



ESCWA

United Nations Economic and Social Commission for Western Asia

Enhancing Regional Cooperation for Policy-Making on the Water-Energy Nexus

Ali Karnib
Water Resources Section
Sustainable Development and Productivity Division
ESCWA

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I

WATER AND ENERGY LINKAGES



Energy Consumption for Water

- To Extract Groundwater
- To Power Desalination processes
- To Power water pumps and purification Systems
- To Power Wastewater Treatment Plants

Water Consumption for Energy

- Fossil fuel production and processing
- Energy production
- Renewable Energy production
- Operating hydropower plants



Water and Energy Linkages



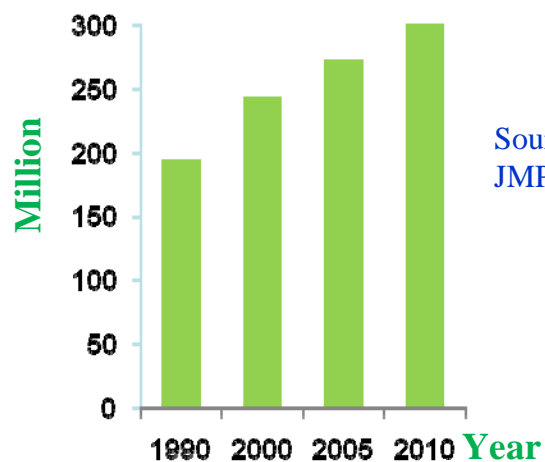
II

REGIONAL SPECIFICITIES



Arab countries face mounting challenges in the water and energy sectors because of:

