Considering the Water-Energy-Food Nexus within the Context of the SDGs

Economic and Social Commission for Western Asia

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The Sector or 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

- The water-energy-food nexus approach may also provide a cross-check on how progress in some thematic targets affects others

Elaborating a WEF security nexus within the context of sustainable development

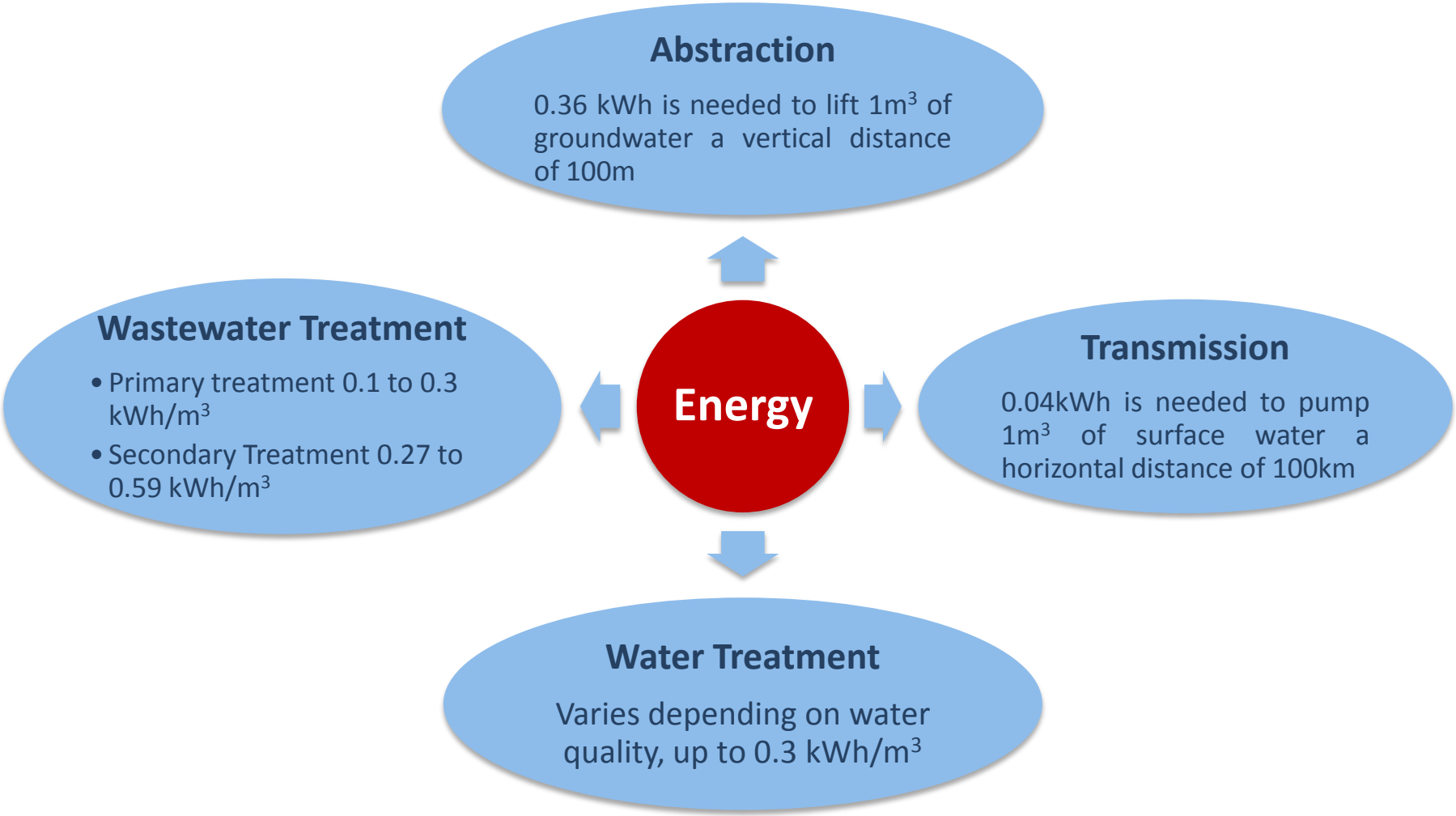
The WEF security nexus within the context of SDGs

