDL-ESM			✓	✓	
RegCM4 (Kau)	HadGEM2 50km	✓		✓	✓	
RegCM4 (Kau)	MPI-ESM 50km	✓		✓	✓	
RegCM4 (Kau)	GFDL-ESM 50km	✓		✓	✓	

Currently have 13 regional climate projections completed
9 are available for download

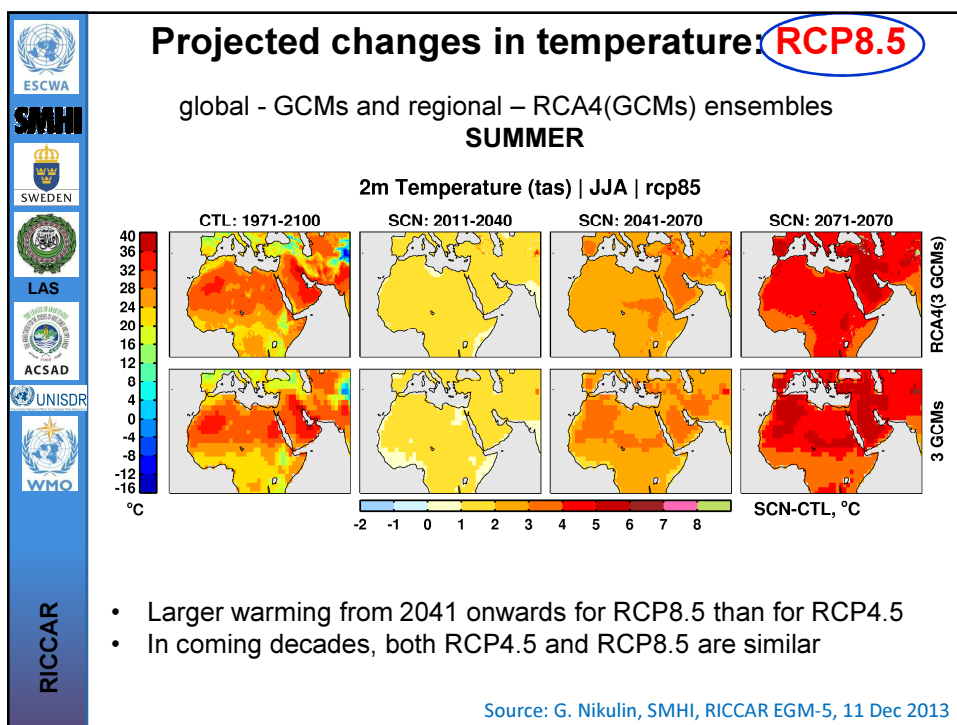
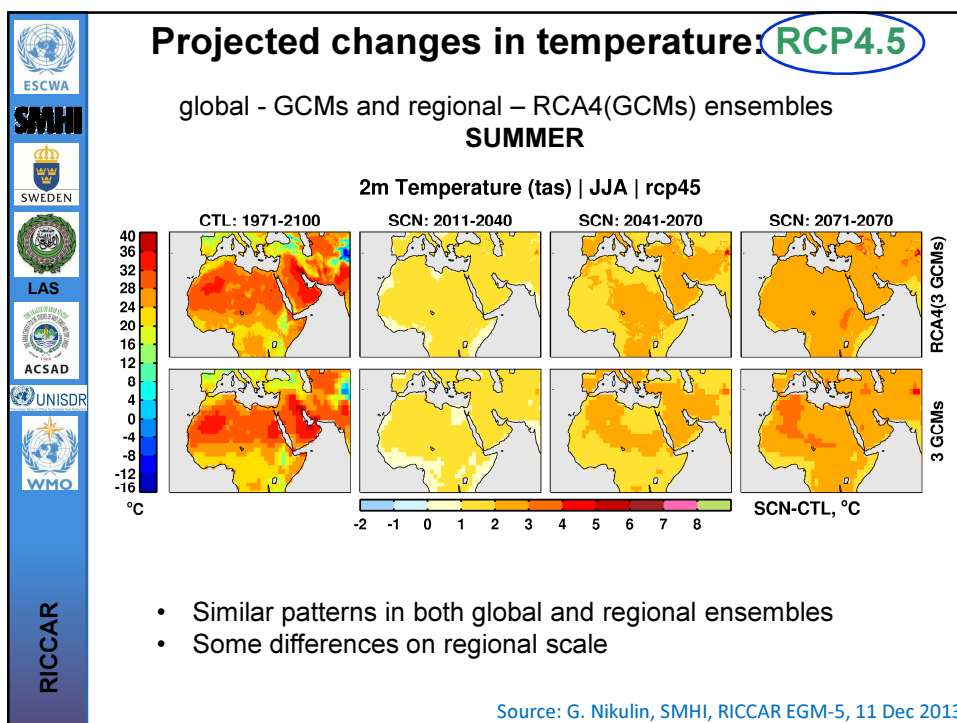
✓ Completed ✓ Running ✓ Planned