Population pressure



Source: UN-JMP

Total population of the ESCWA region

Environmental pressure

Water scarcity

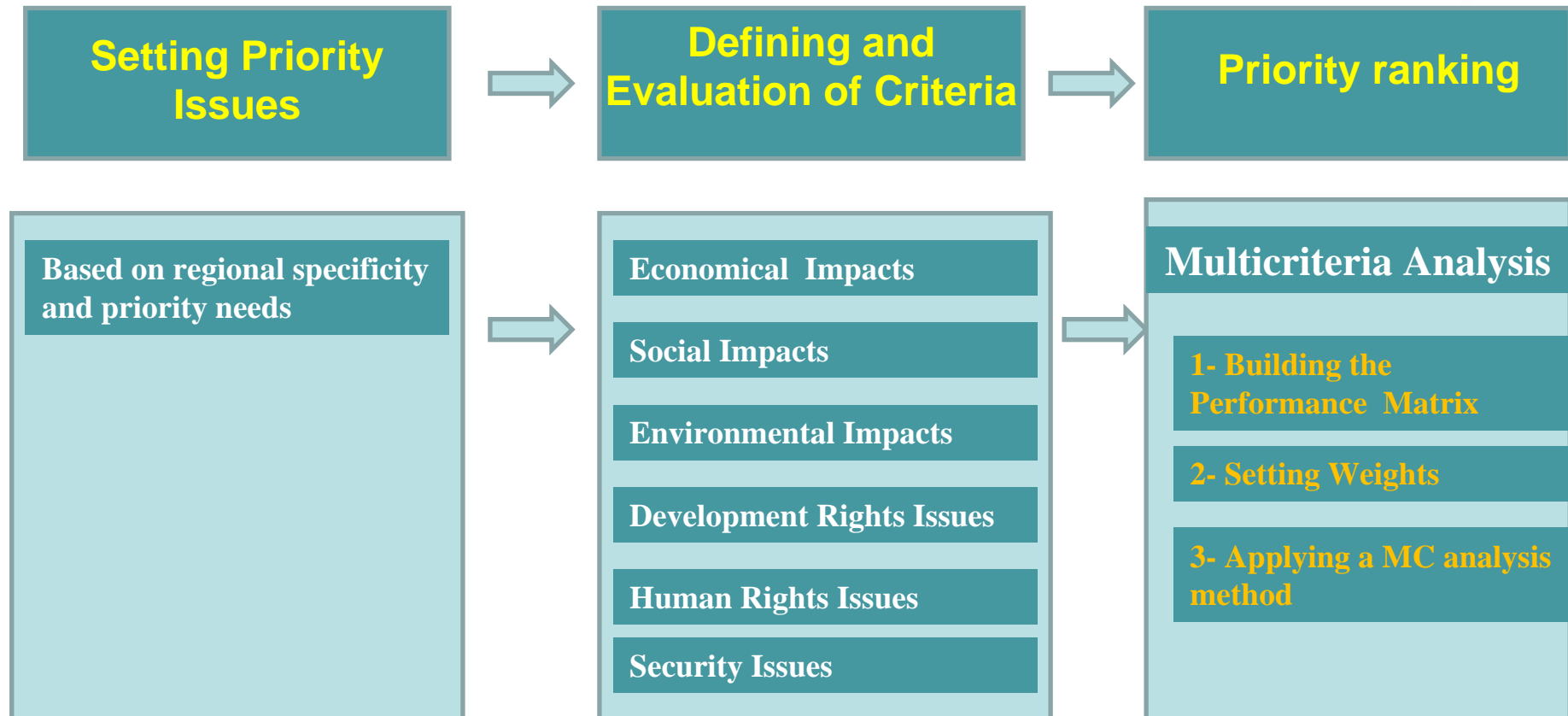
Arid/Semi-arid climate

Pollution and water quality concerns

Climate change and climate variability



There is a need for a new, comprehensive and systematic methodology to approach the water and energy nexus in a sustainable way.



Scenario of the regional energy consumption for water



Available data on Aquastat - FAO for the 22 Arab countries

Total groundwater withdrawal = 46436 (Million m³/year):

Total desalinated water produced = 3285 (Million m³/year)

Total fresh surface water withdrawal = 16557 (Million m³/year)

Assumptions

Assume the average depth of groundwater withdrawal = 100 m and assume the energy required to lift a vertical distance of 100 meters = 0.36 kWh/m³

Assume the average energy required for desalination = 20 kWh/m³

No available data to draw assumptions

Energy consumption (Million kwh/year)

16717

65700

Assume the average cost of 1kwh=15 cents

Energy cost (US \$/year)

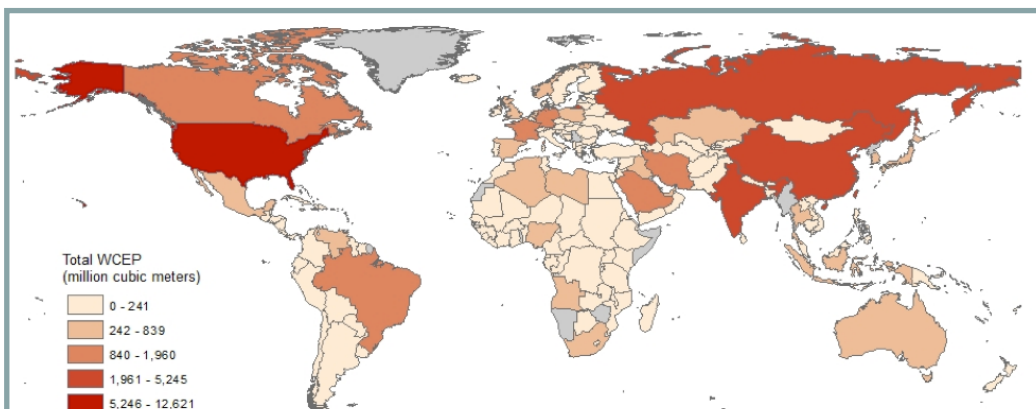
\$ 2.5 Billion/year

\$ 9.8 Billion/year

Scenario of the regional water consumption for energy production

Results of research show that heavy producers of fossil fuels and biofuels demonstrate greater intensity of energy - based water consumption.

Understanding the water demand of energy systems is essential to national water security since the production of energy requires considerable quantities of freshwater.



Source: Spang, E. 2012, *A thirst for power: A global analysis of water consumption for energy production*, GWF Discussion Paper 1246, Global Water Forum, Canberra, Australia. Available online at: <http://www.globalwaterforum.org/2012/10/23/a-thirst-for-power-a-global-analysis-of-water-consumption-for-energy-production/>

Despite not being able to verify the accuracy of the data that were adopted in this study, but it can be used for guidance.

There are no data sources to draw Scenarios of the regional water consumption for energy production

ESCWA: Inter-governmental Consultation



- Intergovernmental Consultation on the Water-Energy Nexus (Beirut, 27-28 June 2012)

Objective of the Meeting:

Provide inter-governmental forum for identifying and prioritizing future work on the water-energy nexus

ESCWA prepared a questionnaire on Water and Energy Nexus in order to gather background information on the identified issues for discussion during the meeting, as well as the challenges characterizing countries of the Region. The questionnaire is composed of two parts:

Part (A) addresses the institutional and organizational aspects

Part (B) focuses on technical and statistical data.