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

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

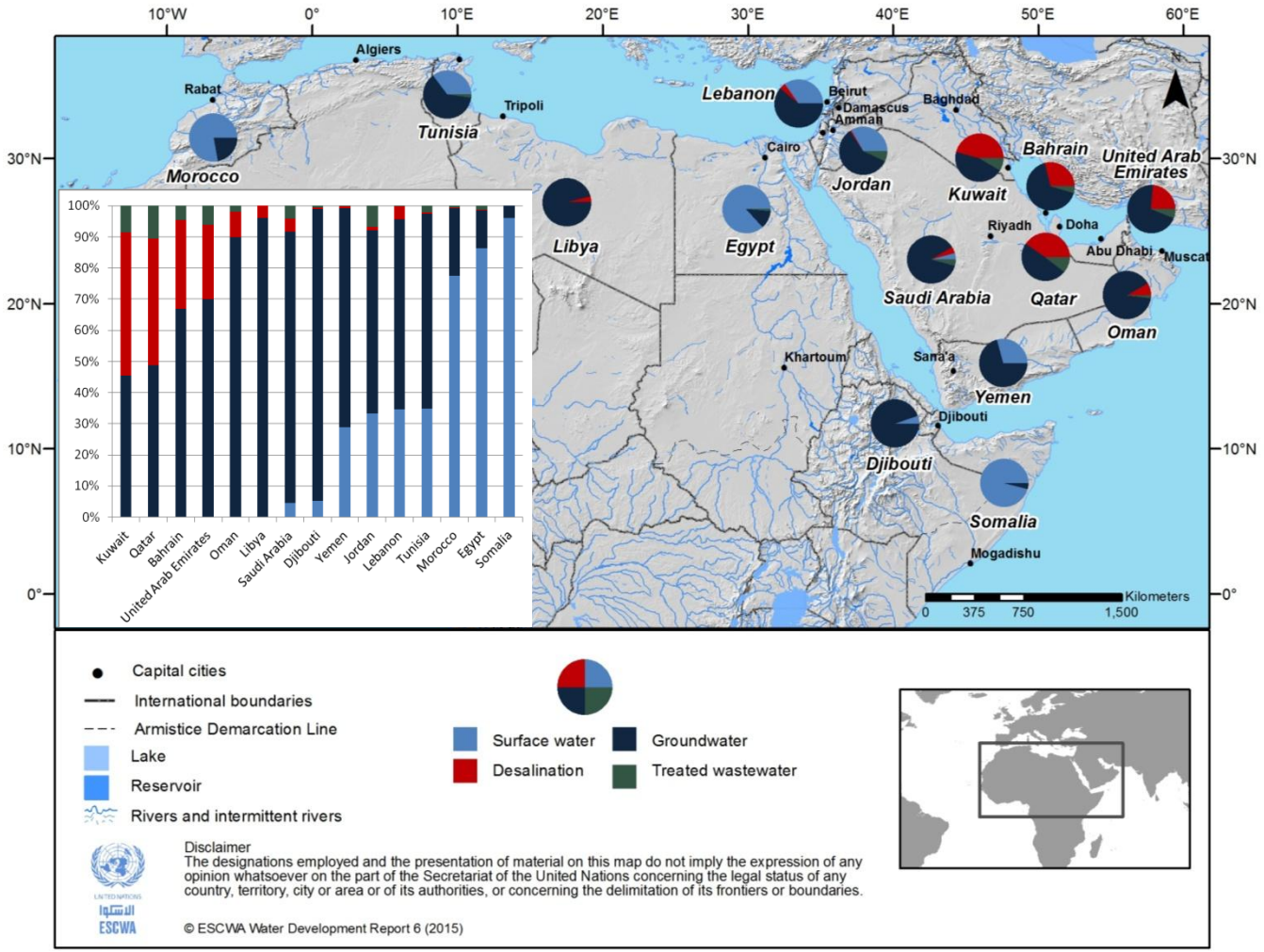
Ensure access to **affordable, reliable, sustainable** and **modern energy for all**

