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Managing complexity for sustainability: Experience from governance of water-food-energy nexus

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Leader, FAO Regional Office for the Near East

G20-Meeting of the Agricultural Chief Scientists, Khobar, KSA, 17-19 February 2020





Origine of the Nexus approach

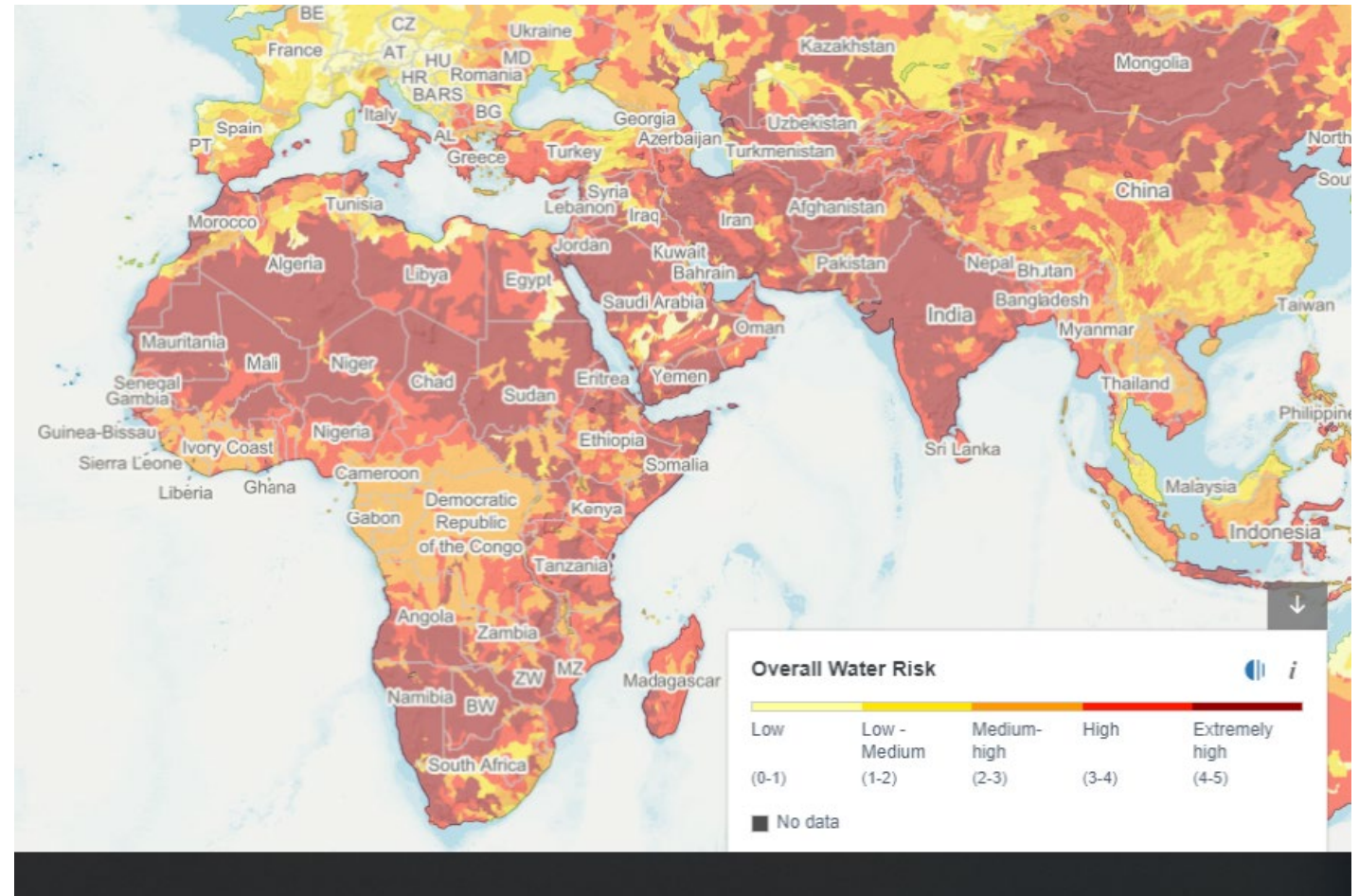
The Nexus approach initially emerged as:

- a framework and a tool to facilitate the shift from sectoral to integrated planning and decision-making
- a vehicle to overcome policy fragmentation, improve coherence, use resources efficiently and to optimize allocation of resources



