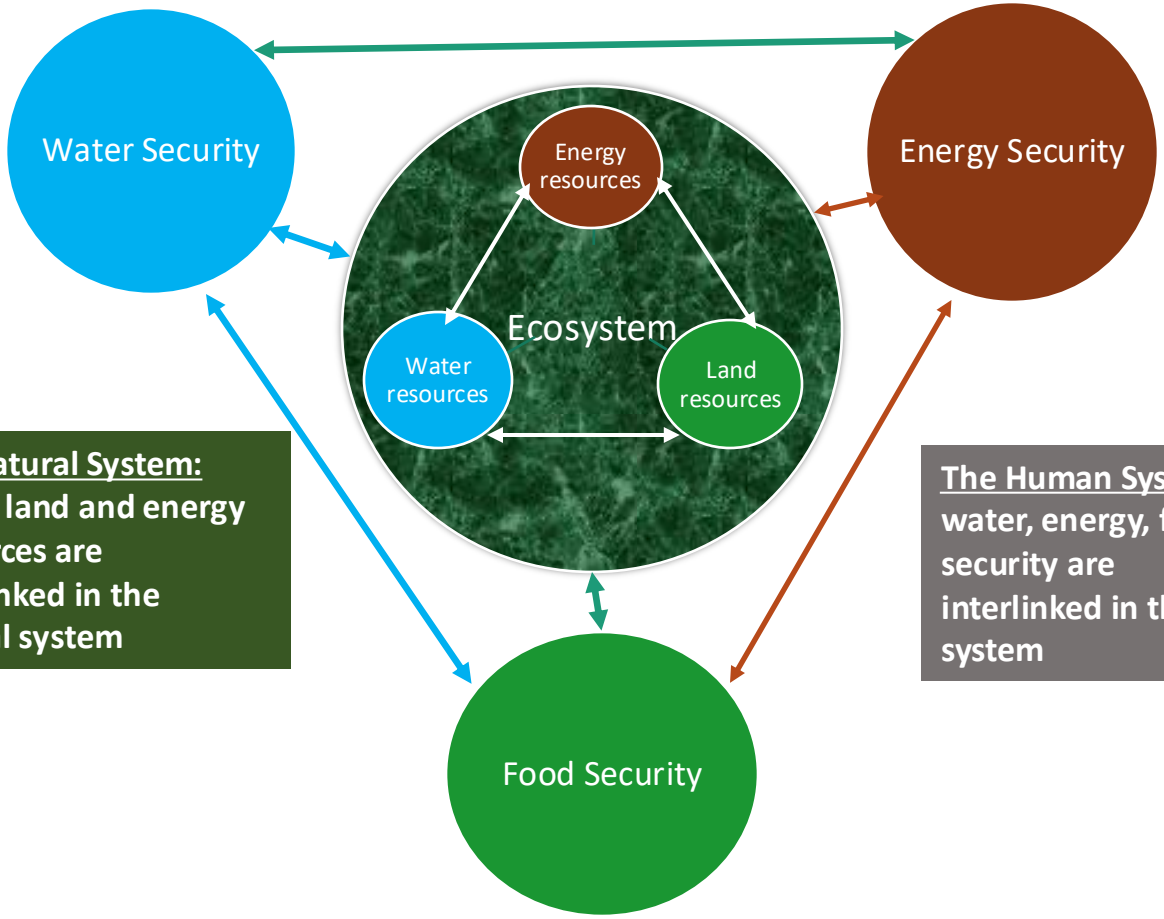
Workshop on Accelerating Progress on the Water-energy-food-ecosystems (WEFE) Nexus in Sub-Saharan Africa

PATRICE K KABEYA (Ph.D)
Senior Programme Officer –SADC Secretariat
04-06 March 2025, Addis Abba, Ethiopia