Energy for Water



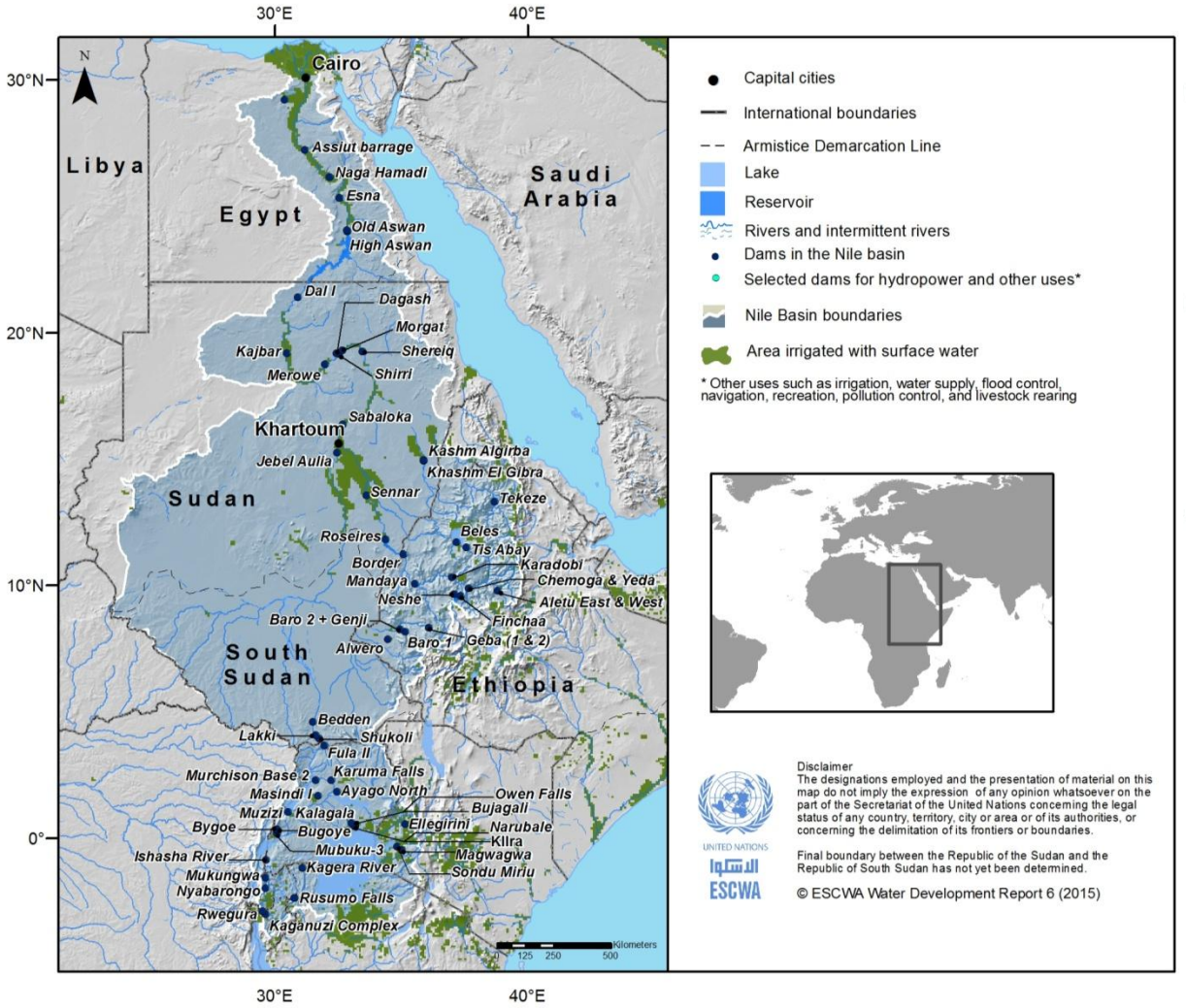
Energy Demand of Water in the Arab Region