Complexity of challenges we face

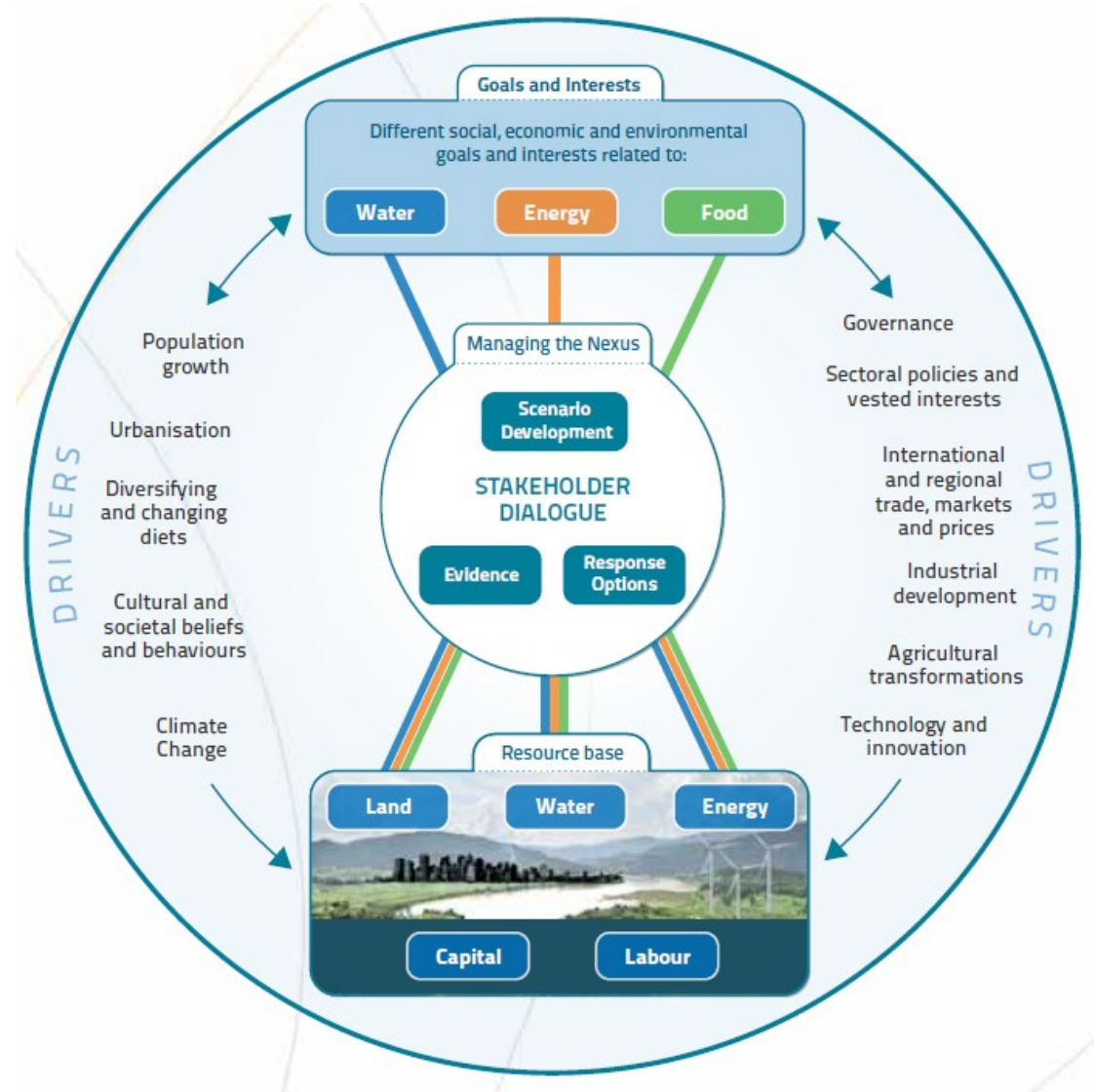
- Climate change
- Water scarcity
- Land degradation
- Food insecurity
- Political instability



WRI's Aqueduct , August 2019,

FAO's nexus approach

- **Energy security:** The uninterrupted availability of energy sources at an affordable price (IEA)
- **Water security: (UNU)** The capacity of a population to safeguard sustainable access to adequate quantities of water of acceptable quality for sustaining livelihoods, human well-being and socio-economic development, and for preserving ecosystems
- **Food security (FAO):** when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets the dietary needs and food preference for an active and healthy life



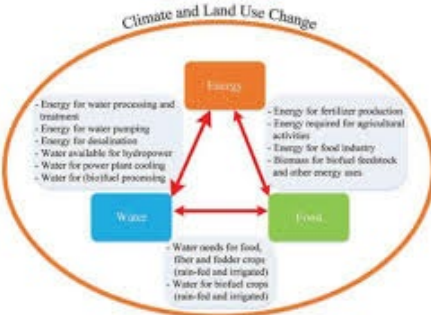
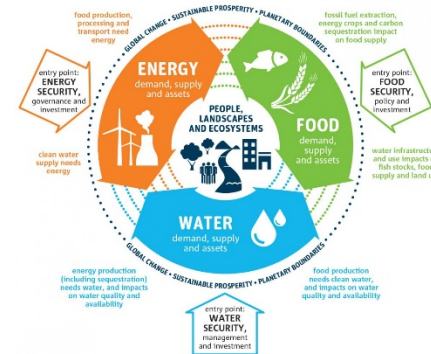


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Nexus framework tools

future^{earth}
research for global sustainability

SEI Stockholm
Environment
Institute



The Resource Management Strategy Guiding Tool



DAFNE: A Decision-Analytic Framework to explore the water-energy-food NEXus in complex and transboundary water resources systems of fast growing developing countries

What is DAFNE?
DAFNE is a four-year project funded by the European Union under the Horizon 2020 Research and Innovation Action category. This project is being carried out in the Zambezi and the Ono river basins in Africa. It investigates how water, energy and food are managed in these areas and explores options for sustainable and integrated management in the future together with stakeholders.