SADC WEF Nexus Framework-conceptualization



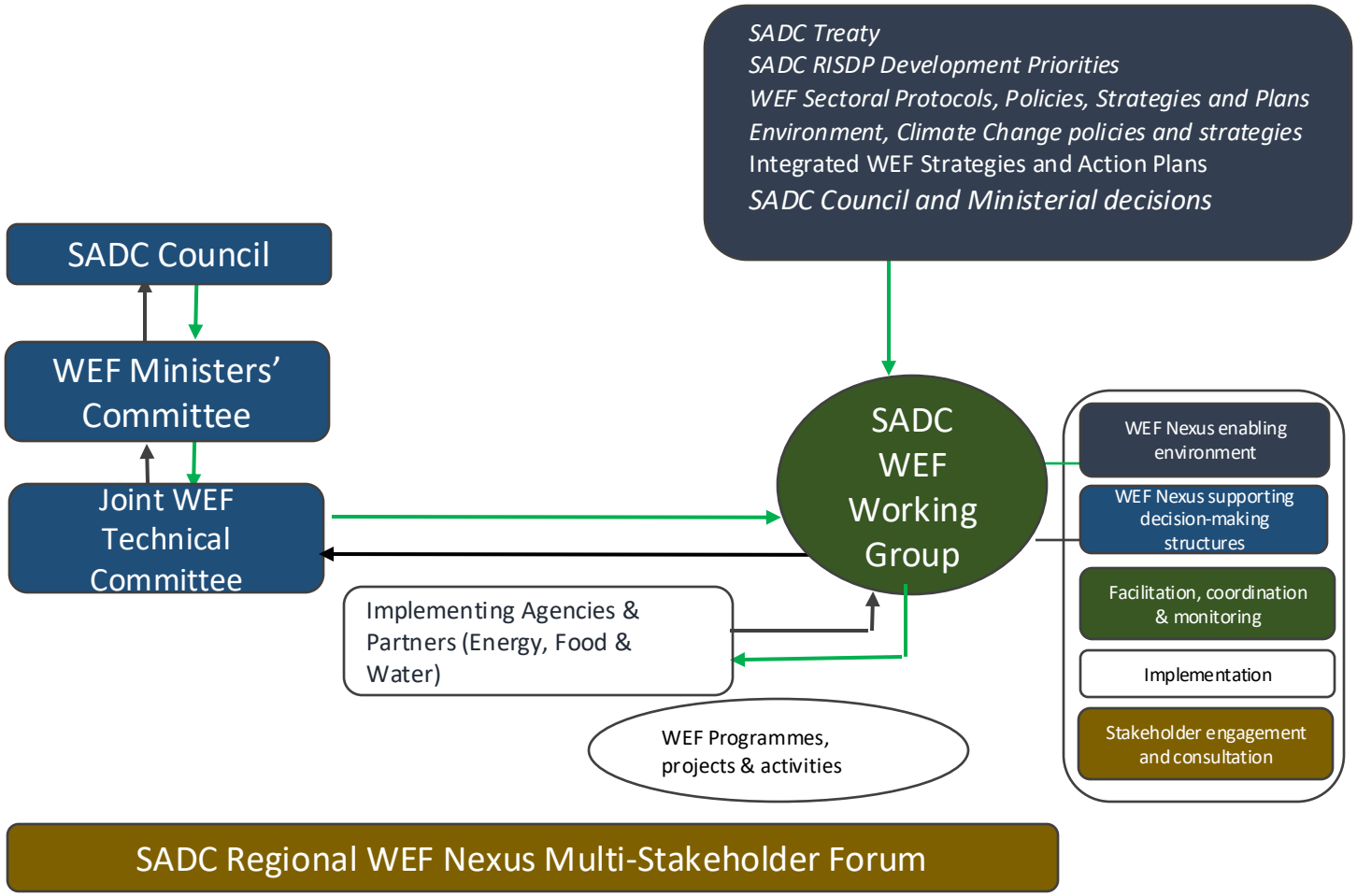
The Natural System: water, land and energy resources are interlinked in the natural system

The Human System: water, energy, food security are interlinked in the system

Natural Resource Use Efficiency

Simultaneous WEF Security

The SADC Regional WEF Nexus Framework



The Framework:

- is expected to provide guidance for:
  - ✓ Coordinating the three sectors at policy and decision making level (i.e., Ministerial Level)
  - ✓ Coordinating the three sectors at the regional technical level
  - ✓ Coordinating the Units responsible for the WEF sectors within the SADC Secretariat
  - ✓ Coordinating with regional implementing entities and other partners
  - ✓ Strengthening regional multi-stakeholder platforms

WEFE Nexus and the National Budget Planning ?

- he **WEFE Nexus** emphasizes the interdependence of water, energy, food, and ecosystems, ensuring sustainable resource management and resilience against climate change. **Integrating WEFE into national planning is essential for:**

1. **Enhancing Resource Efficiency**
    1. A holistic approach reduces **wastage and inefficiencies** in managing water, energy, and food.
    2. Example: **Using treated wastewater for irrigation** reduces freshwater demand while maintaining agricultural productivity.