- 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: Cooling Systems

- Cooling systems advantages and disadvantages

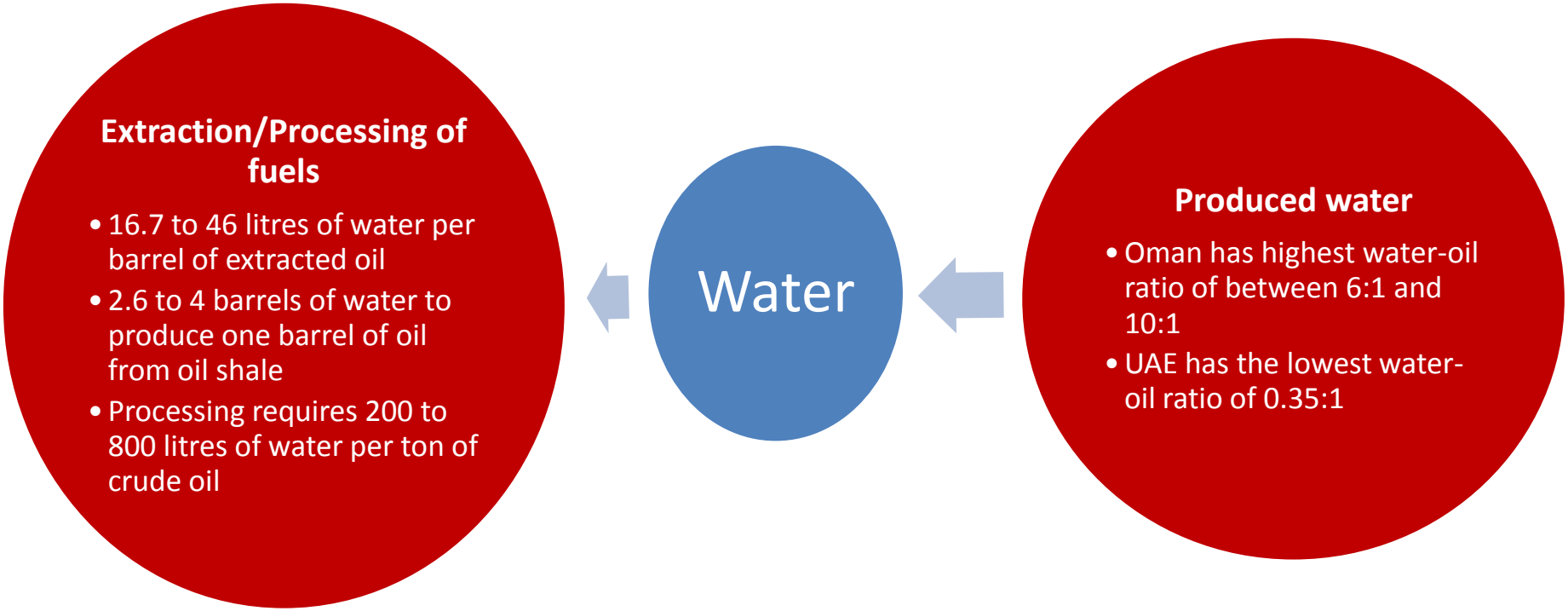
Cooling Type	Water Withdrawal	Water Consumption	Capital Cost	Plant Efficiency	Ecological Impact
Once-Through	Intense	Moderate	Low	Most efficient	Intense
Wet Cooling	Moderate	Intense	Moderate	Efficient	Moderate
Dry Cooling	None	None	High	Less efficient	Low

- Comparison of consumptive water use of various power plant technologies using various cooling methods.