What is the Water-Energy-Food (WEF) nexus approach?
The nexus approach highlights the interdependence of water, energy and food security and the natural resources that underpin that security - water, soil and land. Based on a better understanding of the interdependence of water, energy and climate policy, this new approach identifies mutually beneficial responses and provides an informed and transparent framework for determining trade-offs and synergies that meet demand without compromising sustainability.

What are the goals of DAFNE?

- DAFNE's central objective is to develop a Decision-Analytic Framework (DAF) that can be used to support the quantitative assessment of the social, economic and environmental impacts of expanding energy and food production in complex physical and political contexts where natural and social processes are strongly interconnected and the institutional setting involves multiple stakeholders and decision-makers.
- Moreover, the DAF will integrate a novel participatory and multi-disciplinary perspective, while working with private and public stakeholders in order to develop a better understanding of the WEF-nexus in the Ono and Zambezi river basins.
- generate and explore alternative planning and management solutions focused on the WEF nexus
- contribute to solutions that better profile but equitable use of resources without infringing on environmental limits, and revenue and mitigate societal and stakeholder conflicts.

Who is involved in DAFNE?

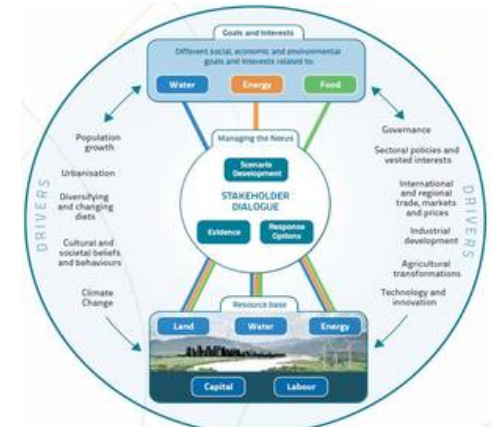
- DAFNE is a consortium project that involves 13 project partners, these include:
 - ETH Zurich
 - IFPRI
 - WFP
 - WFP
 - ATC-10
 - WFP
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- Stakeholders are key to the DAFNE project. Their involvement and participation in the project will revolve around several activities, in particular:
 - Bringing in their perspective on water, energy and food issues in the Ono or Zambezi river basins.
 - Contributing to the identification of indicators and potential pathways to sustainable resource use.
 - Exploring and discussing alternative pathways and solutions for the management of the river basin together with other stakeholders.

What role do stakeholders play?

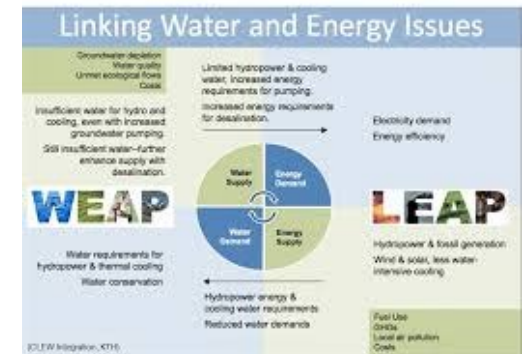
- Validating and verifying model data input and output.
- Supporting the communication of project results.



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Nexus tools help decision makers:

- Assess **quantitatively** the interlinkages between different sectors
- Identify **synergies** and **trade-offs**
- Analyze different technical **options** with diverse benefits and disadvantages
- Estimate the impact of different **scenarios** on resources and people (modelling)
- Analyze and evaluate the impact of **policies**



