A NEXUS APPROACH TO SUSTAINABLE DEVELOPMENT

The Water-Energy-Food Security Nexus

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Agenda 2030
Integrated Approach
Agenda 2030: The Vision

“A world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy.”

The 2030 Agenda for Sustainable Development clearly states that the SDGs are **integrated and indivisible** (in the preamble and in paras. 5, 18, 55 and 71 of the Declaration).
Agenda 2030: Sustainable Development Goals:

17 SDGs

• 169 Targets
• 230+ indicators
Nexus Approach to the SDGs
Agenda 2030 Sustainable Development Goals: The Nexus Vision

“interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new agenda is realized”

Sector vs. Nexus Approach

- **Sector approach**: Independent management of water, energy and food sectors with minimal considerations for interactions and interdependencies → Independent approach to each SDG

- **Nexus approach**: is a systems based approach that aims to reduce trade-offs and build synergies across sectors by considering interactions and dependencies between sectors at all stages

- Nexus approach to SDGs would identify potential trade-offs and synergies among Goals and Targets → Consider systemic not only sectoral progress
Water in the Sustainable Development Agenda 2030 Preliminary Core Linkages with SDG6
Food in the Sustainable Development Agenda 2030 Preliminary Core Linkages with SDG2
Food in the Sustainable Development Agenda 2030 Preliminary Core Linkages with SDG7
The Water-Energy-Food Security Nexus in the Arab Region
Energy for Water

Desalination
Varies depending on technology, from 1.5-5 kWh/m$^3$ and 0-300 MJ/m$^3$

Abstraction
0.36 kWh is needed to lift 1m$^3$ of groundwater a vertical distance of 100m

Transmission
0.04 kWh is needed to pump 1m$^3$ of surface water a horizontal distance of 100km

Water Treatment
Varies depending on water quality, up to 0.3 kWh/m$^3$

Wastewater Treatment
• Primary treatment 0.1 to 0.3 kWh/m$^3$
• Secondary Treatment 0.27 to 0.59 kWh/m$^3$
Energy Demand of Water in the Arab Region

- Jordanian water sector accounts for ~15% of total annual electricity generated
- Saudi Arabia: Groundwater pumping accounts for 10% of total fuel consumption
- Libya: Groundwater pumping accounts for 14% of total fuel consumption
- Bahrain: 30% of total energy use is for desalination
Water for Energy: Hydropower

- On the Euphrates River Basin, 8,580MW installed capacity

- On the Nile River Basin, hydropower potential is ~20GW, only 26% is currently used
Water for Energy (oil sector)

Extraction/Processing of fuels
- 16.7 to 46 litres of water per barrel of extracted oil
- 2.6 to 4 barrels of water to produce one barrel of oil from oil shale
- Processing requires 200 to 800 litres of water per ton of crude oil

Produced water
- Oman has highest water-oil ratio of between 6:1 and 10:1
- UAE has the lowest water-oil ratio of 0.35:1
Water and Energy for Food

Direct
- Irrigation (W+E)
- 80% of water withdrawal in Arab region used for irrigation with 50-60% efficiency in irrigation systems
- Harvesting (E)
- Processing (W+E)
- Transportation (E)
- Storage (E)
- Retailing (E)

Indirect
- Fertilizers (W+E)
- Pesticides (W)
- Energy embedded in global annual food loses can reach up to 38% of the total energy used in the entire food value chain.

Elaborating a WEF security nexus within the context of sustainable development

2. Zero Hunger

End hunger, achieve **food security** and improved nutrition and promote **sustainable agriculture**

6. Clean Water and Sanitation

Ensure availability and **sustainable management** of water and sanitation **for all**

7. Affordable and Clean Energy

Ensure access to **affordable, reliable, sustainable** and **modern energy for all**
Climate Change and Water Resources in the Arab Region

- Based on the ESCWA coordinated Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR), climate change will in general negatively impact water resources in the Arab region.

- The temperature in the Arab region is increasing and is expected to continue to increase until the end of the century.

- Precipitation trends are largely decreasing across the Arab region until the end of the century, although some limited areas are expected to exhibit an increase in the intensity and volume of precipitation.
  - By the end of the century, both RCP 4.5 and RCP 8.5 project a reduction of the average annual precipitation reaching 90–120 mm/year in the coastal areas. This is mainly projected around the Atlas Mountains and in the upper Euphrates and Tigris basin.

https://www.riccar.org
Elaborating a WEF security nexus within the context of sustainable development

<table>
<thead>
<tr>
<th>13 CLIMATE ACTION</th>
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<td><strong>Take urgent action to combat climate change and its impacts</strong></td>
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<td>Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</td>
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<td><strong>Integrate climate change measures</strong> into national policies, strategies and planning</td>
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<td>Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</td>
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Elaborating a WEF security nexus within the context of sustainable development

- The effects of climate change do not affect a particular sector or country, but much rather resonate across a wide spectrum.