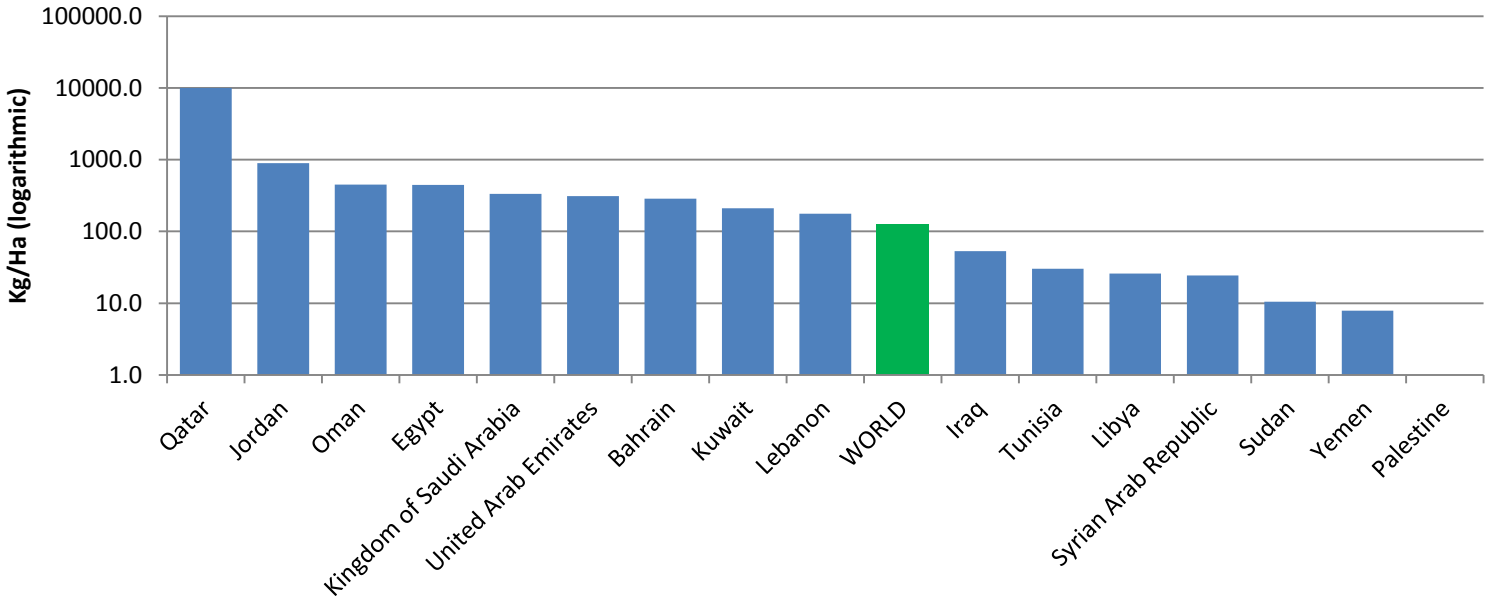
Technology	Cooling Technology	Consumptive Water Use (m^3/MWh)	Performance Penalty	Cost Penalty
Coal / Nuclear	Once-Through	87 – 102		
	Recirculating	1.5 – 2.8		
	Dry cooling	0.19 – 0.25		
Natural Gas	Recirculating	0.76		
Power Tower	Recirculating	1.9 – 2.8		
	Combination Hybrid Parallel	0.34 – 0.95	1 – 3 %	5 %
	Dry cooling	0.34	1.3 %	
Parabolic Trough	Recirculating	3		
	Combination Hybrid Parallel	0.38 – 1.7	1 – 4 %	8 %
	Dry cooling	0.3	4.5 – 5 %	2 – 9 %
Dish / Engine	Mirror Washing	0.08		
Fresnel	Recirculating	3.8		

Source: United States Department of Energy (2009). *Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of CSP Electricity Generation*. Report to Congress. Washington, USA.