SDG and the 2030 Agenda

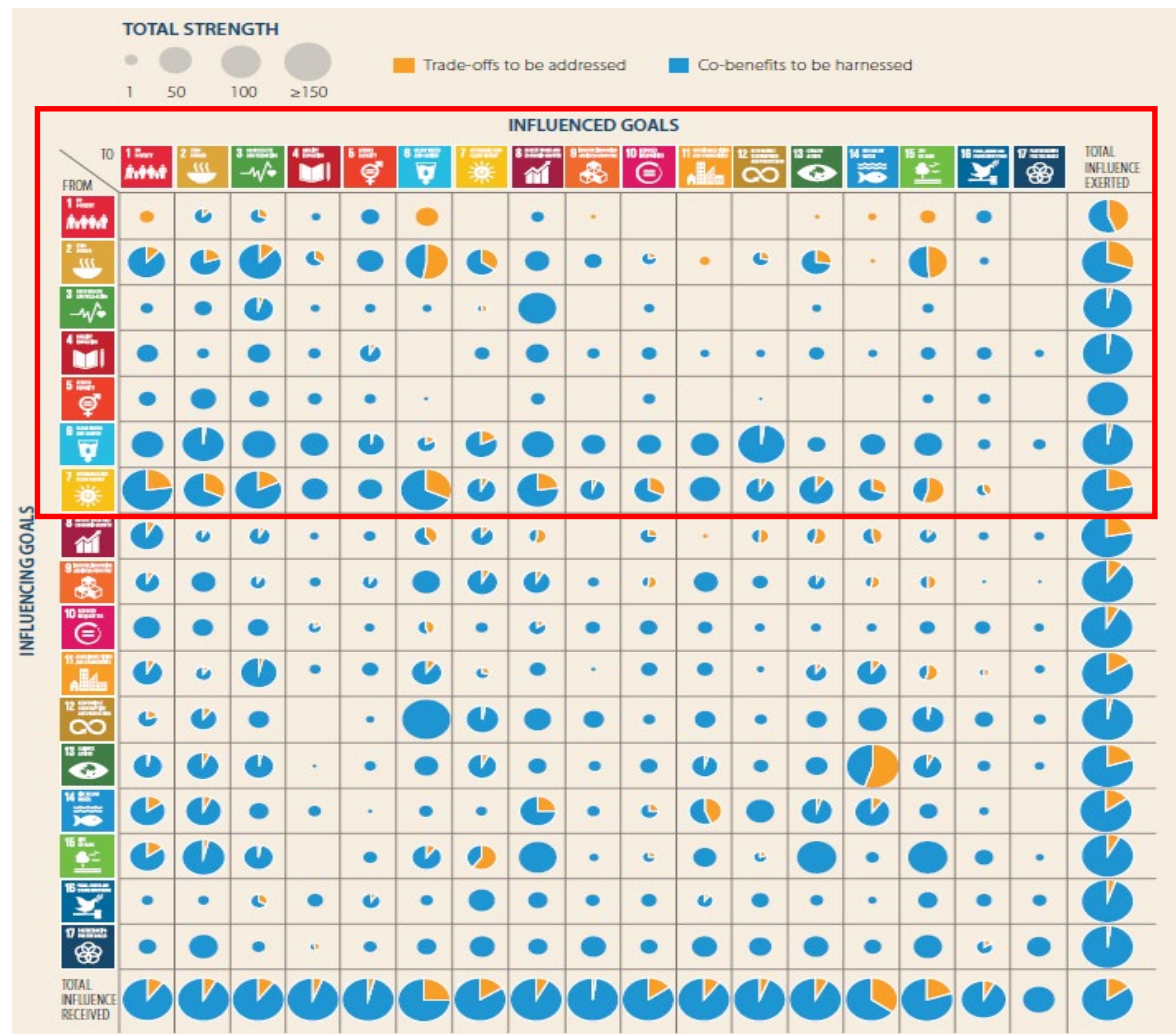
Interconnectedness and cross-sectoral dimension of the 17 Goals

Re-emergence of the nexus approach



Global Sustainable Development Report 2019

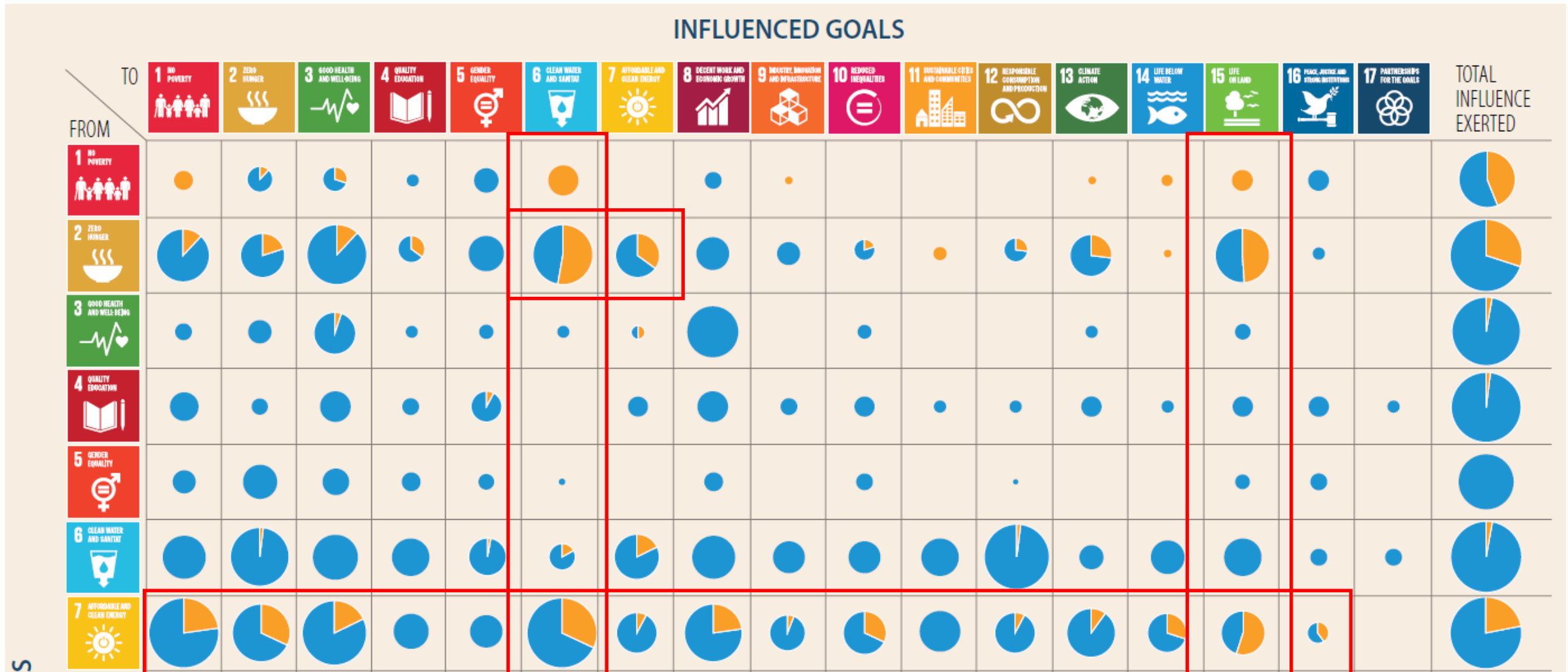
Systems thinking: synergies and trade-offs