Findings from questionnaires:

A- The institutional and organizational aspects

Lack of institutional mechanisms for dealing with the water-energy nexus stakes in the ESCWA region and member countries.

B- The technical aspects (statistical data)

On water production and purification

- ➔ The rate of energy consumption in surface water applications and for producing water using underground extraction processes were not available;
- ➔ Future trends in ensuring the required amount of water would rely on sea water desalination, one of the highest energy-consuming sources;
- ➔ Future trends in operations of water production and purification would rely on the private sector.

Findings from questionnaires:

B- The technical aspects (statistical data)

On water transmission and distribution

- ➔ Current estimated ratios of water leaks in transmission and distribution networks were higher than best practice ratios, but future trends would be to reduce those ratios, which would necessarily lead to the reduction of the rate of energy consumption.
- ➔ The current rate of energy consumption in water transmission and distribution networks varied in member countries from 0.5 to 2 kWh per m³.
- ➔ The questionnaire showed the need to monitor and organize the energy consumption linked to water transmission and distribution, with a view to reducing its costs to a minimum.

On sanitation

- ➔ The rate of energy consumption in sewerage networks was higher than the best practice figures.
- ➔ Wastewater treatment plants mostly used aerobic technologies, whereas the climate in the region encouraged the use of anaerobic technologies.
- ➔ Energy recovered from wastewater treatment plants was almost inexistent, whereas the best practice rate was around 0.1 kWh per m³.

IV

PROSPECTS FOR POLICY-MAKING ON THE WATER-ENERGY NEXUS IN THE REGION



The issues raised during the Intergovernmental Consultation on the Water-Energy Nexus (Beirut, 27-28 June 2012)

Identification of Priority Areas

Self-Assessment of national capacities and natural resource endowments

Knowledge Mapping (literature review) on data availability and research work on water-energy nexus in the ESCWA Region, including best practices

Identifying indicators for monitoring (with regular reporting on the indicators by the countries reported to the committees)

Sharing experiences and data between ESCWA countries

Increasing knowledge & awareness raising

Institutional Coordination

Assessing trade-offs between competing demands

Increasing policy coherence

Balancing water security and energy security

Water-energy

IV

PROSPECTS FOR POLICY-MAKING ON THE WATER-ENERGY NEXUS IN THE REGION



The issues raised during the Intergovernmental Consultation on the Water-Energy Nexus (Beirut, 27-28 June 2012)