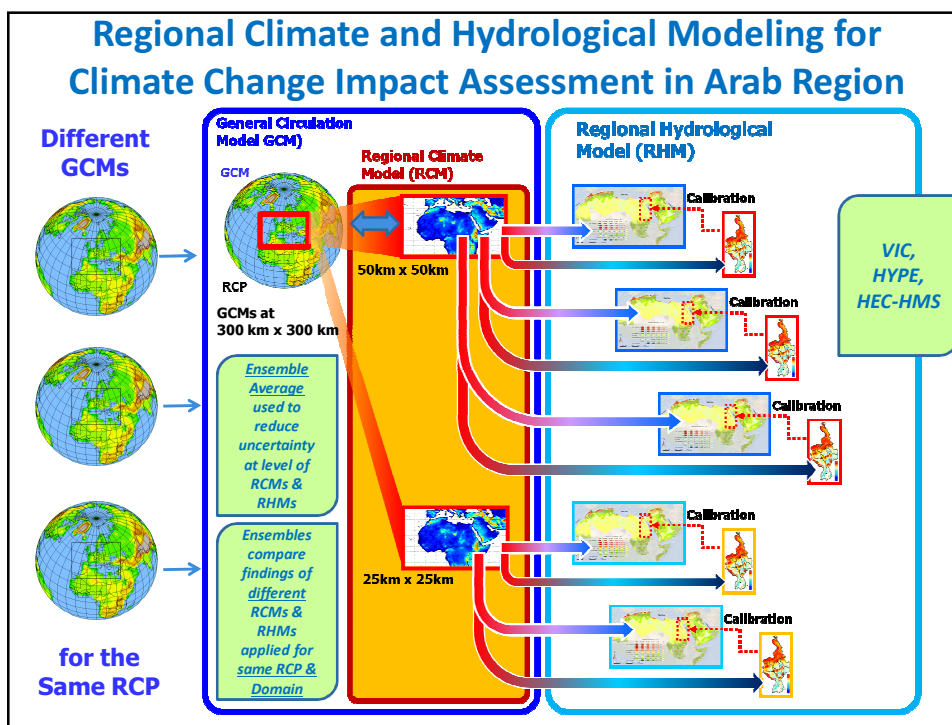
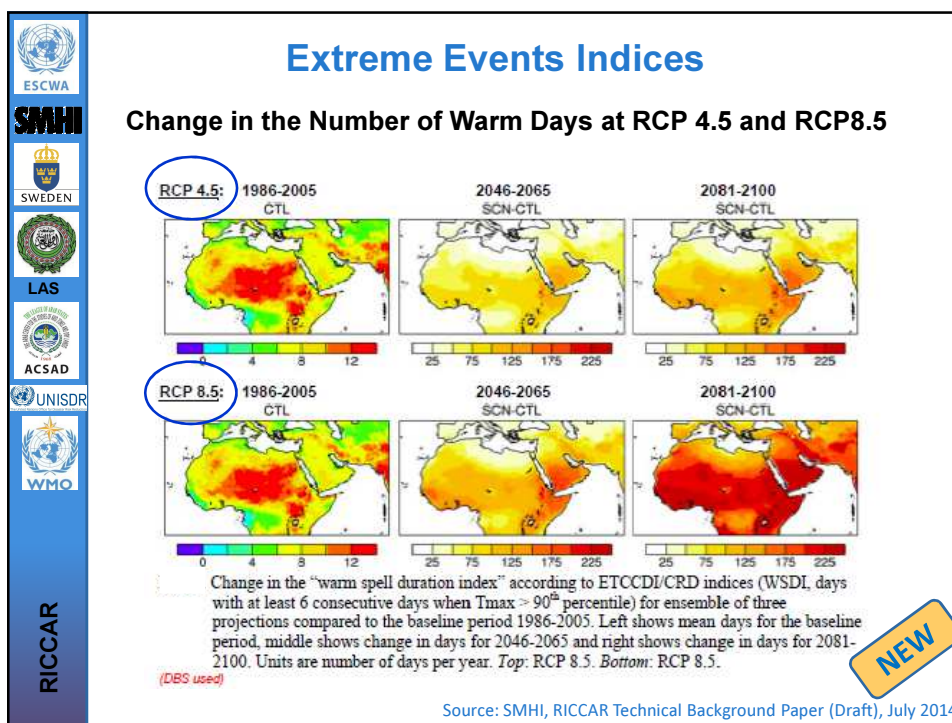
Accessing MENA/Arab Domain CORDEX Projections via Earth System Grid Federation (ESGF)

