Developing the Capacities of Arab Countries for Climate Change Adaptation Using IWRM Tools

Tarek Sadek – Water Resources and Climate Change Officer, ESCWA (SDPD) – Beirut, 28/09/2017

UNITED NATIONS
الاسكوا
ESCWA

UN environment

THE LEAGUE OF ARAB STATES
THE ARAB CENTER FOR THE STUDIES OF ARID ZONES AND DRY LANDS
ACSAD 1968

World Health Organization

ACWUA

german cooperation
DEUTSCHE ZUSAMMENARBEIT

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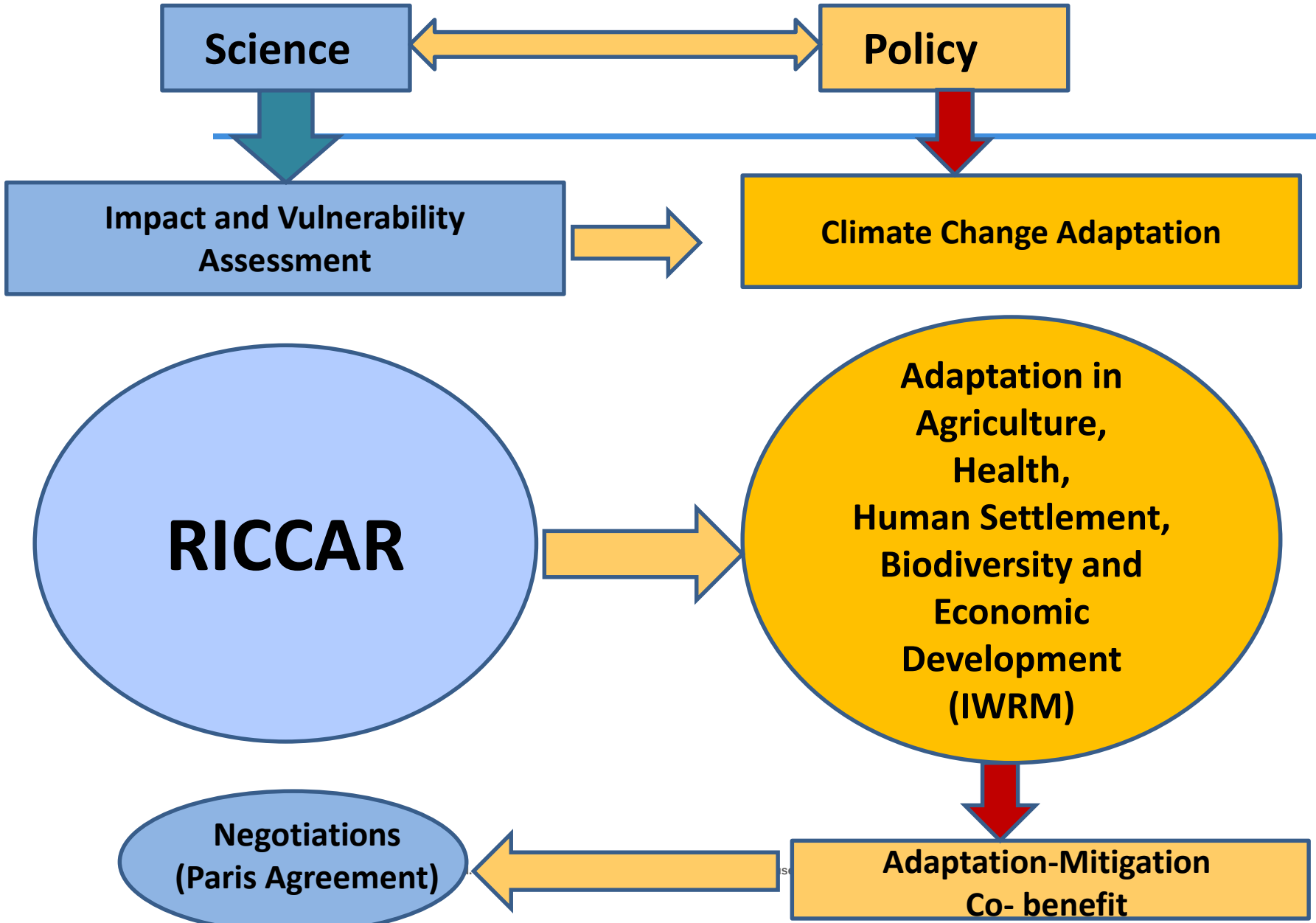
Introduction

- ESCWA Implemented a United Nations Development Project on Developing the Capacities of the Arab Countries for Climate Change Adaptation by Applying IWRM Tools
- This project built upon the climate change impact assessment (RICCAR) outputs, and will assist countries to adapt to climate change through the use of regionally-appropriate IWRM tools in five key sectors.
- The key objective is to develop the capacity of 22 Arab Governments to adapt to climate change by applying IWRM tools in the key sectors that will be affected by climate change impacts on freshwater resources.
- Implementing partners are UN-ESCWA (lead agency), UNEP/ROWA(coordinating agency), ACSAD, ACWUA, WHO/CEHA and GIZ.