Water – food – energy - land

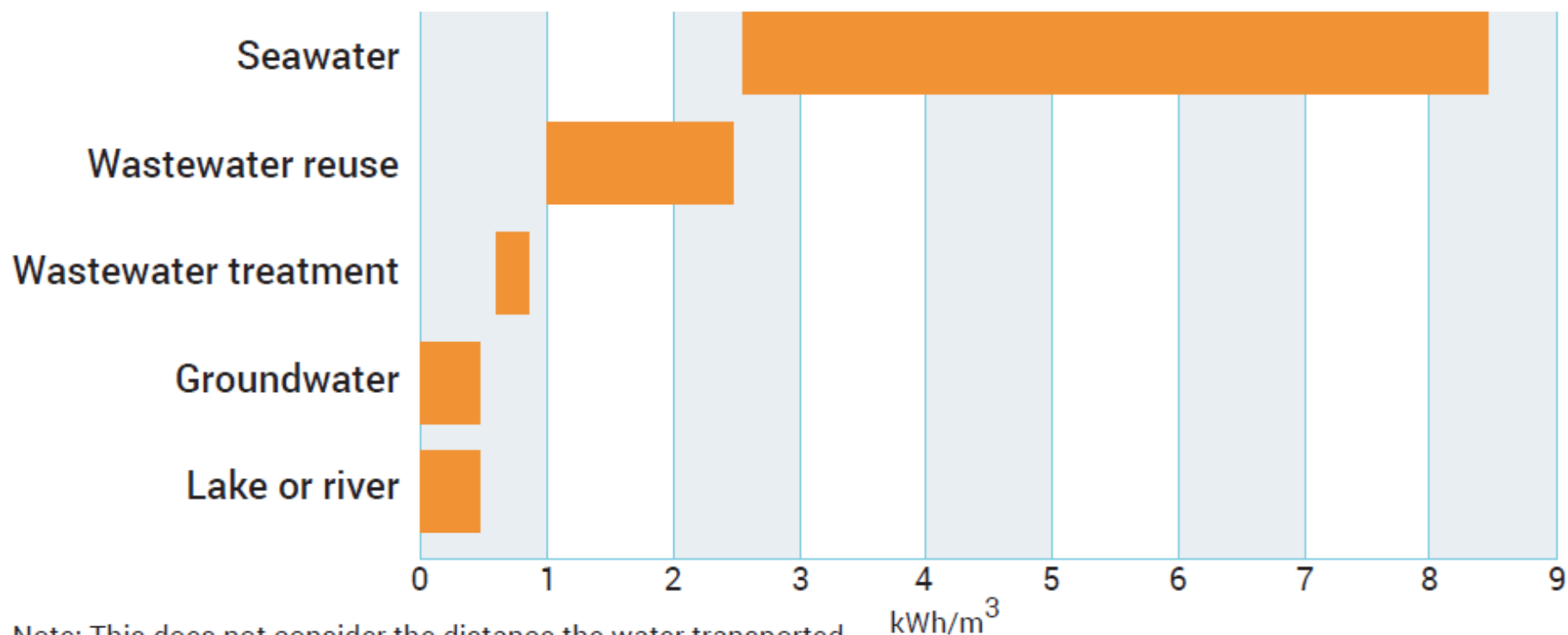
Source: GSDR (2019)





Water-energy nexus

Amount of energy required to provide one cubic meter of water safe for human consumption from various water sources (UN Water, 2014)