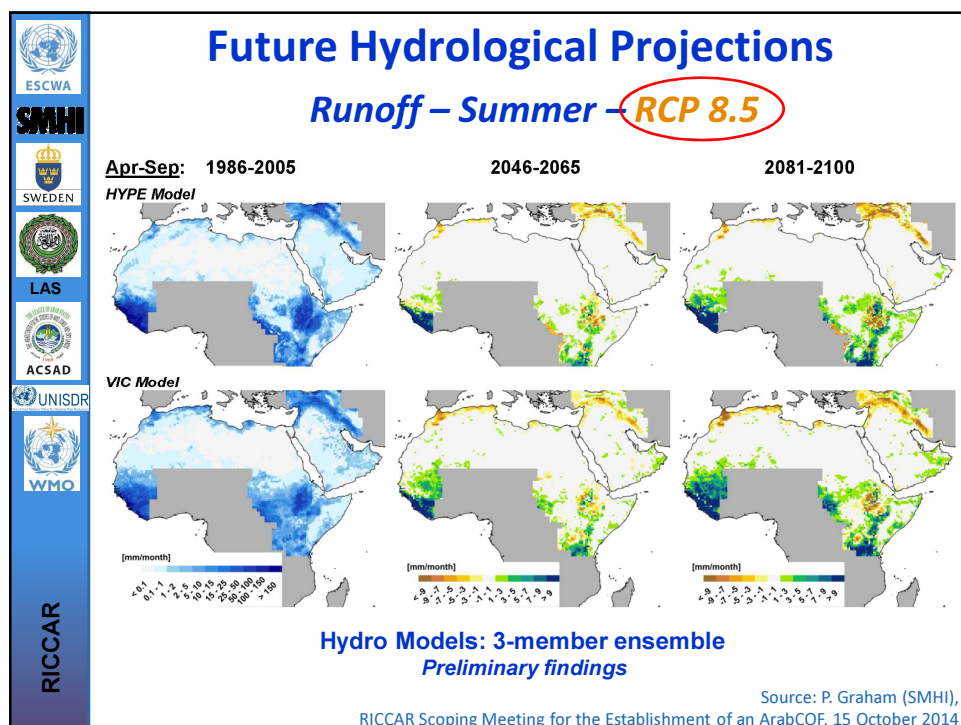
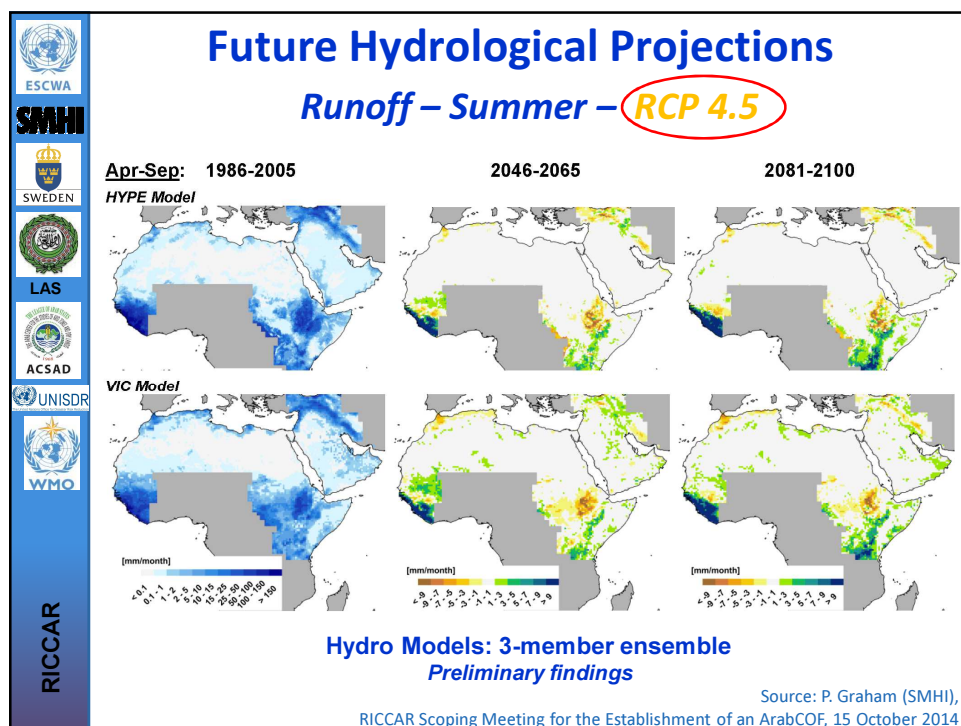
esg-dn1.nsc.liu.se