Linking Climate Science to Policy, Adaptive Strategy and Mitigation



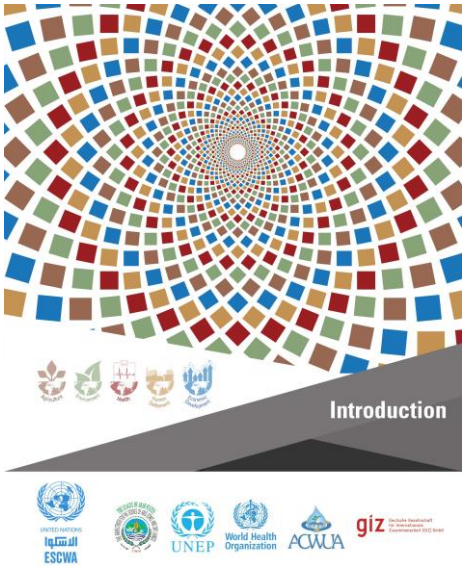
Climate Change Adaptation

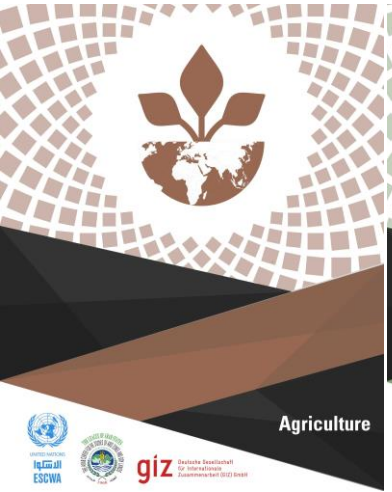
United Nations Development Account Project on Developing the Capacities of the Arab Countries for Climate Change Adaptation by Applying Integrated Water Resources Management Tools

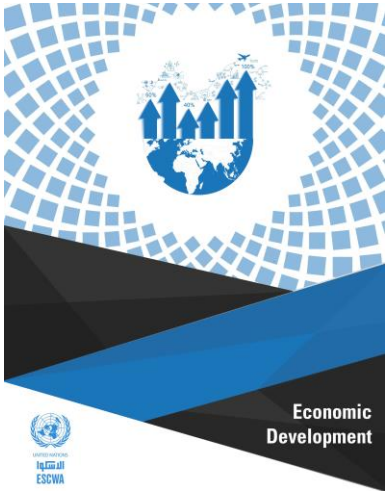
Five sector modules were developed by the following leading organizations (in coordination with ESCWA):

1. Environment module by UNEP/ROWA;
2. Agriculture module by ACSAD/GIZ;
3. Health module by WHO;
4. Human settlements (water supply and sanitation) by ACWUA;
5. Economic module by ESCWA as well as an introductory chapter for the manual.

Five workshops were held with stakeholders from each sector to review respective modules







Environment (1/2)

1. Introduction

- Objectives
- Methodology
- UNEP vulnerability assessment approach
- Ecosystem Based Management (EBM)

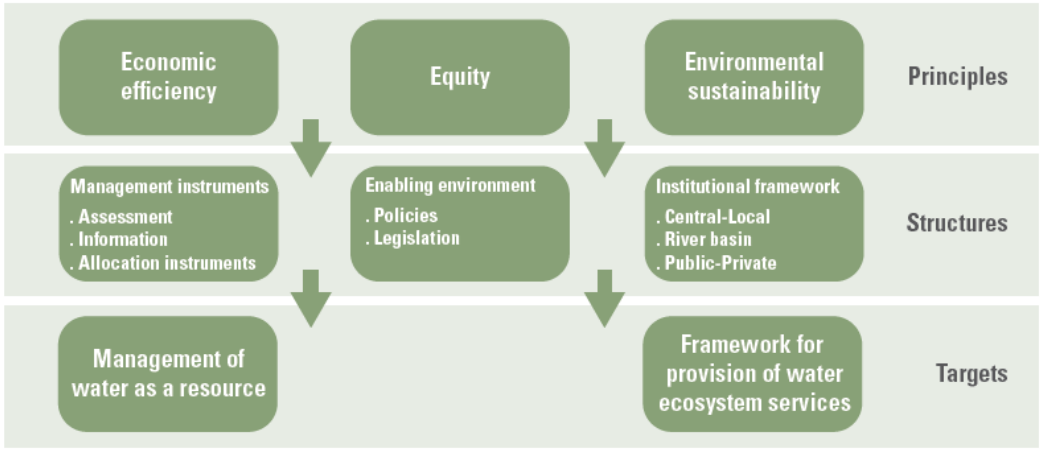
2. CC Impacts on Regional Ecosystems and Biodiversity