Identification of Priority Areas

Mapping water and energy losses and inefficiencies

Optimizing resource use, reducing losses, rationalization

Conservation, demand side management

Privatization

Increasing efficiency

Assessing the cost and feasibility of different technology choices

Informing technology choices

Increase Renewable Energy Use

Renewable Energy Applications

Promoting renewable energy

Mitigation and Adaptation

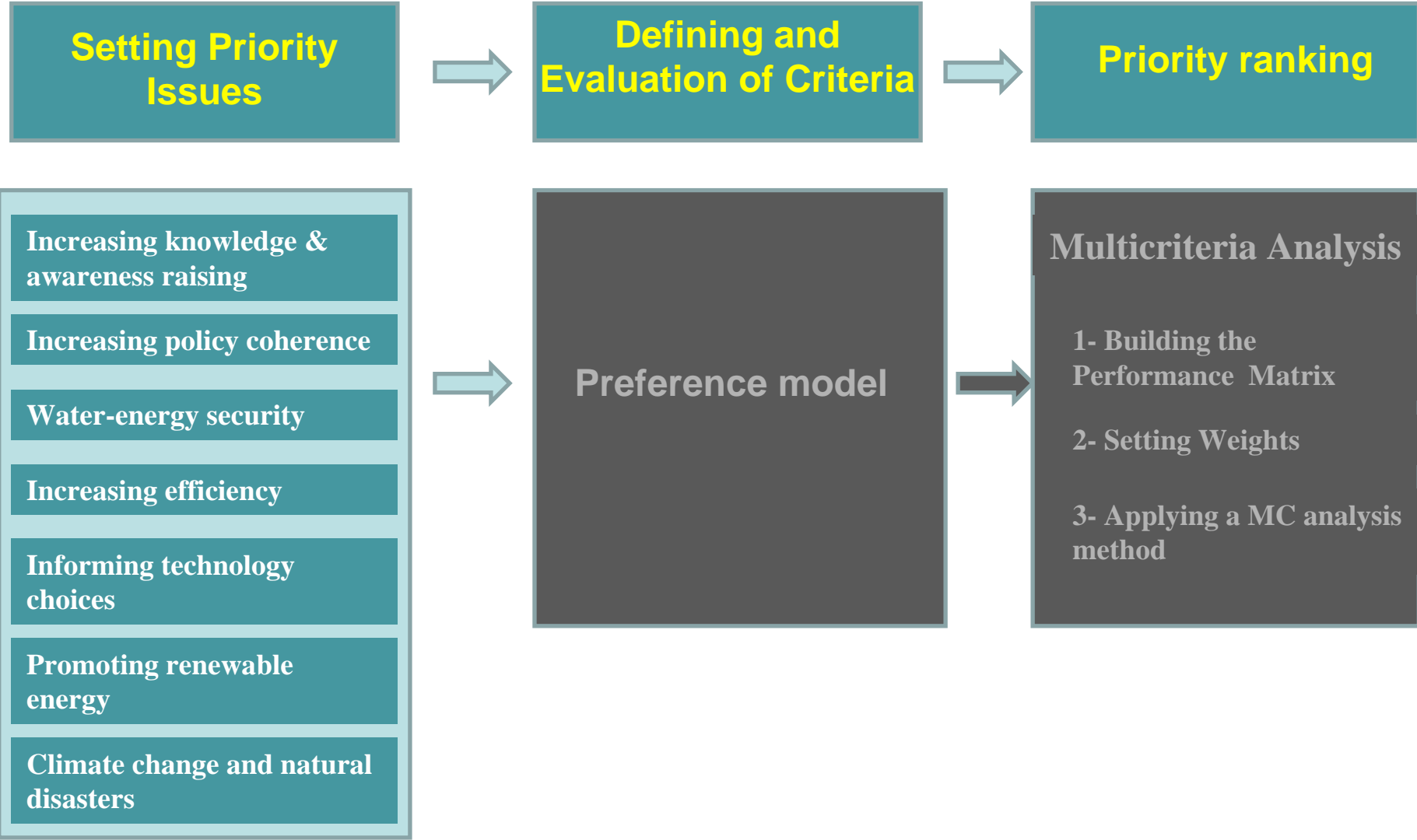
Climate change and natural disasters

IV

PROSPECTS FOR POLICY-MAKING ON THE WATER-ENERGY NEXUS IN THE REGION



methodology





IV PROSPECTS FOR POLICY-MAKING ON THE WATER-ENERGY NEXUS IN THE REGION

Participants should assign ranks to the seven priorities for future activities in the water-energy nexus field, which were agreed upon during the meeting. They should discuss their priority ranking with stakeholders in their countries, with a view to reflecting the official national position.

- Preference model:**
- 3: would be assigned to an issue of great importance
 - 2: to an issue of average importance
 - 1: to an issue of limited importance

Priority Issues	Ranking			Total
	Of great importance (3)	Of average importance (2)	Of limited importance (1)	
Increasing knowledge and awareness raising				
Increase policy coherence				
Examining water-energy security nexus				
Improving efficiency				
Increasing knowledge of technological choices				
Promoting renewable energy				
Climate change and natural disasters				

Preference model

Performance Matrix

IV

PROSPECTS FOR POLICY-MAKING ON THE WATER-ENERGY NEXUS IN THE REGION



Priority Issues	Score	Priority rank
Increasing knowledge & awareness raising	40	1
Improving efficiency	40	1
Increasing policy coherence	38	2
Examining water-energy security nexus	38	2
Increasing knowledge of technological choices	38	2
Promoting renewable energy	37	2
Climate change and natural disasters	34	3
		4

V

NEXT STEPS



ESCWA is examining the water and energy nexus in the region and helping to fill knowledge gaps through research and intergovernmental processes.

The Water-Energy-Food nexus will be the subject of the ESCWA Water Development Report 6 in (2015).

The Water and Energy Nexus priority issues in the ESCWA Region will be followed up during the next ESCWA “Committee on Water Resources” meeting in March 2013.

The Water and Energy Nexus priority issues in the ESCWA Region will be followed up during the next ESCWA “Committee on Energy” meeting in April 2013.

“Developing the capacity of ESCWA member countries to address the water and energy nexus for achieving sustainable development goals” will start in 2015 (financed by UN Development Account Project for a total budget of USD 525000).

Global deliberation on the Sustainable Development Goals will have water and energy monitoring and reporting targets.



Thank you!