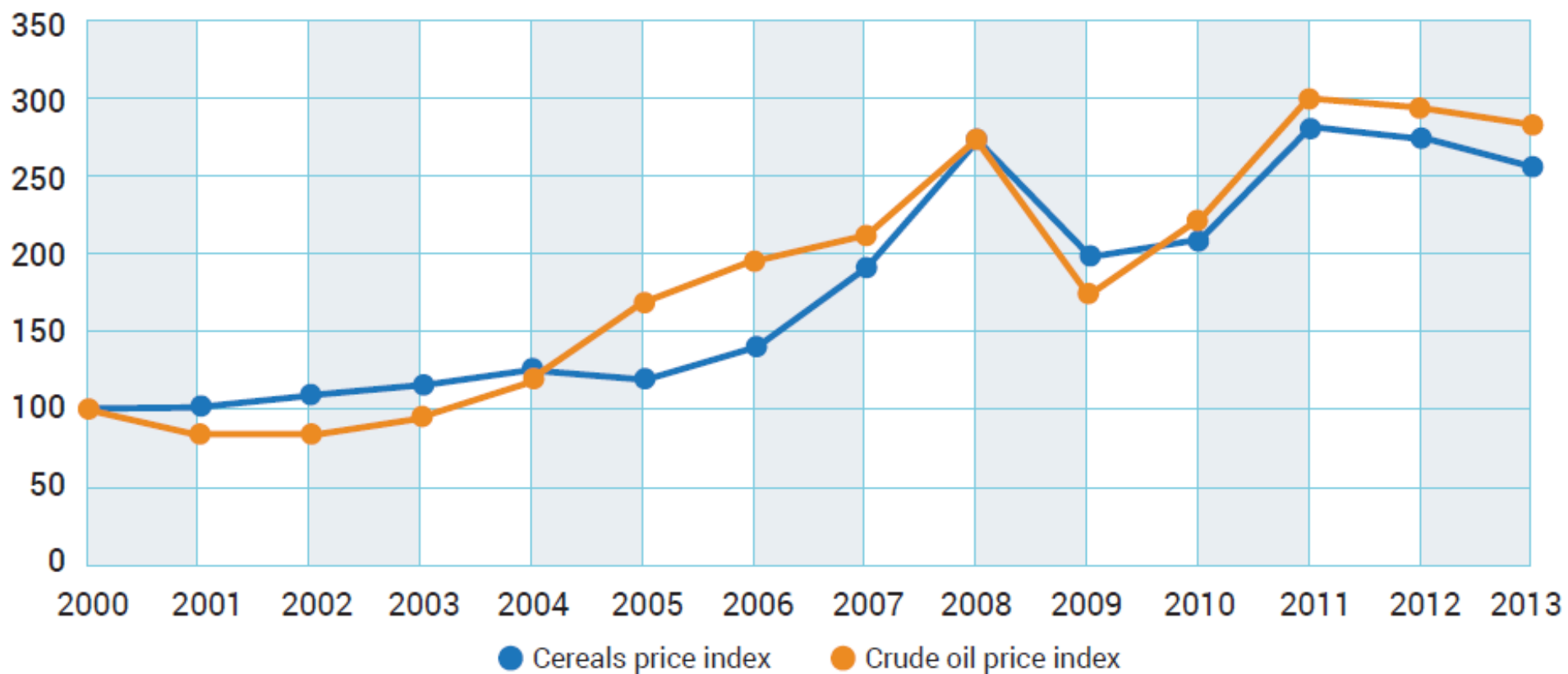
Note: This does not consider the distance the water transported

Source: UN World Water Development Report, 2014 (unesdoc.unesco.org/images/0022/002257/225741e.pdf)



Energy – food nexus

Oil-Cereal price inter-linkages 2003-2013



Source: Based on FAO Food Price Index and BP Statistical Review of World Energy 2014 (Base 2000 = 100)



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A focus on food system:

TRANSFORMING FOOD SYSTEMS TO ACHIEVE THE SDGs





GSDR 2019: Transforming food systems to achieve SDGs

Food systems and nutrition patterns: changing food systems is essential for sustainable development



More equitable global access to nutritious food is needed

2 billion people suffer from food insecurity



People undernourished



Adults overweight



Children under 5 years overweight



One third of all food produced is either lost or wasted



Livelihoods in agriculture must be considered

Agriculture employs over 1.1 billion people



AGRICULTURE



EMPLOYS 1 BILLION +



Climate and environmental impacts of food production must be minimized

Agriculture is responsible for 80% of global deforestation



80%
GLOBAL
DEFORESTATION

Food systems release 29% of global GHGs



29%
RELEASE OF
GLOBAL GHGs

Agriculture accounts for 70% of freshwater use



70%
FRESHWATER
USE



GSDR 2019: Systemic interactions related to Goal 2

A

Co-benefits and trade-offs

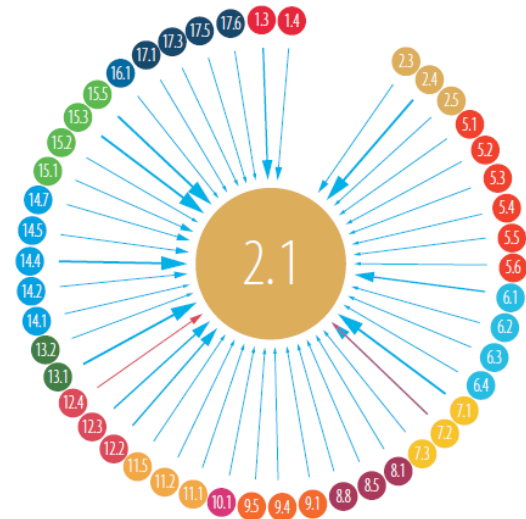
TOWARDS GOAL 2 FROM OTHER TARGETS

FROM GOAL 2 TOWARDS OTHER TARGETS



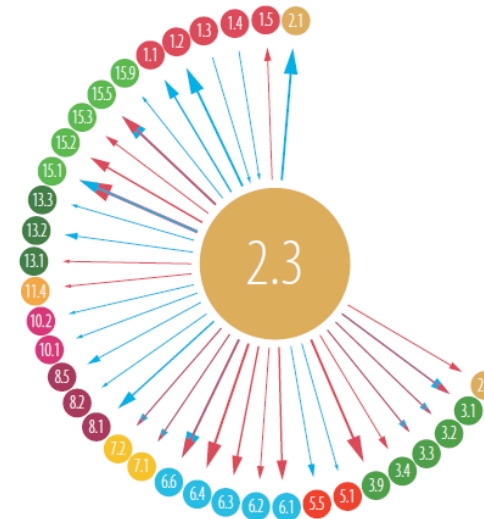
B

Target 2.1 (food security): Significant co-benefits received through interactions