- Projected impacts based on RICCAR outputs
- Examples of hot spots

3. Linking Ecosystem Management & IWRM for CC Adaptation

- Analysis of differences and similarities
- Indicators for ecosystem based adaptation

Figure 8. Linkages among principles, structures and targets



Source: Adapted from UNEP-IISD-DHI, 2011. Ecosystem Approaches in Integrated Water Resources Management, p.17.

Environment (2/2)

4. & 5. Ecosystem Adaptation Measures & their Implementation

- Functions of ecosystems
- Processes and structure for supply of services
- Ecosystem state and impact
- Cycle for strategic adaptive management
- Valuing
- ecosystem services

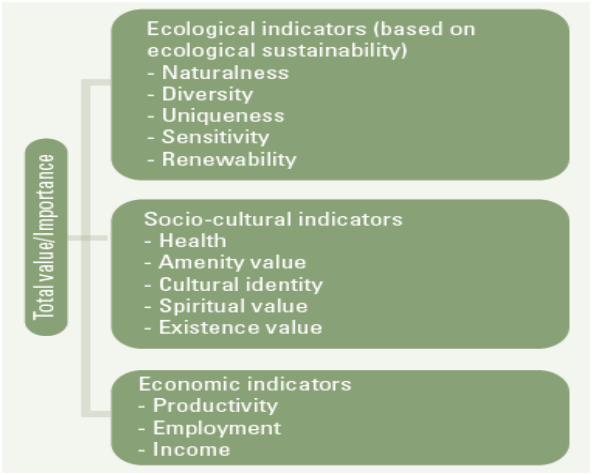
6. Areas for Action

- Implementation tools
- Monitoring and evaluation
- National and regional actions

Table 13. Average global value of annual ecosystem services

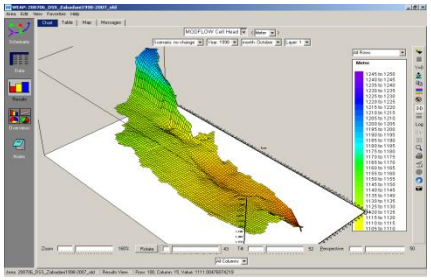
Ecosystem	Typical cost of restoration	Estimated annual benefits from restoration	Net present value of benefits over 40 years	Internal rate of return	Benefit/cost ratio
	US$/ha	US$/ha	US$/ha	%	Ratio
Marshlands	33,000	14,200	171,300	12%	5.4
Lakes and rivers	4,000	3,800	69,700	27%	15.5
Coastal	232,700	73,900	935,400	11%	4.4

Figure 16. Components of the total value of an ecosystem



Source: Reconstituted from UNEP-IISD-DHI, 2011. Ecosystem Approaches in Integrated Water Resources Management, p. 105.

Agriculture (1/2)



1. Introduction

- Objectives
- Methodology
- Targeted Stakeholders

2. Framing Sectoral Problems

- Natural resources
- Socio-economic aspects
- Governance
- Legislations
- Sub-sector issues

3. Impacts of CC and Vulnerability Assessment

- Impacts of CC (T, P, ET, extreme events, etc., projections till 2100)
- Vulnerability assessment (VA) approach
- VA Indicators

Table 1. Biophysical and socioeconomic impacts of climate change on food production

Second order (biophysical)	Third order (socioeconomic)
• Physiological effects on crops, pasture, forests and livestock (quantity and quality) • Change in land, soil and water resources (quantity and quality) • Increased weed and pest challenges • Shifts in spatial and temporal distribution of impacts • Sea level rise, changes to seawater salinity and acidity • Sea temperature rise causing fish to inhabit different ranges	• Decline in yields and production • Reduced marginal GDP from agriculture • Fluctuations in world market prices • Changes in geographical distribution of trade patterns • Increased number of people at risk of hunger and food insecurity • Migration and civil unrest • High demographic fluctuations • Fragile socioeconomic conditions of women, children and elderly people • Spread of unconventional diseases affecting humans, animals and plants • Lower livestock production due to constant conflict between humans and animals on land use

Source: Adapted from FAO, 2007.

