

# ASSESSING THE STATE OF THE **WATER-ENERGY-FOOD (WEF)** NEXUS IN SOUTH AFRICA

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Brussels Policy Briefing n. 56

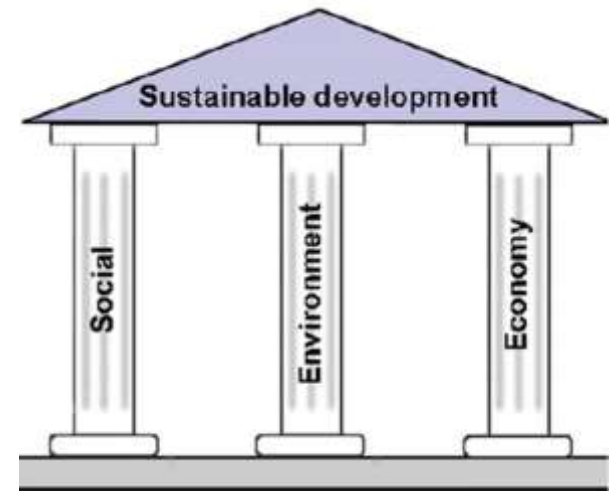
The Land-Water-Energy nexus and the Sustainability of the  
Food System



# INTRODUCTION

- **Background and Significance**

- Sustainable resource management is a major world-wide governance concern
- Integrated Water Resource Management (IWRM) is **water-centric**, while the WEF Nexus has a **polycentric** philosophy
- The WEF nexus is closely aligned to the **SDGs 2,6 and 7**



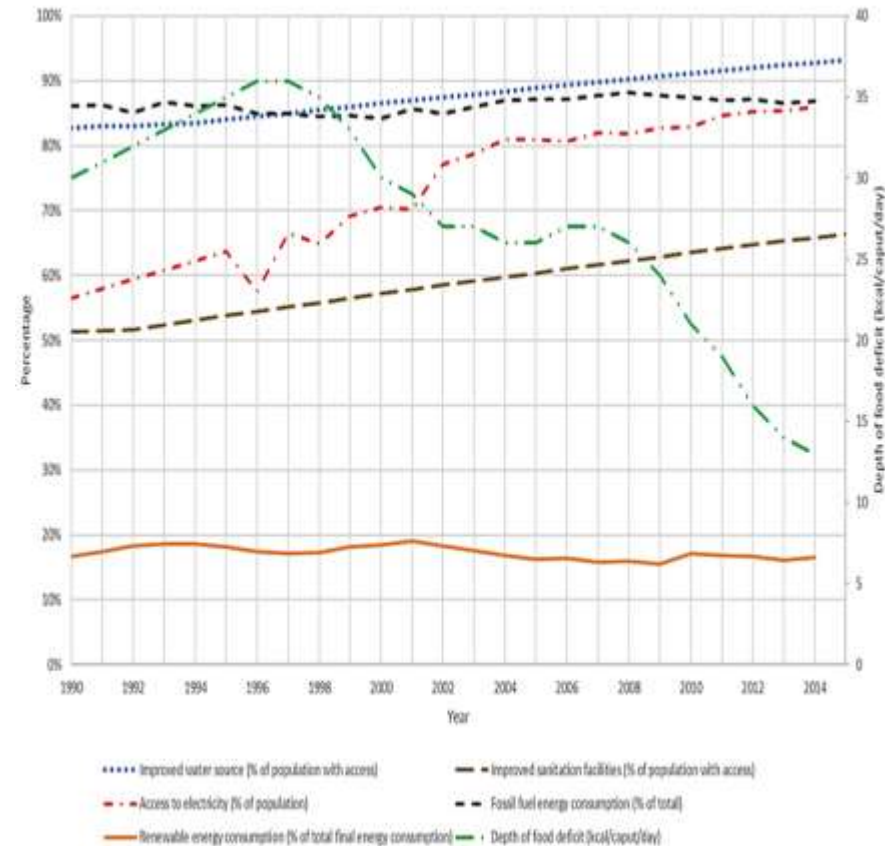
<http://en.envirocitiesmag.com/articles/innovati-on-for-sustainability/sustainable-development-and-its-origin.php>



# CURRENT STATUS OF THE WEF NEXUS IN SOUTH AFRICA

## • *Nationally*

- Most **information** is available at a **sector-specific** level
- The WEF nexus is currently being investigated by several universities and institutions in South Africa (UKZN, UCT)
- South Africa is one of the most advanced countries in terms of achieving the targets set in the three relevant SDGs (i.e. 2, 6 and 7)



# CURRENT STATUS OF THE WEF NEXUS IN SOUTH AFRICA

- *Provincially*

- The sustainability of exporting **‘virtual water’** in agricultural products need to be evaluated
- The Northern Cape’s agricultural land is reduced by the colonisation of alien invasive plants
- **Water resource systems** and the **supporting infrastructure** within the **Karoo** are **extremely strained**