Water for Energy



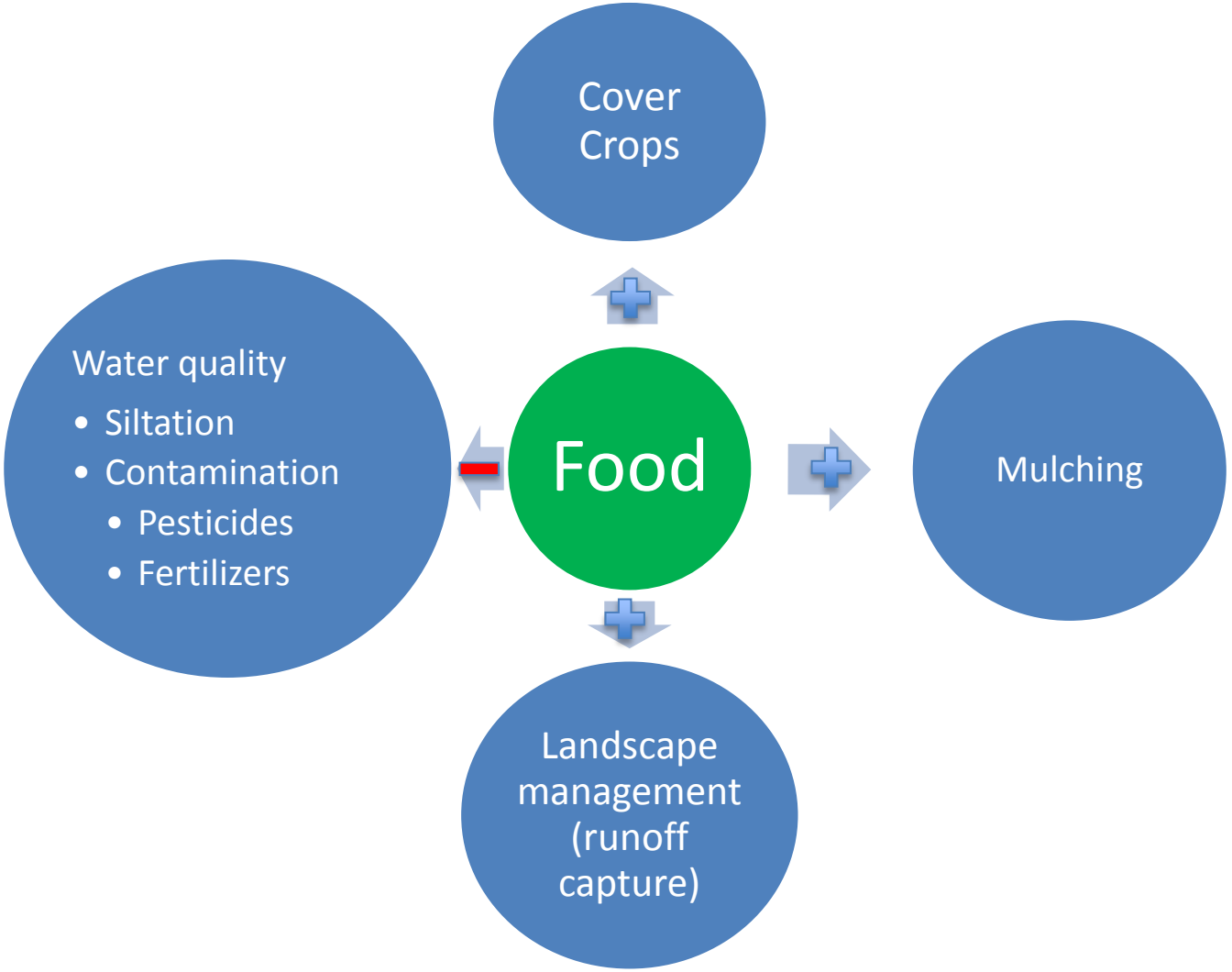
Water and Energy for Food



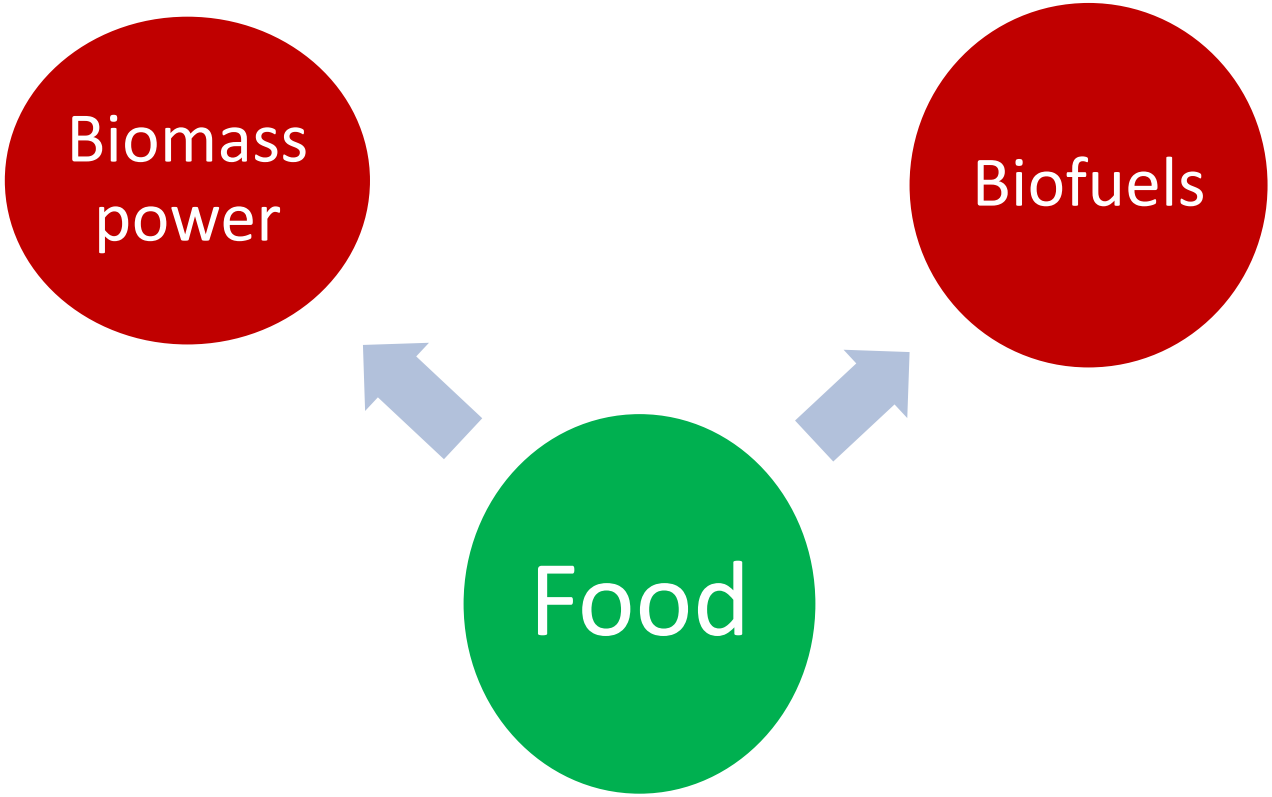
Source: Computed from FAO, FAOSTAT, Accessed February 2015 (http://faostat3.fao.org/home/E). Note: Data for the State of Palestine is not available.