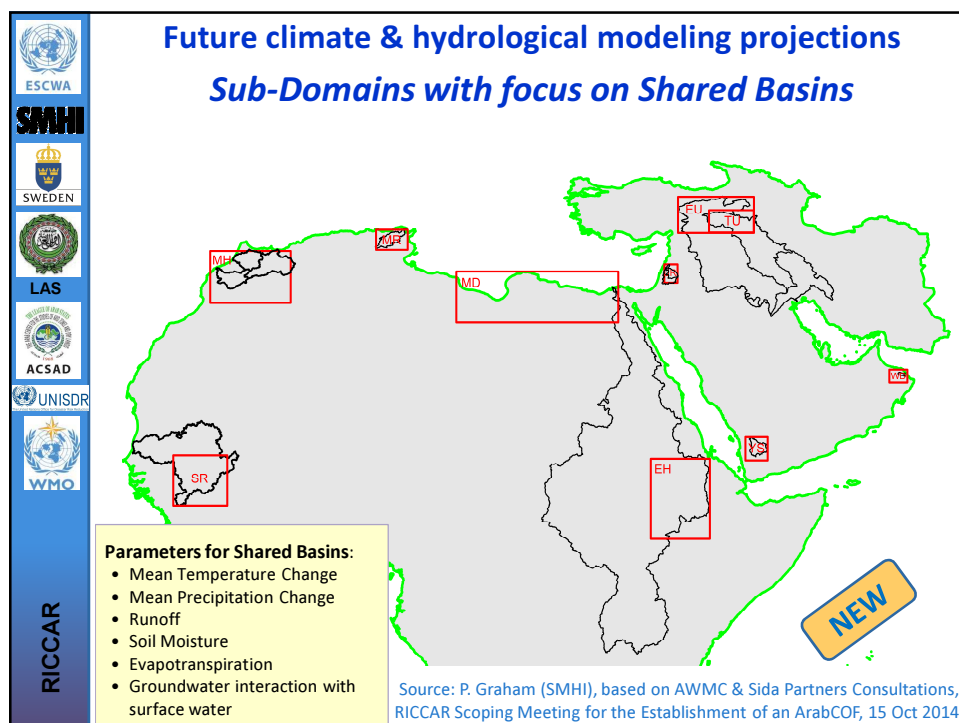


Projections in NetCDF can be visualized using ArcGIS10.x









10 Nominated Hydrological Focal Points			
Country	Focal Point	Title	Ministry
Iraq	Jaafar Zamel جعفر زامل	Head of Environmental Policy Department/ رئيس قسم السياسات البيئية	Ministry of Water Resources
	Abdul Jabar Khalaf Fench عبد الجبار خلف فنش	Expert	National Center for the Management of Water Resources المركز الوطني لإدارة الموارد المائية
Qatar	Saad Abdullah El Hatmi سعد عبد الله الهتمي		Ministry of Environment
Libya	Mahdi Abdullah El Mejrebi المهدي عبد الله المجري	Director General	Public Water Authority الهيئة العامة للمياه
Oman	Ali Ben Mohsen Ben Jawad Lwatia علي بن محسن بن جواد اللواتيا	Hydrological	Ministry of Regional Municipalities and Water Resources
Palestine	Deeb Saleh	Director, Water Resources	Palestinian Water Authority
Mauritania	Mohamed Abdellahi Ould Taleb	Technical Advisor responsible for Hydrology	Ministry of Hydrology and Sanitation
Morocco	Hasan Bargheit حسن برغيت	Head of Surface Water Establishment at the Water Research and Planning Directorate / رئيس مصلحة المياه السطحية بمديرية البحث والتخطيط المائي	Ministry of Energy, Minerals, Water and Environment الوزارة المنتدبة لدى وزارة الطاقة والمعادن والماء والبيئة المكلفة بالماء
Saudi Arabia	Yaser Bin Mashfar El Asmari ياسر بن مشفر الأسمرى	Hydrologist	Ministry of Water and Electricity
Sudan	Informally received Dec 2014		Ministry of Water & Electricity
Yemen	Abdulkhaleq Alwan عبد الخالق علوان	IWRM Principal Advisor Water Planning and Policies Director at NWRA-SB	Ministry of Water and Environment

Climate Change & Disaster Risk Reduction

National Level	Regional Level
<ul style="list-style-type: none"> • Disaster Loss Inventories <ul style="list-style-type: none"> – Supported by UNISDR – Sida project supported establishment or update of National Inventories in Tunisia, Morocco, Yemen, Jordan, Palestine ➤ Inventories used by ACSAD to develop Flood Risk Map for VA 	<ul style="list-style-type: none"> • 2nd Arab Conference on Disaster Risk Reduction (Sharm El-Sheikh, September 2014) <ul style="list-style-type: none"> ❖ RICCAR Side Event: LAS, UNISDR and ESCWA with SMHI Input ➤ Contribution to World Conference on Disaster Reduction (Sendai, March 2015)

Proposed Targets on Climate Change & Water-related Disasters in post-2015 Development Agenda zero draft (July 2014)

Impact Assessment Case Studies

Agriculture	Health
<ul style="list-style-type: none"> • FAO, ACSAD, GIZ • Forests • In-land Fisheries • Selected Crops • Selected Hot Spots 	<ul style="list-style-type: none"> • UNU/INWEH under Sida Project, in consultation with WHO • Disease Vectors • Rodent-Borne Infectious Diseases • North Africa








giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



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UNU-INWEH



RICCAR Vulnerability Assessment Sectors		
Work supported by GIZ/ACCWaM Contribution to RICCAR, with ACSAD and ESCWA		
	Impacts	Sub-Vulnerability
 Water	Change in water availability	V0
 Biodiversity & Ecosystems	Change in area covered by forests	V1
	Change in area of wetlands	V2
 Agriculture	Change of water available for crops	V3
	Change of rangeland for livestock	V4
 Infrastructure & Settlements	Damage from inland flooding	V5
	Damage from coastal flooding	V6
 People	Change of water available for drinking	V7
	Change in health due to heat stress	V8
	Change of employment rate in the agricultural sector	V9

Source: K.Fritzsche,
RICCAR EGM-5, 12 December 2013

Vulnerability Assessment Working Group

Objective: To support the preparation of the methodology and contribute to the preparation of the vulnerability assessment.

Tasks:

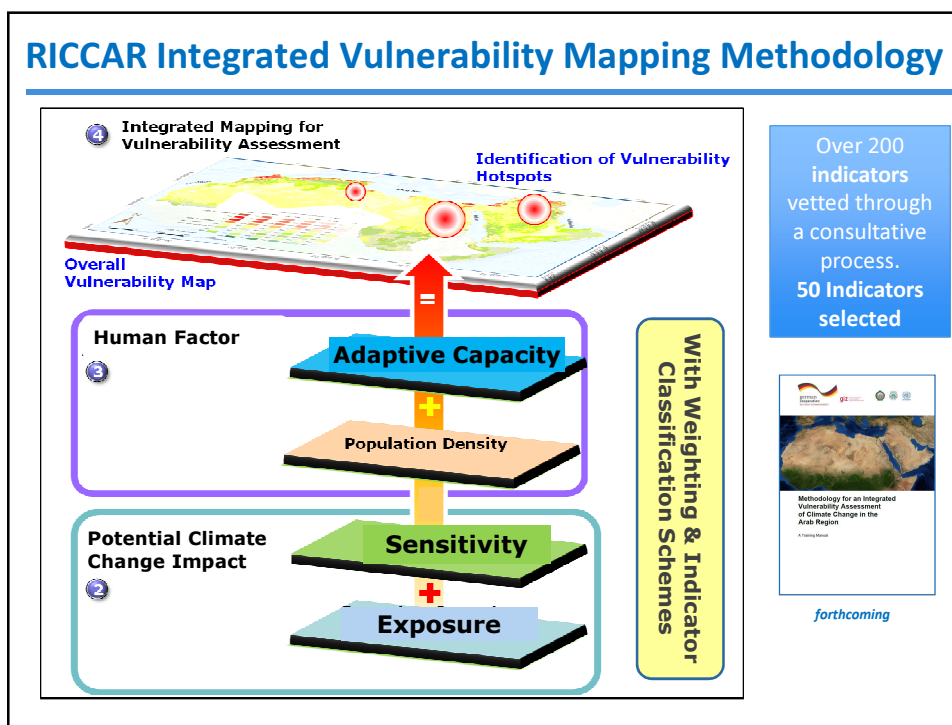
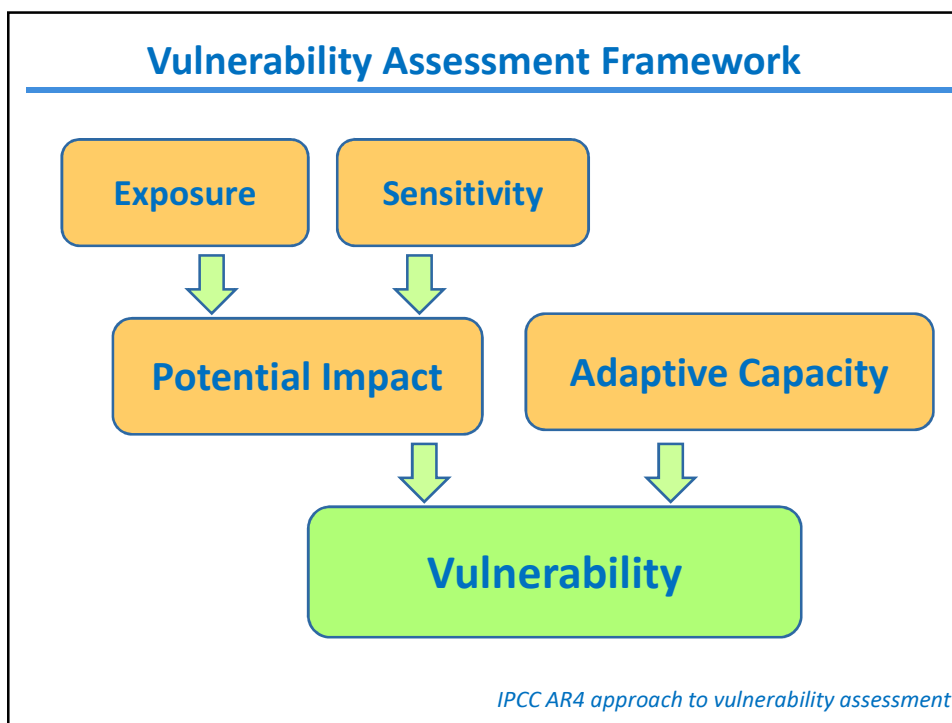
- Define the objectives, scope and deliverables of the socio-economic and environmental vulnerability assessment;
- Agree on the most suitable methodology and tools to be used;
- Contribute to the collection of data and information to support the assessment;
- Assist with the identification of expertise to provide input to the assessment;
- Provide expert review of the assessment products as they become available.