WEFE Nexus and the National Budget Planning ?

- **Strengthening Climate Resilience**
- WEFE integration **anticipates and mitigates climate risks** by ensuring adaptive resource management.
- Example: **Drought-resistant crops combined with solar-powered irrigation** reduce reliance on erratic rainfall.
- **Improving Policy Coherence**
- Aligning national plans with **regional and global goals** (e.g., SDGs, Paris Agreement) prevents policy contradictions.
- Example: A **National Energy Policy** promoting hydropower must consider its **impact on water availability** for agriculture.

WEFE Nexus and the National Budget Planning ?

- **Attracting Investment and Partnerships**
- A well-structured WEFE strategy **encourages private sector involvement, international funding, and PPPs**.
- Example: **Green financing** for integrated water-energy projects (e.g., small hydropower for irrigation).
- **Enhancing Food Security and Economic Growth**
- Sustainable food production depends on **reliable water and energy supply**.
- Example: **Smart agriculture** using precision irrigation and renewable energy reduces costs and increases yield.

How WEFE Affects National Budgeting Process Alignment

- integrating WEFE into **national budgets** requires a shift from **sector-specific** funding to **cross-sectoral budget planning**, leading to:

1. **Reallocation of Budgetary Resources**
    1. Traditional budgets **separate water, energy, and agriculture**; WEFE calls for **interlinked funding**.
    2. Example: Funding a **solar-powered irrigation system** falls under **both energy and agriculture sectors**.
- **Multi-Sectoral Budget Coordination**
- Ministries of **Finance, Agriculture, Water, and Energy** must jointly develop budgets to ensure **holistic resource allocation**.
- Example: A **hydropower project** should account for both **electricity generation** and **downstream water availability**.

How WEFE Affects National Budgeting Process Alignment

- **Long-Term vs. Short-Term Budgeting**
- WEFE requires **long-term investments** in **resilient infrastructure and innovation**, not just annual budget allocations.
- Example: **Investing in smart irrigation systems** ensures long-term **water and food security** benefits.

- **Performance-Based Budgeting**
- National budgets must include **impact assessments** of WEFE investments.
- Example: A country investing in **renewable energy for rural farming** should measure **food production increases**.

How WEFE Affects National Budgeting Process Alignment

New Funding Mechanisms

1. Governments may introduce **climate resilience funds, green bonds, and cross-sector grants** to finance WEFE projects.
2. Example: A **Climate Adaptation Fund** financing **drought-resistant crops and water-saving irrigation**.

- Incorporating **WEFE into national planning** ensures **sustainable resource management**, aligning national budgets with **holistic development goals**. It fosters **sectoral integration, climate resilience, and economic efficiency**, ultimately improving **national sustainability and food security**.

Hypothetical WEFE Budget Alignment for Selected SADC Countries

- The following table presents an example of how **Water-Energy-Food-Ecosystem (WEFE) budgeting** could be aligned in selected **SADC** countries (Malawi, Zimbabwe, and Botswana), ensuring integrated planning across sectors.

Table 1:Hypothetical WEFE Budget Alignment for Selected SADC Countries

Country	Total National Budget	Water (W)	Energy (E)	Food & Agriculture (F)	Ecosystem (E)	Integrated WEFE Programs
Malawi	**$10.5B**	$1.2B	$0.9B	$0.8B	$0.5B	$1.0B for **Solar-Powered Irrigation & Climate-Resilient Farming**
Zimbabwe	**$14.8B**	$1.5B	$1.2B	$1.0B	$0.7B	$1.3B for **Hydropower Expansion & Sustainable Agriculture**
Botswana	**$17.3B**	$2.0B	$1.5B	$1.2B	$0.9B	$1.5B for **Desalination & Renewable Energy-Based Farming**

WEFE Budget Efficiency Analysis and Ranking for Malawi, Zimbabwe, and Botswana

Malawi: Solar-Powered Irrigation & Climate-Resilient Farming

- Water: $1.2B for irrigation infrastructure (dams, boreholes).
- Energy: $0.9B for off-grid solar energy solutions for farmers.
- Food: $0.8B for drought-resistant crops and smart agriculture.
- Ecosystem: $0.5B for reforestation and wetland restoration to combat soil erosion.
- Integrated WEFE Program ($1.0B): Solar-powered irrigation systems for smallholder farmers, reducing dependency on rainfall and improving food security.