Table 3. Projected relative average change (per cent) of main crops in three target areas

Location	Crop	Climate scenario			
		RCP4.5		RCP8.5	
		At the mid-century (2046-2065)	At the end of the century (2081-2100)	At the mid-century (2046-2065)	At the end of the century (2081-2100)
Irrigated crop					
At Orontes watershed (Lebanon)	eggplant	-9.4	-13.3	-9.8	-27.3
	maize	-7.4	-12.3	-9.9	-17.1
	potato	-3.9	-5.2	-5.2	-10.7
At North Delta (Egypt)	maize	0.3	-1.0	-1.5	-8.9
	wheat	-4.1	-5.7	-4.0	-5.5
	cotton	-3.0	-4.3	-3.2	-6.3
Average		-4.6	-7.0	-5.6	-12.6
Rainfed crop					
At Karak governorate (Jordan)	wheat	-1.5	-15.5	-5.2	-55.3
	barley	-7.0	-17.3	-2.4	-59.3
Average		4.3	16.4	3.8	57.3

Agriculture (2/2)

4. Adaptation Measures and IWRM Options and Tools

- Water resources
- Water storage and quality aspects
- Water harvesting
- Rain-fed farming
- Irrigated farming
- Forestry and agro-forestry
- Livestock management
- Pasture management
- Fisheries and aquaculture

5. Implementation Matrix and Areas for Action

- Screening adaptation measures
- Stakeholders analysis
- Increasing adaptive capacity
- National and regional actions

Figure 8. Application of the IWRM concept for CCA to agriculture

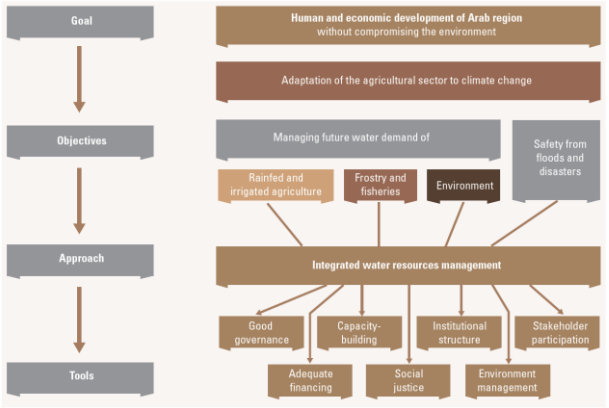


Figure 38. A schematic diagram of regional adaptation strategy to climate change

Health (1/3)

1. Introduction

- Objectives
- Target audience

2. Impacts on Water and Health

- Extreme events impacts
- flood related diseases
- Heat wave related mortality and morbidity
- Indirect health consequences
- Vector borne diseases
- Microbiological drinking water quality

3. Vulnerability Assessment of the Health Sector

- Vulnerability and adaptation using WHO guidance
- Health within the National Adaptation Plan (NAP) process

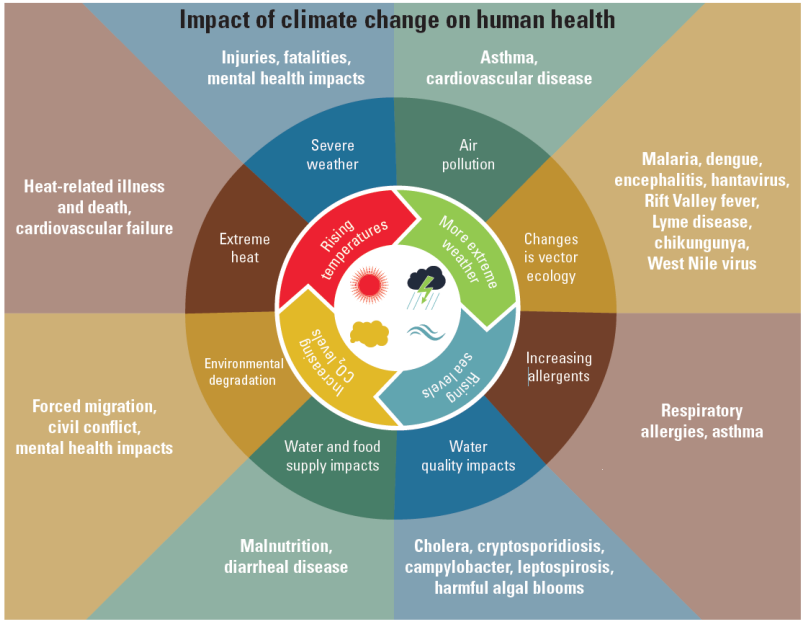
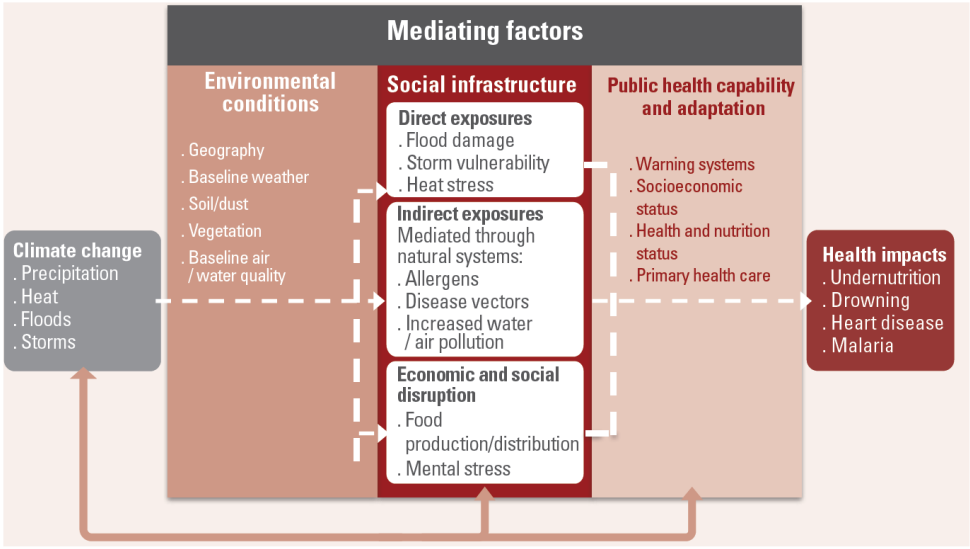