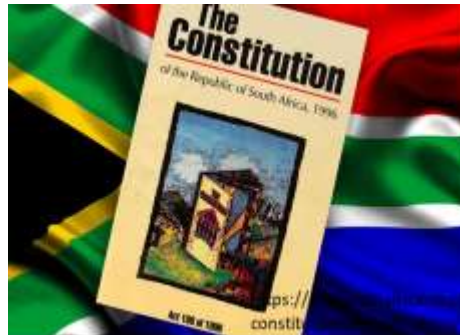
[https://www.researchgate.net/publication/320670915\\_INVASIVE\\_PLANT\\_SPECIES\\_IN\\_LESOTHO%27S\\_RANGELANDS\\_SPECIES\\_CHARACTERIZATION\\_AND\\_POTENTIAL\\_CONTROL\\_MEASURES/figures](https://www.researchgate.net/publication/320670915_INVASIVE_PLANT_SPECIES_IN_LESOTHO%27S_RANGELANDS_SPECIES_CHARACTERIZATION_AND_POTENTIAL_CONTROL_MEASURES/figures)



# CURRENT STATUS OF THE WEF NEXUS IN SOUTH AFRICA

- ***Policy Frameworks***

- South Africa faces a mounting **challenge to secure a supply of clean water, to protect water resources and to eradicate hunger and poverty**
- Progressive policies and sector-specific laws need to be properly **aligned with the constitution for synergy**



# IMPLEMENTING THE WEF NEXUS IN SOUTH AFRICA

- **Technical Level**

- **Green technology and infrastructure will influence resource availability** in South Africa
- Many opportunities exist that could enhance the evolution of the WEF Nexus
- South Africans need to be **educated and informed**
- There is potential for **improving data collection**, as well as the documenting, visualising and sharing (cohesion between research groups)
- South Africa has **great potential for renewable energy**



<https://www.gauteng.net/attractions/menlyn-mainie-hub-brings-sustainable-city-living-to-pretoria>



# IMPLEMENTING THE WEF NEXUS IN SOUTH AFRICA

- *Policy Level*

- **Multi-stakeholder dialogues** are needed
- There is scope for improvement for information and interest to be generated at a technical level
- Work is also required to present the WEF nexus better at a regional level
- Policy-making processes need to consider the **adverse effects of climate change**



<https://theforestdialogue.org/process>



# POLICY AND RESEARCH GAPS

- Previously, natural resources management and environmental issues were mainly discussed by engineers and environmental scientists
- The **exclusion** of policymakers and other stakeholders **creates a large gap of knowledge**
- The development of WEF nexus policies **requires sustainable resource planning and management through a central authority.**
- **Interdisciplinary studies** between water, energy and food security **are needed** to address the knowledge gap, which is required for policy formation
- In South Africa, the disconnection between three sectors is apparent
- **National policies lack convergence**