C

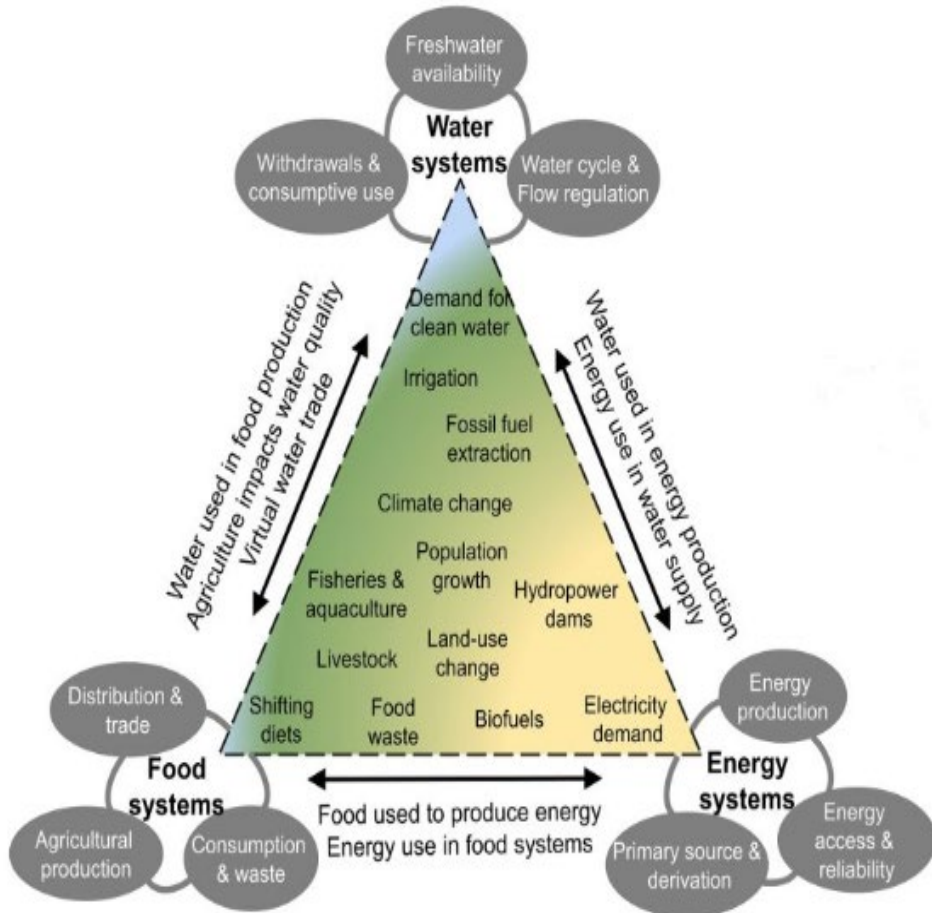
Target 2.3 (increased productivity): Significant negative impacts