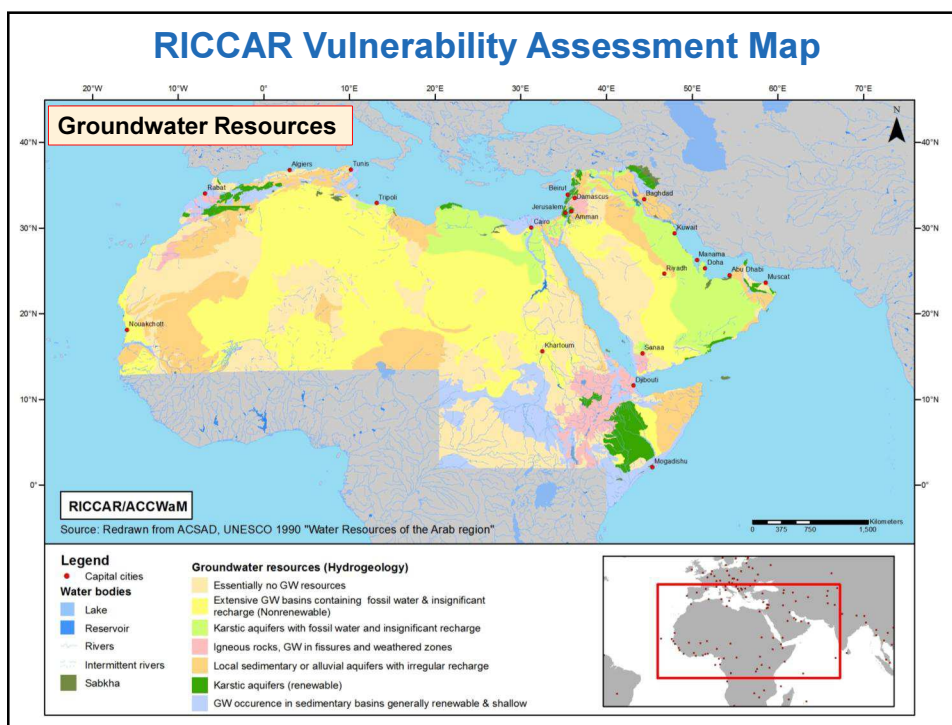
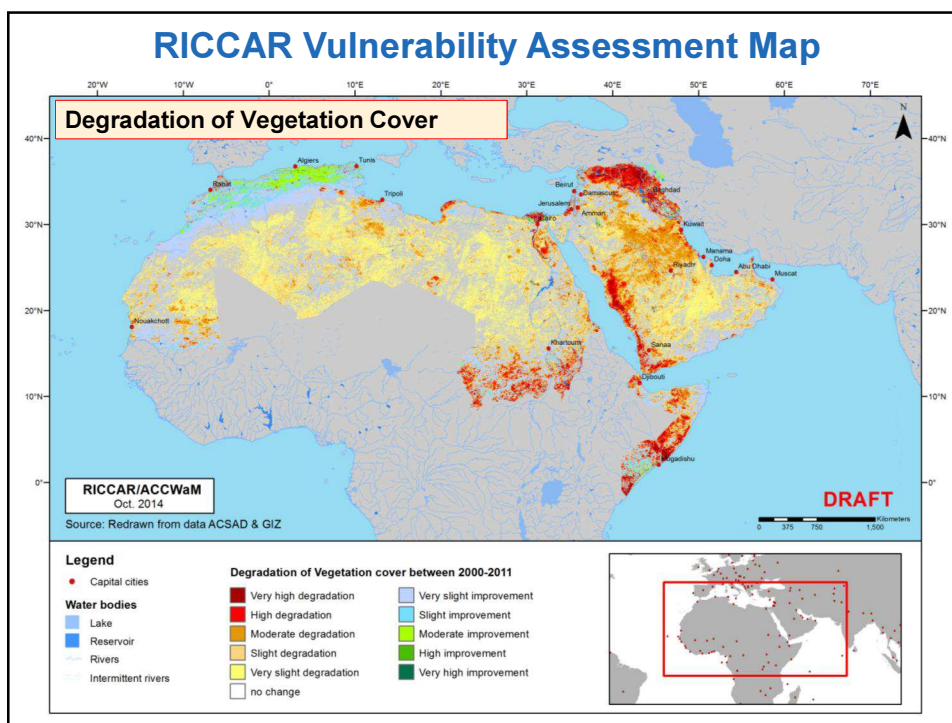
Composition (15 members):

- 4 Arab Governments (Egypt, Libya, Palestine, Tunisia)
- 4 Arab Organizations (ACSAD, AGU, AUB, LAS)
- 4 UN Organizations (ESCWA, UNEP, UNESCO, WHO)
- 3 Expert Organizations (GIZ, ICBA, University of Alexandria)

Duration: January 2013 – September 2014

Meeting 1: January 2013; **Meeting 2:** May 2013; **Meeting 3:** November 2013





Workshop on Applying the Climate Change Vulnerability Assessment Methodology in the Arab Region

Beirut, 11-13 May 2014

Training heavily GIS Based & targeted Arab Research Institutes

Purpose was to Test the Draft Manual

Led to Decision to set up
Sensitivity TF (ACSAD) and
Adaptive Capacity TF (ESCWA) to support application of VA methodology for Arab Region



Forthcoming

Regional Workshop on Moving from Impact Assessment to Vulnerability Assessment

Beirut, 8-10 June 2015

Weighting the Vulnerability Assessment Indicators Questionnaire

ESCWA Committee on Water Resources Members will be invited to complete the Questionnaire, as well as members of the VA Working Group, VA Task Forces and participants in RICCAR Expert Group Meeting

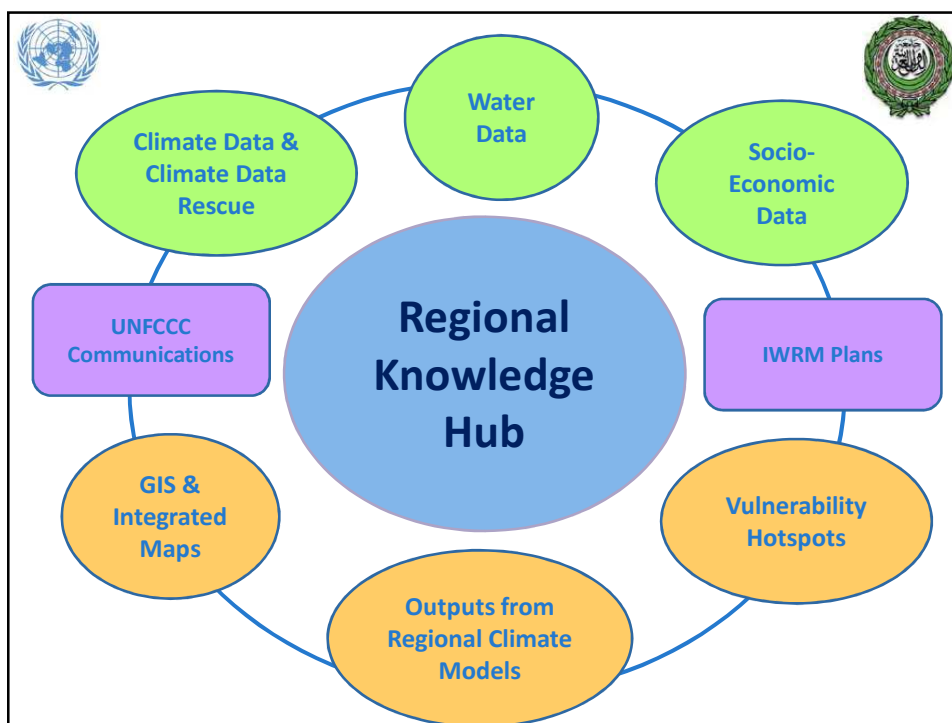
SENSITIVITY

Sensitivity Indicators (3 dimensions)

For a detailed description of each indicator, please refer to the 'Definitions' page.

