ONEPlanET

Policy brief

Innovate towards a sustainable Water-Energy-Food Nexus transition in the African Union

Executive Summary

This policy brief draws on insights from the ONEPlanET project regarding the transition of the Water-Energy-Food (WEF) Nexus in the African Union (AU) towards a sustainable model. While significant barriers exist, such as fragmented governance, infrastructure constraints, socio-economic inequalities, and resistance to change, **opportunities lie in harnessing transformative innovation**, implementing integrated governance, and fostering stakeholder engagement. The transition dynamics registers the co-existence of system breakdown and innovation build-up: leveraging open innovation through frameworks like **thematic and place-based Living Labs**, would facilitate multi-stakeholder co-creation and boost the emergence and scaling up of sustainable WEF solutions in the AU. Recommendations are provided to strengthen institutional frameworks, promote integrated approaches, invest in sustainable technologies, and empower local populations to navigate this transition.

Introduction

The AU is experiencing rapid demographic growth, with its population projected to reach 2.5 billion by 2050, accounting for 25% of the global population. This, coupled with increased demand for goods and services, is driving land use transformation, urbanization, and resource exploitation. Climate change is also emerging as a crucial driver in the African landscape, intensifying challenges like floods, desertification, biodiversity loss, and resource scarcity. These pressures highlight the urgent need for an **integrated approach to managing water, energy, and food resources, recognizing their inherent interdependence within the WEF Nexus.** Changes in one system, such as energy use in food processing or water use in energy generation, can have considerable implications for others. While the WEF Nexus approach is increasingly acknowledged for jointly managing these resources sustainably, national vulnerabilities, geopolitical factors, and shared hydrological basins demand a transnational perspective.

The ONEPlanET project promotes the sustainable management of the WEF Nexus in the AU through a multidimensional approach that fosters capacity building, knowledge sharing, and stakeholder empowerment. Focusing on three distinct river basins with diverse WEF complexities – the Songwe (shared by Malawi and Tanzania), the Inkomati-Usuthu area (South Africa), and the Bani River Basin (Mali) – the project specifically analysed the pathway towards a sustainable WEF Nexus using the analytical lens of **Socio-Technical Systems Transition Theory (STS-TT)**. This approach provides a framework for understanding the multi-dimensional system processes required for **systemic change**, considering how innovation in technologies, social practices, institutions, and infrastructures can transform unsustainable systems towards new sustainable regimes.

Methodology

The complex and interconnected nature of the WEF Nexus, with its geographical specificity, was tackled through an integrated process encompassing several steps. An extensive **literature review** was conducted to establish the theoretical foundation, particularly on STS-TT, and provide background on the case studies and the WEF Nexus in Africa. **Conceptual mapping** was undertaken for the AU and the three selected basins to visually represent the interdependencies and relationships within the WEF Nexus, providing insights into location-specific social, economic, and environmental contexts. This involved integrating information from project partners and stakeholder interviews. **Co-creation**

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activities were then organized, including two interactive workshops designed to explore stakeholder knowledge and perceptions about the state and dynamics of the WEF Nexus. The X-curve framework was introduced to visualize transition dynamics, highlighting the build-up of innovations and the breakdown of existing systems. Finally, qualitative analysis was applied to all collected data, enabling the identification of key drivers, barriers, innovation assets, and leverage points for transition.

Barriers hindering the WEF Nexus transition in the African Union

The analysis identified numerous barriers hindering the transition to a sustainable WEF Nexus in the African Union. These barriers operate across landscape, regime, and niche levels, often interacting with each other.

At the landscape level, overarching counterforces include:

- **Historical Factors:** Colonial legacy continues to influence resource distribution, governance structures, and infrastructure development.
- **Climate Change:** Existing vulnerabilities are intensified by climate change, leading to growing environmental degradation and resource scarcity.
- **Rapid Population Growth:** The rapid growth in population exerts significant pressure on water, energy, and food resources, making progress very volatile.
- **Conflicts and Instabilities:** Political instability and local conflicts hinder and jeopardize transformative actions and resource management efforts.