Co-benefits

Trade-offs

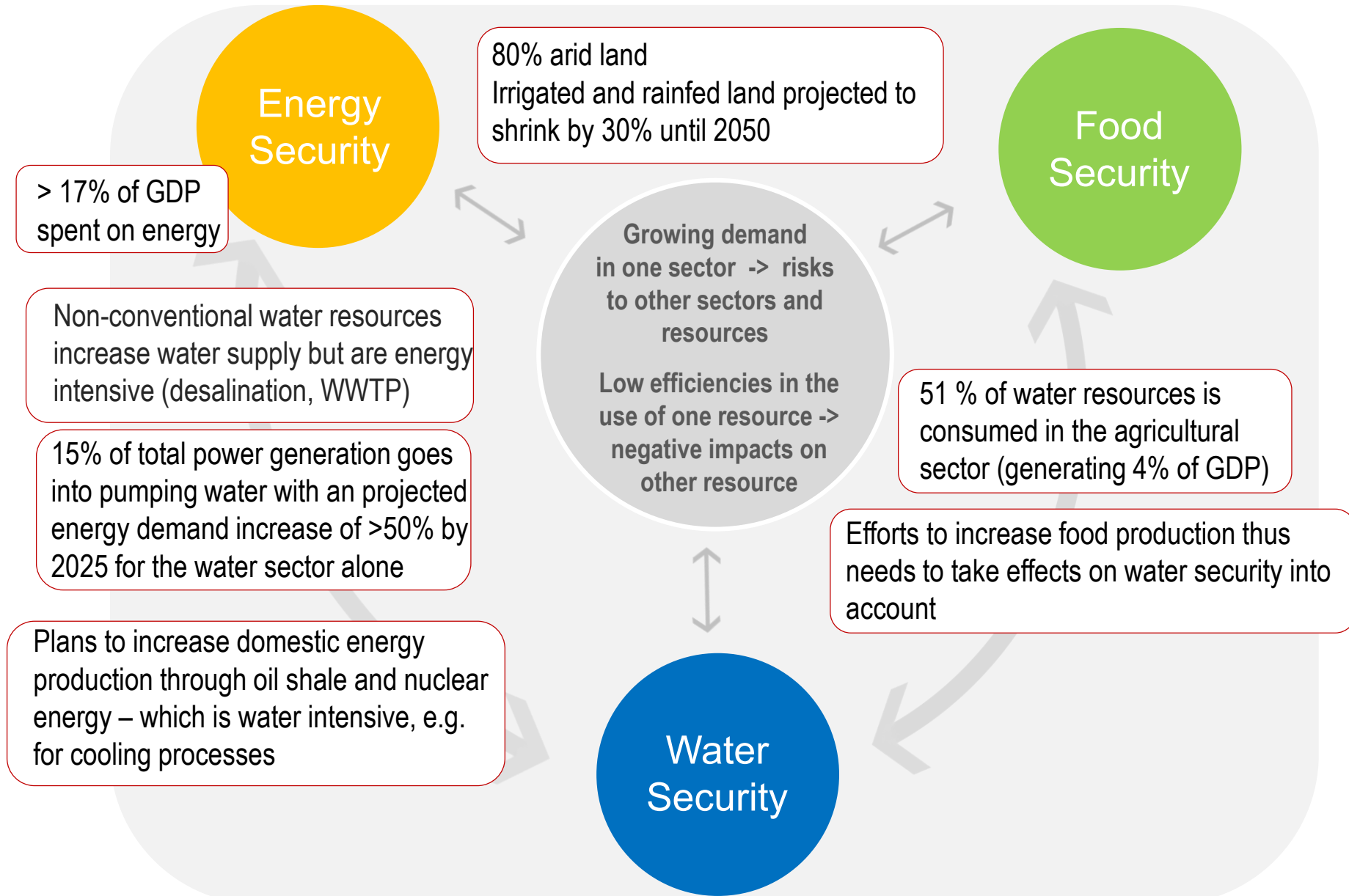
Experience of WFE in Jordan and Morocco



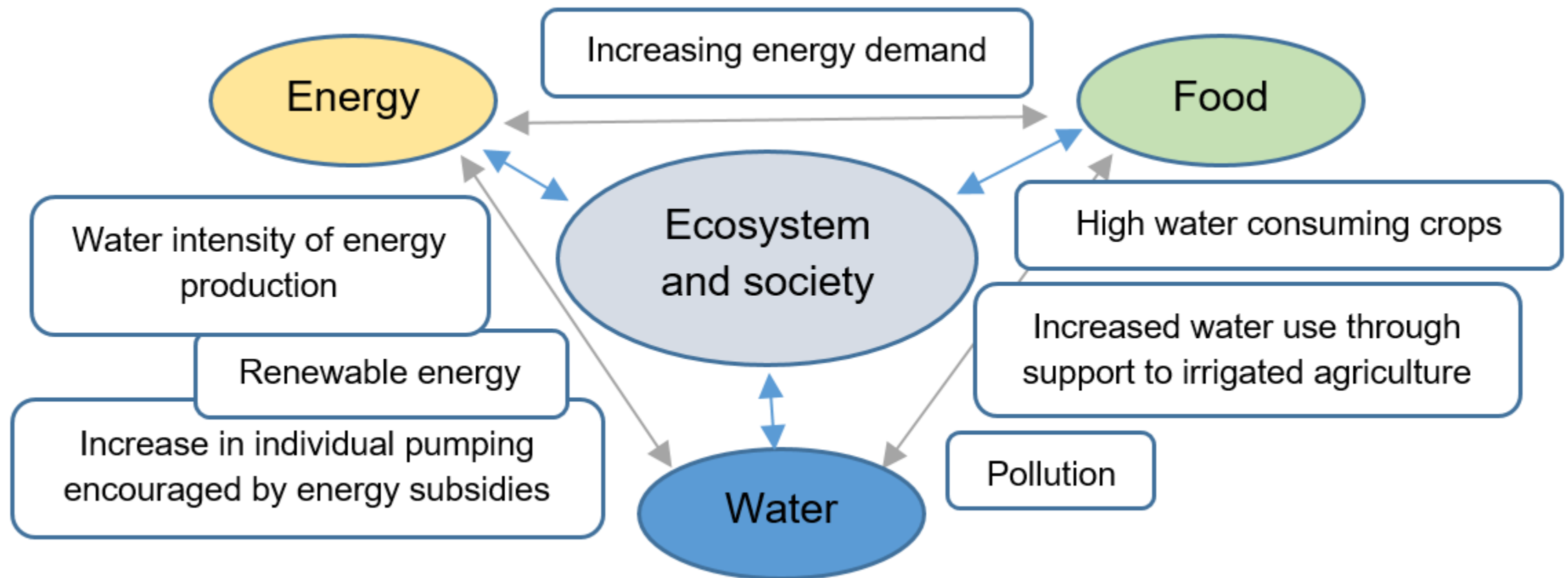
- Both countries have unsustainable abstractions of groundwater (irrigation)
- Both countries are investing more in the energy sector (including solar)
- Both countries are aware of the key interlinkages between sectors and the negative impact that could derive by the lack of coherence in policy development



WFE in Jordan



WFE in Morocco





Findings

- **Governance** is central to nexus implementation
- Institutional legacies and organizational culture induce **inertia** against inter-ministerial coordination
- **Access/share of data** and information remains difficult
- **Vested interests** and power relationships are not playing in favor of the nexus
- Insufficient recognition of relevance of political and governance factors



Successful nexus work requires to:

- prioritize the **most critical** cross-sectoral linkages and identify potential conflicts
- have **more focus on people** and impact on their economy and livelihoods
- provide **incentives** for integrated planning and implementation
- **incorporating social and political context** of WFE sectors
- Develop better way of **engaging stakeholders** and promoting change in perception and attitudes



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THANK YOU

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