1) Population Dimension *

	Not important at all [1]	[2]	Moderately Important [3]	[4]	Very important [5]
Population density	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share of agricultural labor force in total labor force	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share of children and elderly of the population	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Total renewable water available per capita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water consumption per capita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share of water consumption in agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share of agriculture in Gross Domestic Product (GDP)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refugee population	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Regional Knowledge Hub Working Group

Objective: To advise on the terms of reference and criteria for selecting a suitable institution for hosting the Regional Knowledge Hub.

Tasks:

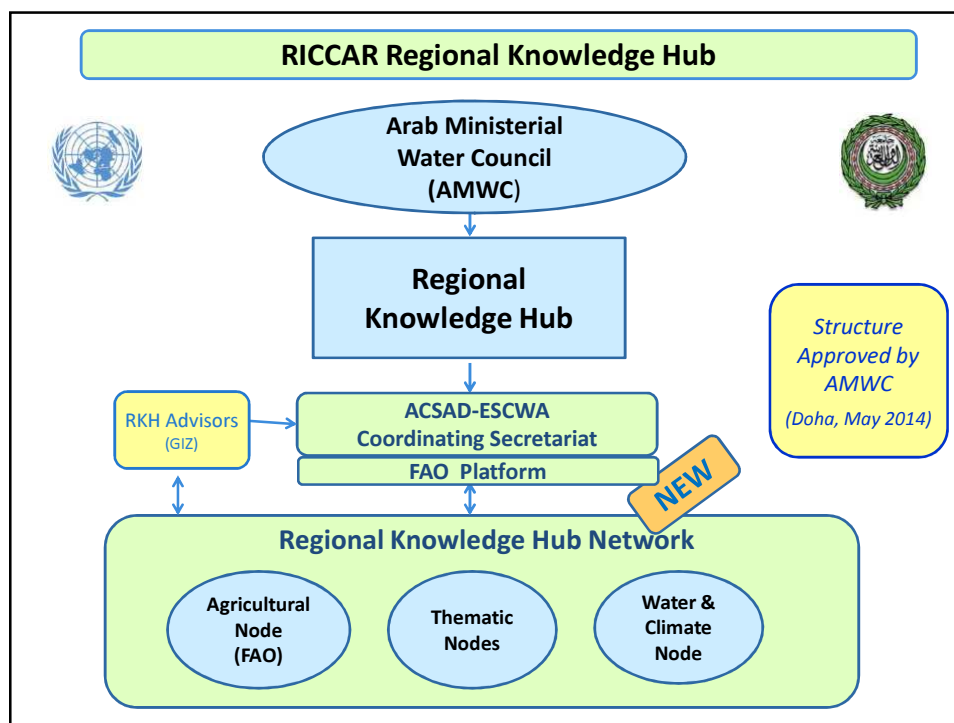
- Define form and function of Regional Knowledge Hub
- Prepare terms of reference
- Formulate selection criteria
- Suggestion potential host institutions

Composition (10 members):

- 3 Arab Governments (Lebanon, Palestine, Yemen)
- 3 Arab Organizations (LAS, ACSAD, CEDARE)
- 3 UN Organizations (ESCWA, UNISDR, UNU-INWEH)
- 1 Expert Organizations (GIZ)

Duration: January–December 2013

Meeting: January 2013; **On-Line Consultation on TOR & Criteria:** On-going

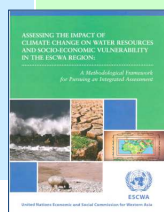


Institutional Strengthening

ArabCOF <i>Under Development</i>	MENA CORDEX Working Group
<ul style="list-style-type: none"> • Scoping Meeting for the Establishment of an Arab Climate Outlook Forum (Amman, October 2014) • Organized at request of Arab Permanent Committee for Meteorology • Organized by LAS, WMO, ESCWA & Hosted by Jordan Met Department with Sida support • ArabCOF Terms of Reference drafted & under review 	<ul style="list-style-type: none"> • Preliminary RCM Ensemble Meeting (Brussels, 2013) • First CORDEX MENA-CA Meeting (Nicosia, November 2014) • Organized by CORDEX (WMO) with SMHI & Hosted by The Cyprus Institute • KAU, KAUST, ESCWA attended & several modeling institutes Contributing additional projections on Arab Domain