At the meso level, barriers are often embedded in existing structures:

- **Path Dependencies and Lock-ins:** Past decisions and established interlinkages create path dependencies that make it challenging to adopt alternative pathways towards systemic change.
- **Lack of Collaboration/Authority Fragmentation:** Absence of a coordinated approach for WEF Nexus sectors and fragmented approaches impede integrated management.
- **Slow Sectoral Policy Adoption:** Despite national commitments to sectoral transitions, adoption at the societal level is often slow.
- **Policy Gaps:** Policy documents may recognize issues like energy access for disadvantaged groups or protection of water resources, but fail to provide clear implementation guidance, limiting accountability.
- **Unsustainable Investment Schemes:** Existing investment schemes may continue to support unsustainable practices.

At the niche (micro) level and concerning the emergence of appropriate technologies and practices, barriers include:

- **Socio-Economic Constraints:** Poverty and low levels of education are considered major barriers, contributing to unequal access to innovative solutions.
- **Limited Infrastructure:** Inadequate infrastructure for water and energy systems constrains the rollout and scaling of WEF technologies.
- **Lack of Knowledge:** In some areas, there is still a lack of understanding about the interconnections between WEF systems and the advantage of Nexus-aware innovations.
- **Cultural Frames:** Language and cultural barriers can hinder communication and collaboration. Traditional practices that pose health risks, like reliance on wood fuel for cooking, are culturally ingrained and prevent the novel ones from scaling up.
- **Data Availability and Quality:** Addressing data availability and quality is a key aspect of operationalizing the WEF Nexus, implying

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it can be a barrier against innovation bundles.

- **Uncertainty about Financial Resources:** Uncertainty about the availability of financial resources creates challenges for planning and management of innovation replication and scale up.

These interconnected barriers highlight the complexity of driving a sustainable WEF Nexus transition in the African Union. Figure 1 below depicts the barriers operating across the niche (micro), meso, and landscape levels of the system.

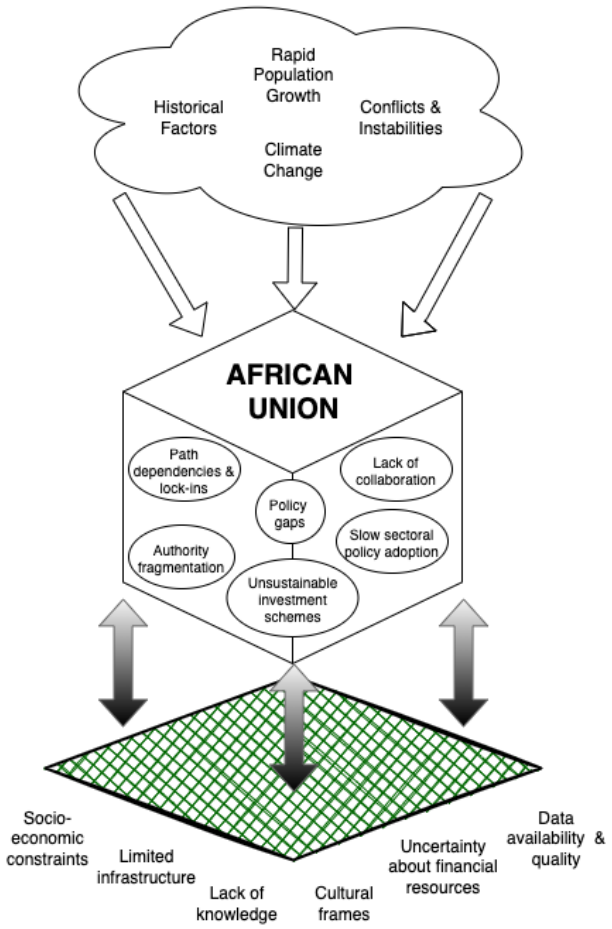

Figure 1 Multi-Level Barriers to Transition Across Niche, Meso, and Landscape Levels

Recommendations

Based on the outcomes of the system mapping process, the following recommendations are proposed to facilitate a sustainable WEF Nexus transition in the African Union:

1. **Strengthen Institutional and Governance Frameworks:** Establish integrated governance structures and strengthen institutional frameworks to ensure fast and successful implementation of WEF Nexus policies across sectoral and regional levels. Address authority fragmentation and promote a coordinated approach by enhancing the use of Data Management and Analytical Tools to improve data availability and quality and utilize these analytical tools to support informed decision-making.