- 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.

Food for Water



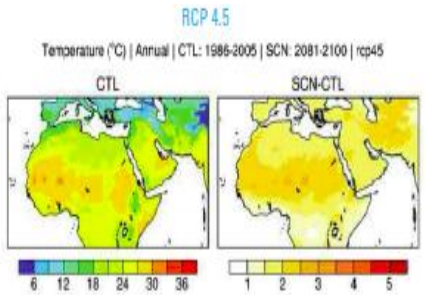
Food for Energy



Climate change and the WEF security nexus

- ESCWA is coordinating the **Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR)** which is being implemented in partnership with the League of Arab States and 11 regional and international organization and three climate research institutes.

- The effects of climate change do not hit a particular sector and country, but much rather **resonate across a wide spectrum.**
  - Consistent warming trend with a general increase in the frequency of warms days and longer summer periods across the Arab region



- The WEF security nexus approach has the potential to effectively **harmonize** these interactions **across sectors and countries**.

RICCAR Partnerships

Implementing Partners (11)

ESCWA

UNEP

WMO

ACSAD

LAS

SMHI

UNESCO
United Nations
Educational, Scientific and
Cultural Organization

Cairo Office

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

UNISDR
The United Nations Office for Disaster Risk Reduction

UNITED NATIONS UNIVERSITY
UNU-INWEH

FAO

Donors

SWEDEN
SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Collaborating Research Institutes

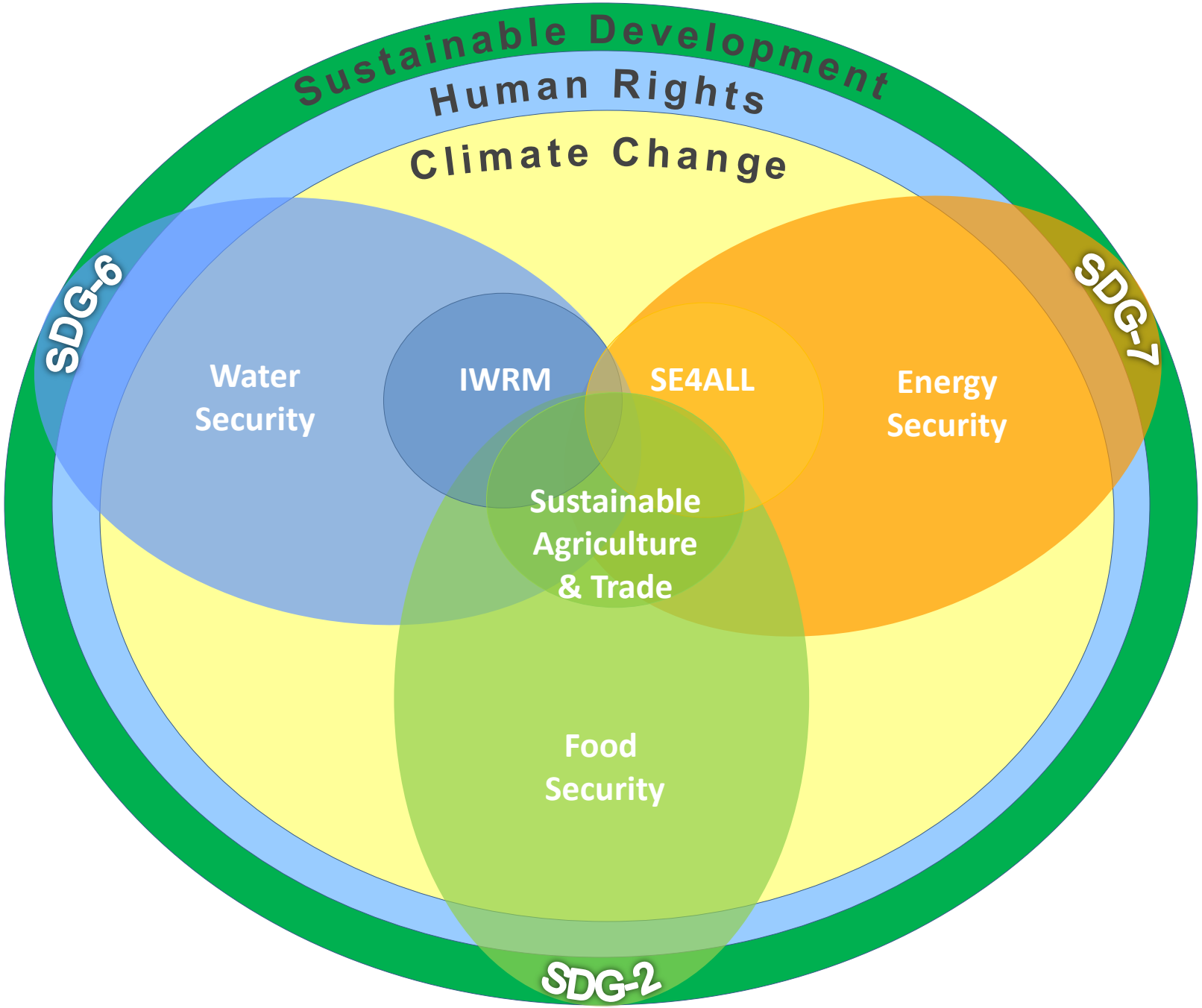
- Center of Excellence for Climate Change Research/ King Abdulaziz University (CECCR/KAU) - *KSA*
- King Abdullah University of Science and Technology *(KAUST) - KSA*
- Climate Services Center 2.0 (CS2.0) - *Germany*