Figure 2. Primary exposure pathways by which climate change affects health



Source: Adapted from U.S. Climate resilience Toolkit https://toolkit.climate.gov/topics/human-health.

Health (2/3)

4. Adaptation Measures for Health Sector & Implementation

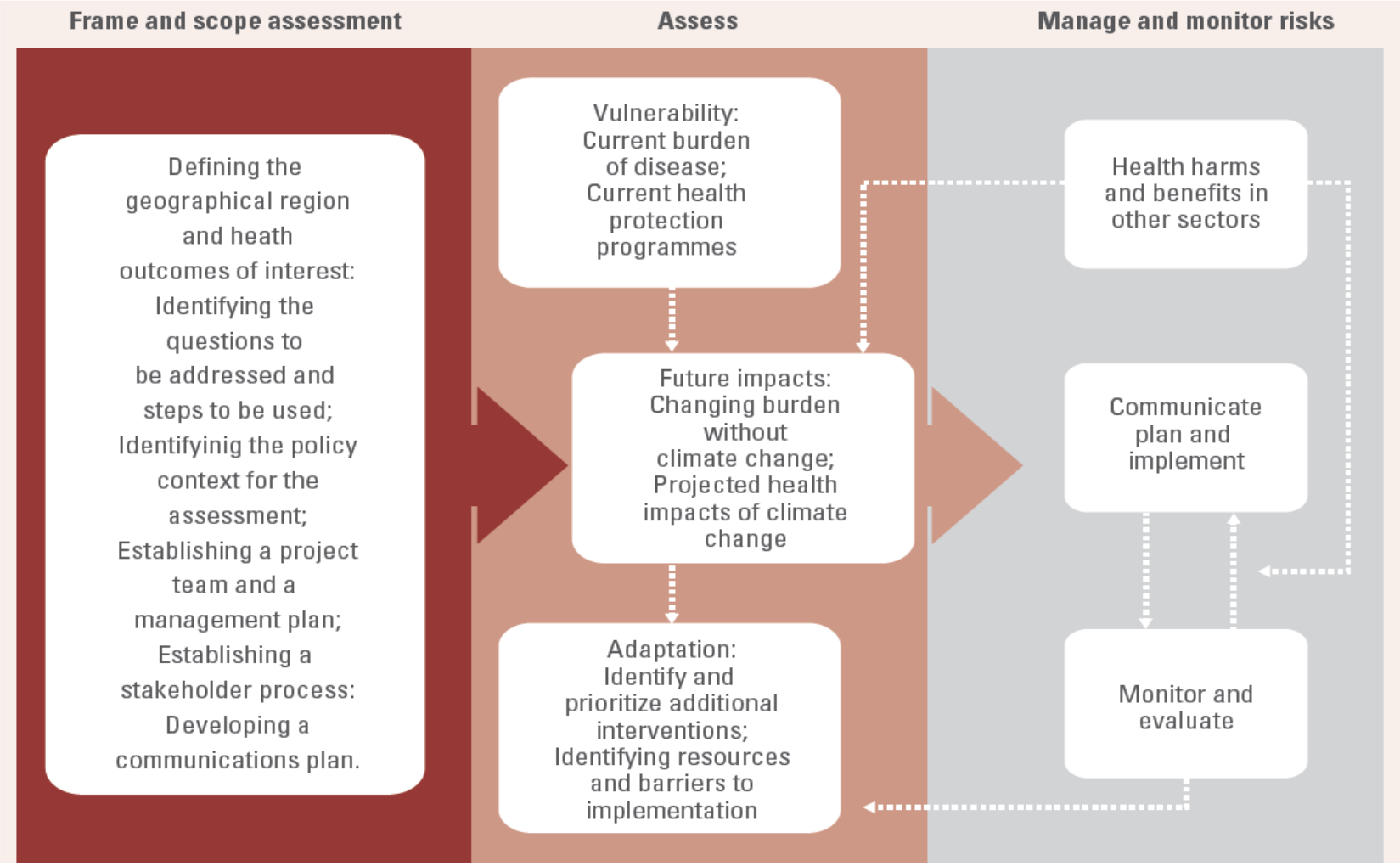
- Institutional and strategic interventions
- Environmental quality monitoring and control
- Awareness and capacity development
- Adaptation implementation matrix
- Institutional analysis methods
- Barriers and opportunities for successful implementation