- The WEF security nexus approach has the potential to effectively harmonize these interactions across sectors and countries for achieving the SDGs.
ESCWA Water Development Report 6 (2015), addresses:

- ESCWA’s vision for a water-energy-food security nexus for the Arab region within the context of sustainable development
- The Nexus from a shared basin perspective
- Energy and water interdependencies for improved services
- Water and energy for food security
- Recommendations for improved integrated natural resources management

Available at: https://www.unescwa.org/our-work/water
ESCWA Nexus Activities
Defining regional priority areas for the Nexus

• In order to initiate intersectoral and intergovernmental dialogue on the nexus in the region, ESCWA organized an intergovernmental consultative meeting in June 2012

• Participants included members of the ESCWA Energy Committee and the ESCWA Committee on Water Resources

• The meeting resulted in the identification of seven priority areas:

1) Knowledge and awareness raising on the nexus
2) Policy coherence
3) Examining the water-energy security nexus
4) Improving efficiency
5) Informing technology choices
6) Promoting renewable energy
7) Addressing climate change and natural disasters
Developing the capacity of ESCWA Member Countries to address the Water-Energy Nexus for achieving SDGs

• ESCWA secured funding from the United Nations Development Account to implement a project on developing the capacity of ESCWA member countries to address the water and energy nexus for achieving sustainable development goals.

The project aimed to:

• Build the capacity of ministries and public service providers who are responsible for water and energy in the region, so that they adopt the nexus approach and address water and energy issues in an integrated manner.

• Assist ESCWA member States in bringing the nexus approach to the sustainable development goals in the 2030 Agenda development framework.
Developing the capacity of ESCWA Member Countries to address the Water-Energy Nexus for achieving SDGs

- The was project pursued through 2 complimentary capacity building interventions

- High level officials in Ministries
- Preparation of a regional policy toolkit
- Regional Policy workshop
- Preparation of 3 technical toolkits
- Regional knowledge exchange workshop
- Resource efficiency
- Technology transfer
- Renewable energy
- Public service providers
- Three pilot activities
- Training workshop
- Training workshop
- Training workshop
The Regional Policy toolkit is composed of 7 modules corresponding to the priorities identified by ESCWA committee members:

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<th>Module 1</th>
<th>Knowledge and awareness raising on the nexus</th>
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<td>Module 2</td>
<td>Policy coherence</td>
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<td>Module 3</td>
<td>Examining the water-energy security nexus</td>
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<td>Module 4</td>
<td>Improving efficiency</td>
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<td>Module 5</td>
<td>Informing technology choices</td>
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<td>Module 6</td>
<td>Promoting renewable energy</td>
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<td>Module 7</td>
<td>Addressing climate change and natural disasters</td>
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Three Operational Modules
Three Pilot Initiatives

1. Generation of electricity from micro-hydro system in a water transmission system in Kairouan, Tunisia

2. Use of photovoltaic solar systems for groundwater pumping for potable uses in Suwayda, Syrian Arab Republic

3. Use of photovoltaic solar system for water pumping for agriculture uses in Moghra Oasis, Egypt
Promoting food and water security through cooperation and capacity development in the Arab region

- Within the context of the regional Arab initiative, ESCWA is implementing the project entitled “Promoting food and water security through cooperation and capacity development in the Arab region” with regional partners and the financial support of the Swedish International Development Cooperation Agency (Sida)

- The project supports cross-sectoral dialogue among water and agricultural stakeholders
Promoting food and water security through cooperation and capacity development in the Arab region

i. Enhance national capacities of the agriculture and water sectors in the area of impact assessment of climate change on water and agricultural production

ii. Support the development of an institutional mechanism to enhance coordination between the agriculture and water sectors at the regional level (AMWC and AOAD)

iii. Support the development of an institutional framework for an Arab-GAP, with the aim to improve food production, safety, and trade

iv. Support the development of a monitoring system for food security in the Arab countries, taking into account global processes, like the 2030 Agenda for Sustainable Development, and the SDGs
Future Outlook
Future Activities

• Continuation of the project on “Promoting food and water security through cooperation and capacity development in the Arab region”

• Regional Initiative for the Promotion of Small-Scale Renewable Energy Applications for Supporting Productive Activities in Rural Areas in the Arab Region (REGEND) includes water and food securities dimension and empowerment of women, 2018-2021

• Expert Group Meeting for advancing dialogue across WEF sectors, 25-26 June, Beirut Lebanon

• Continued work on the Nexus approach to the SDGs
Thank you