ESCWA Water Development Report 6: The Water-Energy-Food Security Nexus in the Arab region

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


Sustainable Development
Human Rights
Climate Change
SDG-6
SDG-7
SDG-2
Water Security
IWRM
SE4ALL
Energy Security
Sustainable Agriculture & Trade
Food Security

The WEF security nexus within the context of the SDGs

- 2030 Agenda::
  - "**interlinkages and integrated nature** of the Sustainable Development Goals are of crucial importance in ensuring that the purpose of the new agenda is realized"
- SDGs:
  - Universal
  - Integrated and indivisible
  - People-centered
  - Seek to achieve gender quality and empowerment of all women and girls
  - Balance the 3 dimensions of sustainable development: the economic, social and environmental
- The integrated nature of the SDGs matches well a nexus approach that specifically considers the numerous links between sectors

Considering a nexus approach to the water-related SDGs in the Arab regional context

- To be successful, a nexus approach will have to go beyond just clustering related targets and actually **examine the interactions**.
  → Develop methods for monitoring and accountability that will make it possible to recognize trade-offs and act to avoid them

- **Maintain focus on improving lives**

Nexus Approach to the SDGs

- **Preliminary mapping of WEF cluster related SDGs identified:**
  - 46 targets; and
  - 11 means of implementation

Food in the Sustainable Development Agenda 2030

Preliminary Core Linkages with SDG2

Water in the Sustainable Development Agenda 2030

Preliminary Core Linkages with SDG6

Energy in the Sustainable Development Agenda 2030

Preliminary Core Linkages with SDG7

ESCWA Nexus Related Activities

Developing the capacity of ESCWA Member Countries to address the water and energy nexus for achieving sustainable development goals

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, starting December 2014 and lasting until December 2017

The project aims 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 a post-2015 development framework.

ESCWA Nexus Related Activities

Developing the capacity of ESCWA Member Countries to address the water and energy nexus for achieving sustainable development goals

The project will be pursued through 2 complimentary capacity building interventions

- Capacity building
  - High level officials in Ministries
    - Preparation of a regional policy toolkit
      - Regional Policy training workshop
      - Three pilot projects
        - Regional knowledge exchange workshop
  - Public service providers
    - Preparation of 3 technical toolkits
      - Resource efficiency
        - Training workshop
      - Technology transfer
        - Training workshop
      - Renewable energy
        - Training workshop

THANK YOU

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40 YEARS