5. Implementation Matrix and Areas for Action

- National assessments
- Monitoring process of CC impacts
- Effective adaptation strategies and policies
- Moving from science to policy
- Follow up on adaptation programs at the global policy level

Health (3/3)

Figure 7. WHO guidance to protect health from climate change through health adaptation planning: health within the NAP process (HNAP)



Human Settlements (1/2)

1. Introduction

- Objectives
- Targeted Stakeholders

2. Framing Sectoral Problems

- Intermittent supply
- Enhancing water efficiency at the city level
- Resource challenge
- Management of storm and wastewater infrastructures

3. Impacts of CC and Vulnerability Assessment

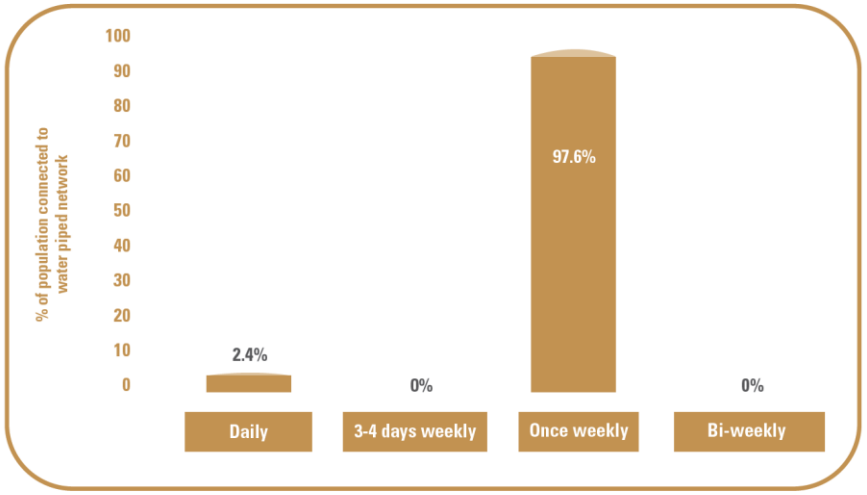
- Drainage networks performance under various climate scenarios
- Impacts on drainage network design

Table 1. Water losses in the water supply distribution system in selected Arab countries, 2005

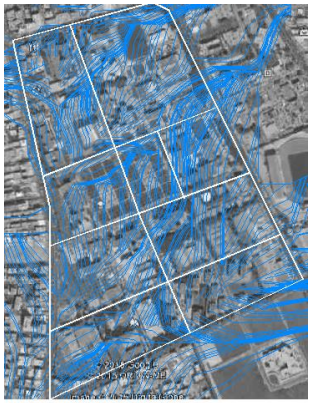
Country	% of loss
Bahrain	15
Egypt	50
Iraq	50
Jordan	50
Kuwait	8-10
Lebanon	50
Oman	23
Palestine	40
Saudi Arabia	25-40
Syrian Arab republic	48
Yemen	30

Source: Food and Agriculture Organization of the United Nations (FAO), AQUASTAT. Available from http://www.fao.org/nr/water/aquastat/main/index.stm (accessed 24 January 2017).

Figure 1. Continuity of water supply in Jordan



Source: League of Arab States, ESCWA and ACWUA, 2015.