2. **Promote Cross-Sectoral Collaboration and Integrated Planning:** Foster collaboration among sectors (relating to water, energy, and food) and stakeholders by developing Capacity Building and Knowledge Sharing Programs to overcome fragmented approaches. Reinforce the capacity of the population and stakeholders to understand the WEF Nexus and exploit opportunities connected to the transition by promoting interdisciplinary research and knowledge integration.

3. **Encourage Investments in Scalable Sustainable WEF Technologies and Infrastructures to Ensure a Just Transition:** Foster access to finance for sustainable practices and infrastructure, potentially by supporting the evolution of investment taxonomies and promoting Public-Private Partnerships (PPPs). Prioritize investment in flexible and decentralized Nexus systems (e.g., solar water pumps, rural renewable micro-grids, improved cold chain technologies, water-saving technologies and efficient irrigation systems, sustainable cooking solutions, constructed wetlands for wastewater treatment, and urban agriculture practices like hydroponics and aquaponics), to reduce adoption barriers, particularly in economically depressed communities. Implement policies and initiatives that address specific underlying issues of poverty and inequality to ensure equitable access to resources and opportunities arising from the Nexus transition.

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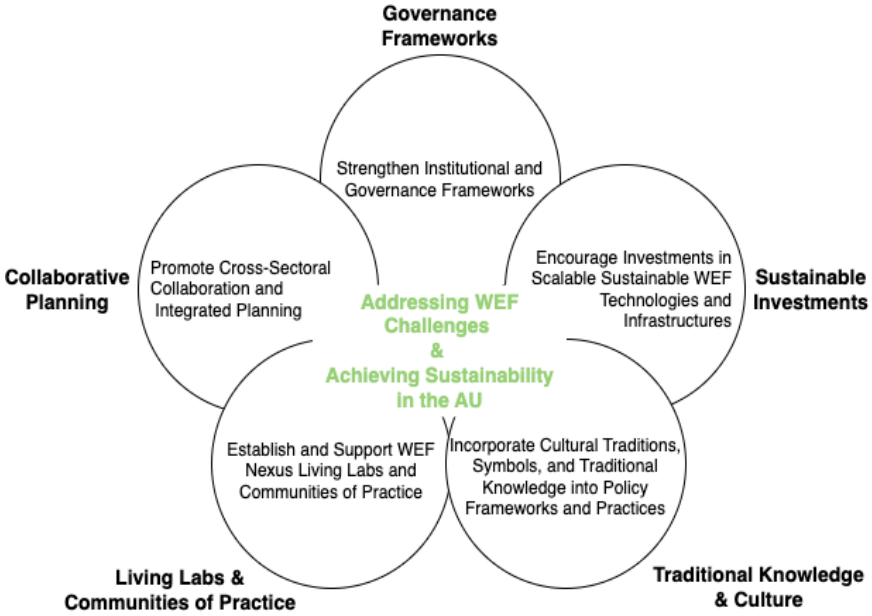

Figure 2 Strategic Action Areas for Advancing WEF Nexus Sustainability in the AU

4. **Integrate Traditional Knowledge and Cultural Considerations:** Incorporate cultural traditions, symbols, and traditional knowledge into policy frameworks and practices to ensure interventions are culturally appropriate, responsive to local needs, and enhance understanding of sustainable resource management. Promote positive behavioral change related to daily practices in the food-to-fork value chain.

5. **Establish and Support WEF Nexus Living Labs and Communities of Practice:** Design and establish place-based Living Labs within the African context to serve as frameworks for user-centered innovation and multi-stakeholder co-creation in real-world environments. Ensure African stakeholders' knowledge and expertise are central to decision-making within these labs. Design flexible and adaptive innovation programs based on local feedback. Promote the development of communities of Practice associated with the Living Labs, and design specific actions to accelerate the widespread adoption of WEF Nexus viable innovations through the CoPs.

By adopting these recommendations, stakeholders would effectively address the interconnected challenges of water, energy, and food security, paving the way for meaningful progress toward sustainability on the African continent through a just and transformative transition.

Figure 2 illustrates five interlinked strategic action areas critical for addressing WEF Nexus challenges and achieving sustainability across the AU. Collectively, these elements form a holistic approach to supporting systemic change through inclusive, context-sensitive, and innovation-driven strategies.

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