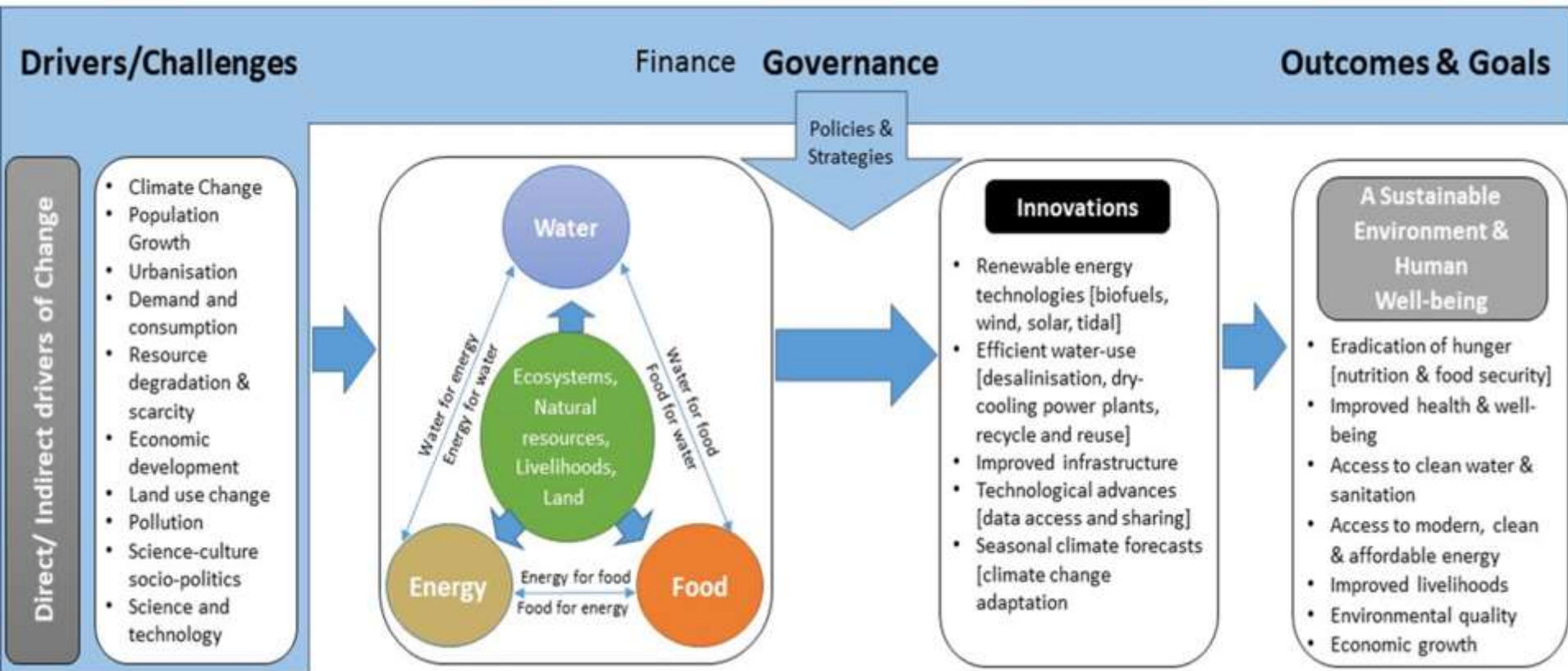


# WEF NEXUS FRAMEWORK FOR SOUTH AFRICA

- A total of 20 WEF Nexus frameworks were reviewed and a criteria was used to assess if the frameworks had the following characteristics,
  - a) Inclusion of all three sectors
  - b) Mentioned major drivers of change
  - c) Applicability to South Africa
  - d) Integration of other sectors
  - e) Connection to SDGs
  - f) Innovations strategies
  
- Based on the above criteria, five existing frameworks were identified

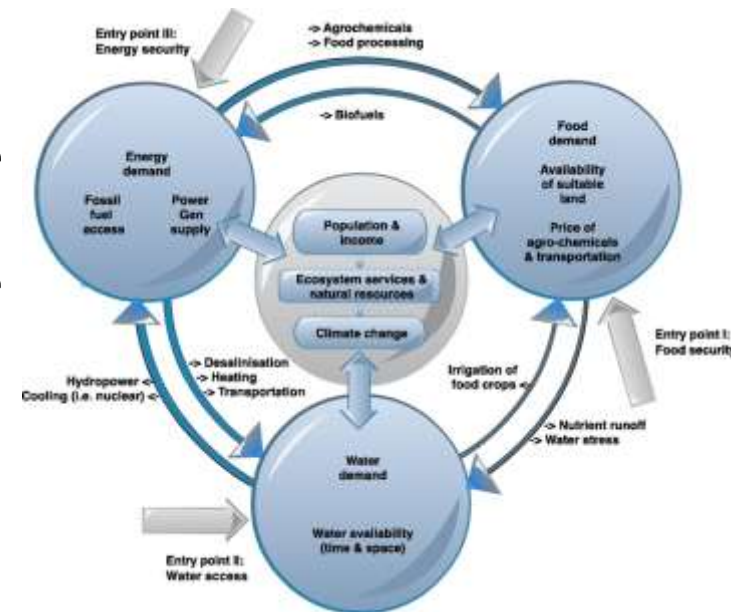


# A PROPOSED WEF NEXUS FRAMEWORK FOR SOUTH AFRICA



# STRATEGIES FOR EVALUATING THE WEF NEXUS

- Indices, metrics and models are used for evaluating and quantifying the WEF nexus
- It is useful to generate data that will be able to quantify flows of energy and materials, make numerical predictions and estimate the associated costs



<https://www.sciencedirect.com/science/article/pii/S0022169415009816>



# WEF NEXUS CHALLENGES

- **Key Challenges:**

1. Poor education, urbanisation, and poverty
2. Culture and politics
3. Climate change in South Africa
4. Access to and distribution of data



<http://bush.tamu.edu/istpp/nexus/>



# CONCLUSIONS AND FUTURE WORK

- The review consolidated the available knowledge of the WEF nexus in South Africa, with a focus on its current status, challenges, and opportunities for intersectoral planning, at a technical- and policy-level
- Policy and research gaps were identified, and WEF nexus research champions were acknowledged
- There are multiple models, tools and indices available to evaluate and quantify the WEF nexus; however they may require modifications to be applicable to South Africa
- A WEF nexus framework was developed with emphasis on SDG's 2, 6 and 7
- Future research projects may consider involving all parties (policymakers, researchers, and stakeholders) when developing policies



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