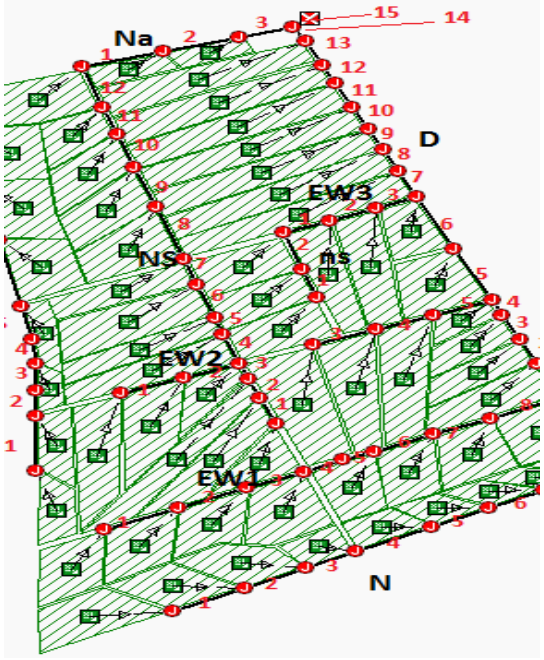
Human Settlements (2/2)

4. IWRM Tools for Identifying Adaptation Measures

- Water harvesting
- Water demand management
- Reuse of grey water
- Treatment technologies for grey water recycling
- Water footprint tool
- Reducing non-revenue water
- Updating urban planning policies
- Wastewater treatment and reuse
- Water Tariffs
- Managed groundwater recharge (aquifer recharge/recovery)
- Desalination by renewable energy

5. Implementation of Adaptation Measures

- Screening
- Planning at sectoral and local level
- Planning at the national level



6. Measuring and Reporting Progress of CCA in Human Settlements

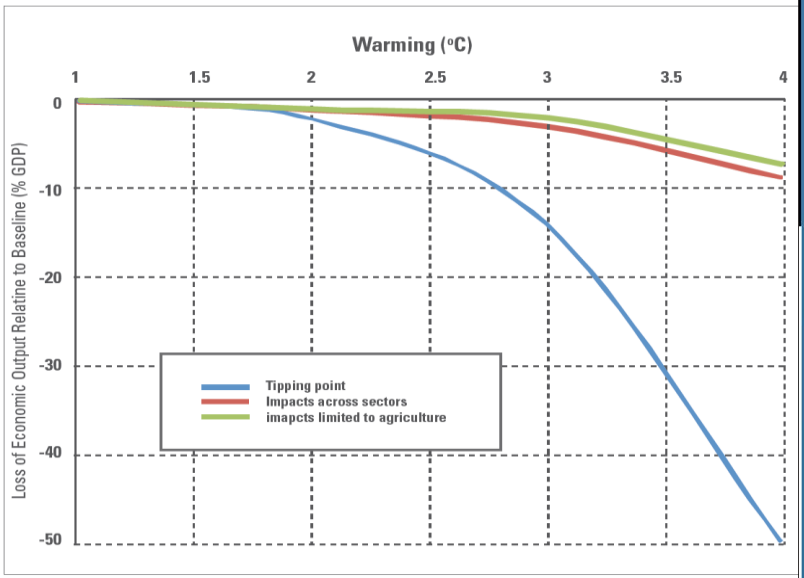
- Indicator framework
- Using MDG+ and SDG indicators
- Best practices
- Governance
- Social factors
- Economic factors
- Cost of water adaptation measures

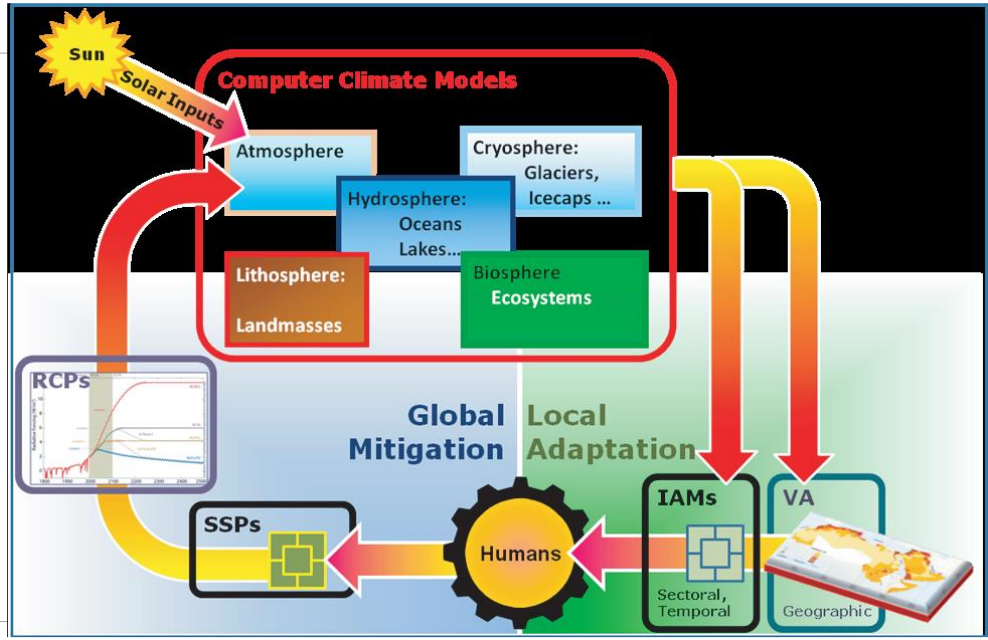
Economic Development (1/2)