Capacity Building & Institutional Strengthening			
Regional Workshops / EGMs	Participants	Leads	Date
Workshop on Projection/Prediction and Extreme Events Indices in Arab Region	Arab Met Offices	WMO	March 2012 Casablanca
Regional Workshop on Applications & Analysis of Regional Climate Models	Arab Water Ministries (technical staff)	SMHI, ACSAD	July 2012 Beirut
RICCAR Expert Group Meeting 4: Climate Ensemble & Working Groups	Arab Water Ministries, Environment Agencies	ESCWA, UNEP, LAS	July 2012 Beirut
National Workshops for Disaster Losses Inventories (Tunisia, Morocco, Yemen, Jordan, Palestine)	Inter-ministerial (planning, interior, environ, etc.)	UNISDR	Sept 2012 - April 2014
Climate Data Rescue Sub-regional Workshop (Palestine, Jordan, KSA, Yemen)	Arab Met Services	WMO, CECCR/KAU	June 2013 Amman
Regional Workshop on linking Regional Climate Models to Hydrological Models	Arab Water Ministries (technical staff)	SMHI, ACSAD	June 2013 Beirut
RICCAR Expert Group Meeting 5: Preliminary Findings of the Regional Climate Models covering the Arab Domain	Arab Water Ministries (senior staff) & RICCAR Partners	LAS, ESCWA, ACSAD, SMHI WMO, UNISDR	December 2013 Amman
* Technical Workshop on VA Methodology, * Task Force on Sensitivity Meeting, * Task Force on Adaptive Capacity Meeting	Climate Change Centers & GIS Specialists; Experts	GIZ, ESCWA, ACSAD	May 2014, October 2014 Beirut
* Scoping Meeting for the Establishment of the ArabCOF	Arab Met Services	WMO	Oct 2014, Amman
* RICCAR Expert Group Meeting 6: Review of RCM & RHM Findings & VA Methodology	Arab Water & Agriculture Ministries, Met Services & RICCAR Partners	LAS, ESCWA, SMHI, ACSAD, WMO, UNISDR	December 2014 Cairo

Awareness Raising & Information Dissemination		
Technical Materials	Information Access	Forthcoming
<ul style="list-style-type: none"> ✓ Integrated Assessment Methodological Guidance Document (ESCWA) ✓ <i>Journal of Climatology</i> - Joint Journal Article by Met Services ✓ VA Training Manual (GIZ, draft) ✓ Extreme Events Brochure ✓ RCM Fact Sheet 	<ul style="list-style-type: none"> ✓ RICCAR Website www.escwa.un.org/RICCAR * Supported by ESCWA ✓ Earth System Grid Federation (ESGS) www.esg-dn1.nsc.liu.se * Developed by SMHI, Populated with RCM outputs, supports CORDEX ✓ National Disaster Loss Databases (DesInventar) www.desinventar.net www.desinventar.org * Supported by UNISDR 	<ul style="list-style-type: none"> <input type="checkbox"/> Regional Knowledge Hub <input type="checkbox"/> Technical Materials <input type="checkbox"/> Policy Briefs <input type="checkbox"/> Vulnerability Assessment Training Manual <input type="checkbox"/> RICCAR Climate Change Assessment Report for Arab Region



Arab Climate Change Assessment Report Outline

- | | |
|--|---|
| <p>I. Introduction</p> <p>II. Data, Databases and Baseline Information for Conducting Climate Change Assessments</p> <p>III. Climate Modelling Findings for the Arab Region</p> <p>IV. Basin Level Findings & Analysis for Major Shared Basins</p> <ul style="list-style-type: none"> A. Nile Basin B. Tigris and Euphrates Rivers C. Medjerda River Basin D. Jordan River Basin E. Senegal River Basin | <p>V. Extreme Events Case Studies</p> <ul style="list-style-type: none"> A. Wadi Diqah (Oman) B. Medjerda (Tunisia/Algeria) C. Nahr Al-Kabir (Lebanon/Syria) D. Dhamar and Hadhramout Groundwater Basins (Yemen) – tbc <p>VI. Impact Assessment Studies</p> <ul style="list-style-type: none"> A. Agriculture (rainfed, irrigated, mixed) B. Human Health <p>VII. Vulnerability Assessment</p> <ul style="list-style-type: none"> A. Water B. Agriculture C. Biodiversity & Ecosystems D. Infrastructure & Human Settlements E. People <p>VIII. Conclusion</p> |
|--|---|

Climate Change Adaptation Projects funded by United Nations Development Account

Developing the Capacity of Arab Countries for Climate Change Adaptation using IWRM Tools

- Based on RICCAR outputs
- Focuses on 5 sectors:
 - Agriculture (ACSAD, with GIZ support)
 - Water Supply & Sanitation (ACWUA)
 - Economic Development (ESCWA)
 - Environment (UNEP)
 - Health (WHO)
- Preparation of training modules
- TOT workshops on each sector

Strengthening the capacity to manage water scarcity and drought in Western Asia and North Africa

- Led by UN-DESA
- Drought planning capacity building
- Support for preparation of drought management plans in some countries.

Proposed Recommendations

To Member States

- ☐ Encourage the nomination of RICCAR Hydrological Focal Points to support finalization of the integrated assessment during the coming month.
- ☐ Complete the Vulnerability Assessment Questionnaire, and encourage at least 1 other person in the ministry to complete the questionnaire as well during the coming month.

To ESCWA

- ☐ Continue to support the Arab Ministerial Water Council and Arab Permanent Committee for Meteorology on climate change assessment, adaptation and negotiations.
- ☐ Pursue continued collaboration with regional partners and efforts to draw upon the RICCAR outputs to support further work related to water and climate change in the Arab Region

THANK YOU

Economic and Social Commission for Western Asia



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For more information on RICCAR, please visit:

www.escwa.un.org/RICCAR