Zimbabwe: Hydropower Expansion & Sustainable Agriculture

- Water: $1.5B for dam construction and groundwater management.
- Energy: $1.2B for hydropower development.
- Food: $1.0B for smart irrigation & value chain improvements.
- Ecosystem: $0.7B for forest conservation and land rehabilitation.
- Integrated WEFE Program ($1.3B): Hydropower projects that supply both electricity and irrigation, ensuring sustainable energy and food production..

Botswana: Desalination & Renewable Energy-Based Farming

- **Water:** $2.0B for **desalination and water recycling projects**.
- **Energy:** $1.5B for **solar and wind energy farms**.
- **Food:** $1.2B for **climate-smart agriculture & hydroponics**.
- **Ecosystem:** $0.9B for **wildlife protection & sustainable land use**.
- **Integrated WEFE Program ($1.5B):** Large-scale desalination powered by **solar energy**, providing **water for agriculture** and reducing reliance on underground water sources.

Table2: WEFE Budget Efficiency Analysis & Ranking

Criteria	Malawi: Solar-Powered Irrigation	Zimbabwe: Hydropower & Agriculture	Botswana: Desalination & Renewable Energy Farming
Cross-Sectoral Integration	✅ Strong (Water, Energy & Food well aligned)	✅ Moderate (Energy & Food linked, but Water at risk)	✅✅ Excellent (Water, Energy, and Food highly interconnected)
Long-Term Impact	✅ Moderate (Sustainable, but needs expansion)	✅✅ High (Infrastructure supports large-scale agriculture)	✅✅✅ Very High (Future-proofed water & energy solutions)
Climate Resilience	✅ High (Solar-based, reduces reliance on rain)	⚠️ Moderate (Droughts may reduce hydropower output)	✅✅ Very High (Desalination ensures water supply)
Return on Investment (ROI)	✅ High (Low-cost and scalable)	⚠️ Moderate (High capital costs, long payback period)	⚠️ Lower (Desalination has high operational costs)
Technological Innovation	✅ Moderate (Solar-powered irrigation)	✅ Low (Hydropower is a well-established technology)	✅✅✅ Very High (Advanced desalination and renewable energy systems)
Budget Allocation Efficiency	✅✅ Very Efficient	✅ Moderate Efficiency	✅✅✅ Highly Efficient
Overall Efficiency Score	8.5/10	7.5/10	9.0/10
Ranking	2 Second Most Efficient	3 Least Efficient	1 Most Efficient

Key Insights from the Ranking

- 1 **Botswana ranks highest (9.0/10)** because of its **innovative technology and long-term resilience**, despite high costs.
- 2 **Malawi ranks second (8.5/10)** due to its **cost-effectiveness and adaptability**, though it requires more infrastructure investment.
- 3 **Zimbabwe ranks third (7.5/10)** because **hydropower is capital-intensive** and vulnerable to climate risks.

Key Questions ?

The efficiency of **Water-Energy-Food-Ecosystem (WEFE) budget allocation** depends on how well financial resources are distributed across sectors, ensuring sustainability, economic growth, and resilience against climate change. **Efficiency is assessed based on:**

1, Cross-sectoral Integration: Does the budget balance all WEFE components?

2.Long-Term Impact: Will investments lead to sustainable outcomes?

3. Climate Resilience: How well does the budget address water scarcity, energy reliability, and food security?

4. Return on Investment (ROI): Does the budget promote cost-effective, high-impact solutions?

5. Technological Innovation: Are new technologies being leveraged for WEFE solutions?

What are the strategies for Integrated Budgeting Planning?

01

- Establish inter-ministerial committees for joint budget planning

02

- Develop multi-sectoral investment frameworks to align funding priorities

03

- Utilize Public-Private Partnerships (PPPs) to finance cross-sectoral initiatives

04

- Implement data-driven decision-making tools for resource allocation optimization

Strategies for Integrated Budgeting

01

- Establish inter-ministerial committees for joint budget planning

02

- Develop multi-sectoral investment frameworks to align funding priorities

03

- Utilize Public-Private Partnerships (PPPs) to finance cross-sectoral initiatives

04

- Implement data-driven decision-making tools for resource allocation optimization

THANK YOU

MERCI

OBRIGADO