1. Introduction	2. Economic Development and Resources Management	3. Vulnerability Outlook

• Objectives
• Module structure
	• Macro-economic impacts
	• Integrated assessments economic models (IAMs)
	• Economic implications of extreme events
	• Climate finance
	  • Criteria
	  • Global architecture
		• VA integration with IAM's and linkage to RICCAR outputs
		• Economic indicators used in VA
		• Economic cost of CC impacts

Figure 2. Estimates of economic losses from climate change[12]

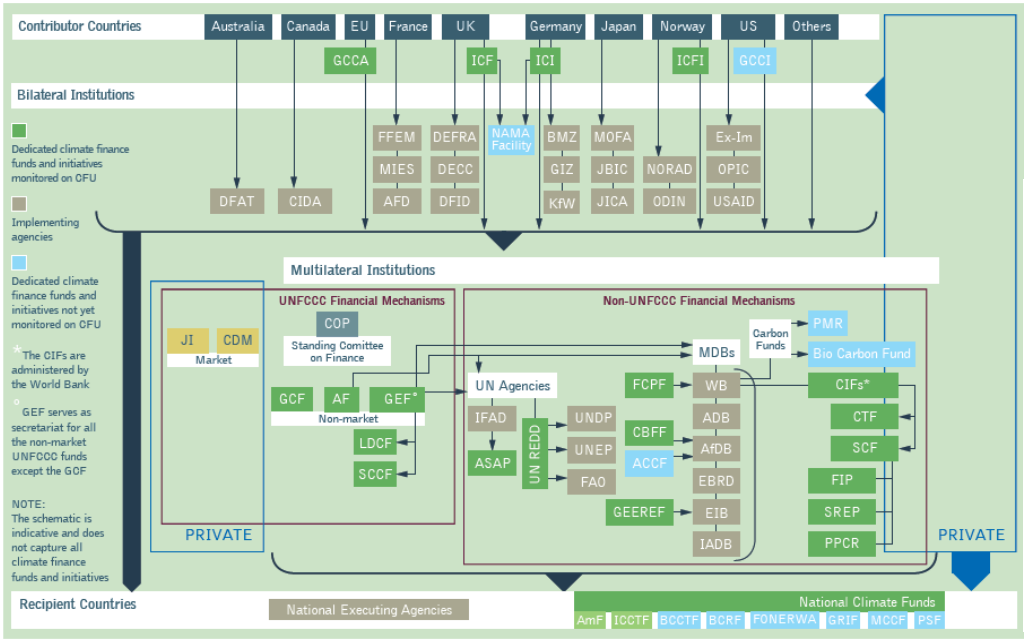




Economic Development (2/2)

4. CC Adaptation Measures

- Adaptation risk management
- Climate proofing
- Investment planning
- No regret and low regret measures
- Global and national funds



5. Applications

- Best practices
- Governance
- Participatory capacity
- Transparency and accountability
- Technical and managerial competence
- Education and training

Table 9. Multilateral funds active in the Arab region

Fund	Amount approved ($ million)	Number of projects
Adaptation for Smallholder Agriculture Programme (ASAP)	18.00	3
Adaptation Fund (AF)	19.42	3
Clean Technology Fund (CTF)	725.00	5
Global Environment Facility-Strategic Priority on Adaptation (GEF-SPA)	55.04	1
Global Environment Facility - 2006-2010 funding period (GEF4)	4.62	16
Global Environment Facility – 2011-2014 funding period (GEF5)	33.85	13
Global Climate Change Alliance (GCCA)	4.05	1
Least Developed Countries Fund (LDCF)	34.56	8
MDG Achievement Fund (MGF-F)	8.00	2
CTF Pilot Program for Climate Resilience (PPCR)	20.50	2
Special Climate Change Fund (SCCF)	38.01	7

Source: Adapted from Barnard and others, 2014.

Final Remarks

- This training manual benefits a wide variety of officials from the public sector, academia, non-governmental organisations and the private sector.
- The manual presents the issues on CCA and IWRM within a regional context and based on the practical experiences of practitioners working in the Arab region.
- Gender-related issues in each sector were taken into consideration throughout the modules and case studies, as gender is not a standalone sector and needs to be mainstreamed as a cross-cutting issue in all sectors and systems as well as in IWRM.
- A set of exercises were included in the modules to provide an opportunity for practitioners to learn more, extend their understanding of the various concepts underlying IWRM and exchange knowledge on inter-linkages with climate change adaptation and sector issues.

Thank you…..