

Transboundary Water-Food-Energy (WFE) Nexus

**Analysis of policy coherence and relevance
in implementation of Songwe River Basin
Development Program (SRBDP)**

**A case study of Songwe River Basin in Tanzania and
Malawi**

**TRANSNATIONAL
FOOD
ENERGY AND
WATER
CONFERENCE
2025**



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PRESENTATION OUTLINE

1. Introduction
2. Project Description
3. Problem Statement
4. Study Objectives
5. Study area Description
6. Project Description
7. Materials and Method
8. Results
9. Policy Recommendation
10. Conclusion

1. INTRODUCTION

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❑ Background of the study

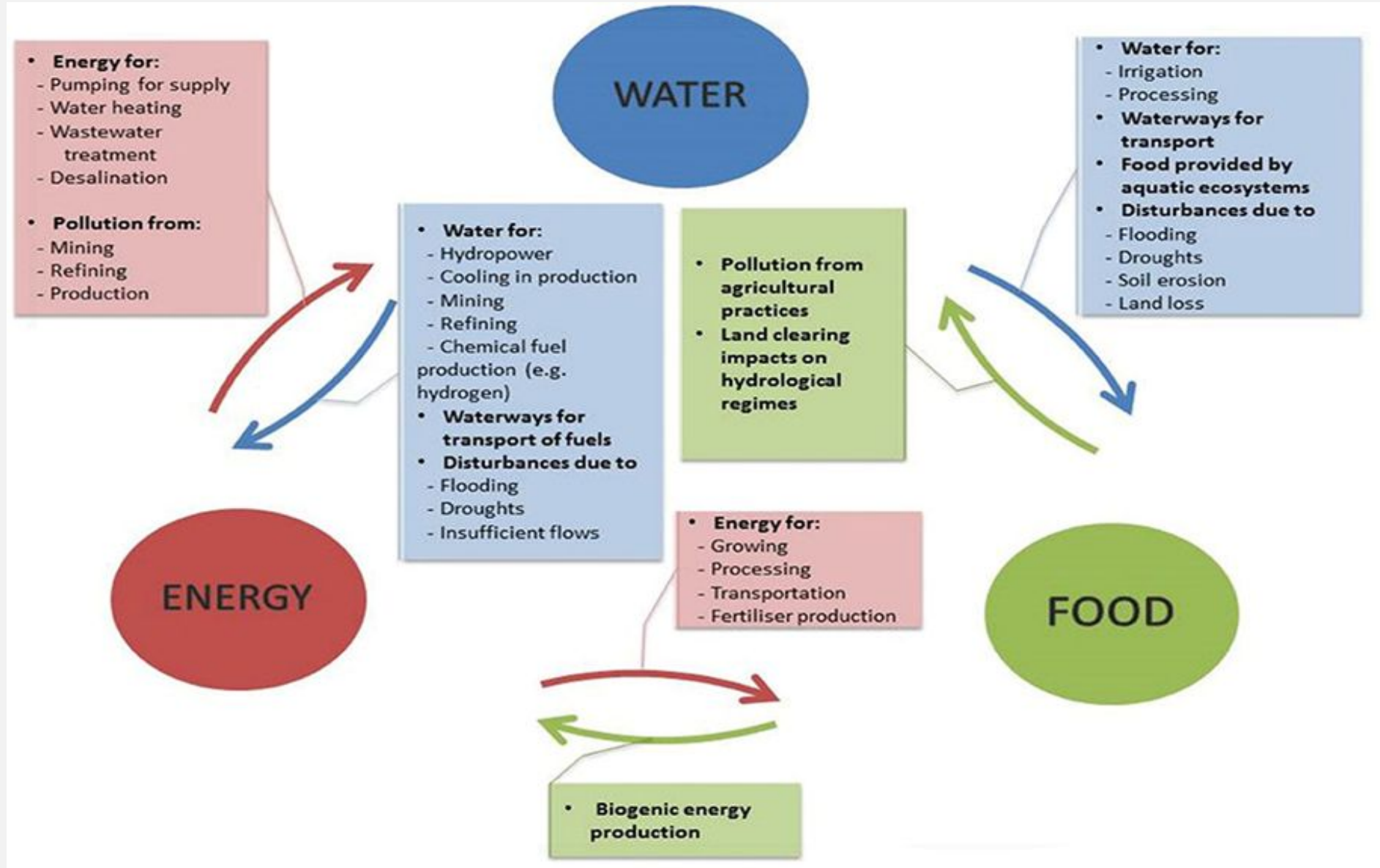
- Rapid population growth and climate change lead to resource pressure in SADC
- Need for integrated management of water, food, and energy
- Songwe Basin as a transboundary hotspot (shared by Tanzania & Malawi)

❑ What is the WFE Nexus?

- A holistic framework linking water, food, and energy
- Enables joint planning, identifies trade-offs and synergies
- Supports SDGs: Zero Hunger, Clean Water, and Clean Energy

1. CONT...,

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Summary of the Interactions of Water-food and Energy Nexus from (Markantonis et al., 2019).

3. PROBLEM STATEMENT

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- ❑ There is a major challenge in coordinating and aligning;
 - ✓ Different policies
 - ✓ Goals and strategies
 - ✓ Tools and measures
 - ✓ Institutional roles and personnel
- ❑ This affects effective management of the WFE nexus under SRBDP
 - ✓ The challenge is increased because;
 - ✓ The Songwe River Basin is a transboundary river, and
 - ✓ Each operates under separate national systems



POLICY

horizontal WFE policy coherence in Tanzania, Malawi, and SRBDP.



POLICY GAPS

Identify existing policy gaps in Water-food and energy policy documents in Tanzania and Malawi

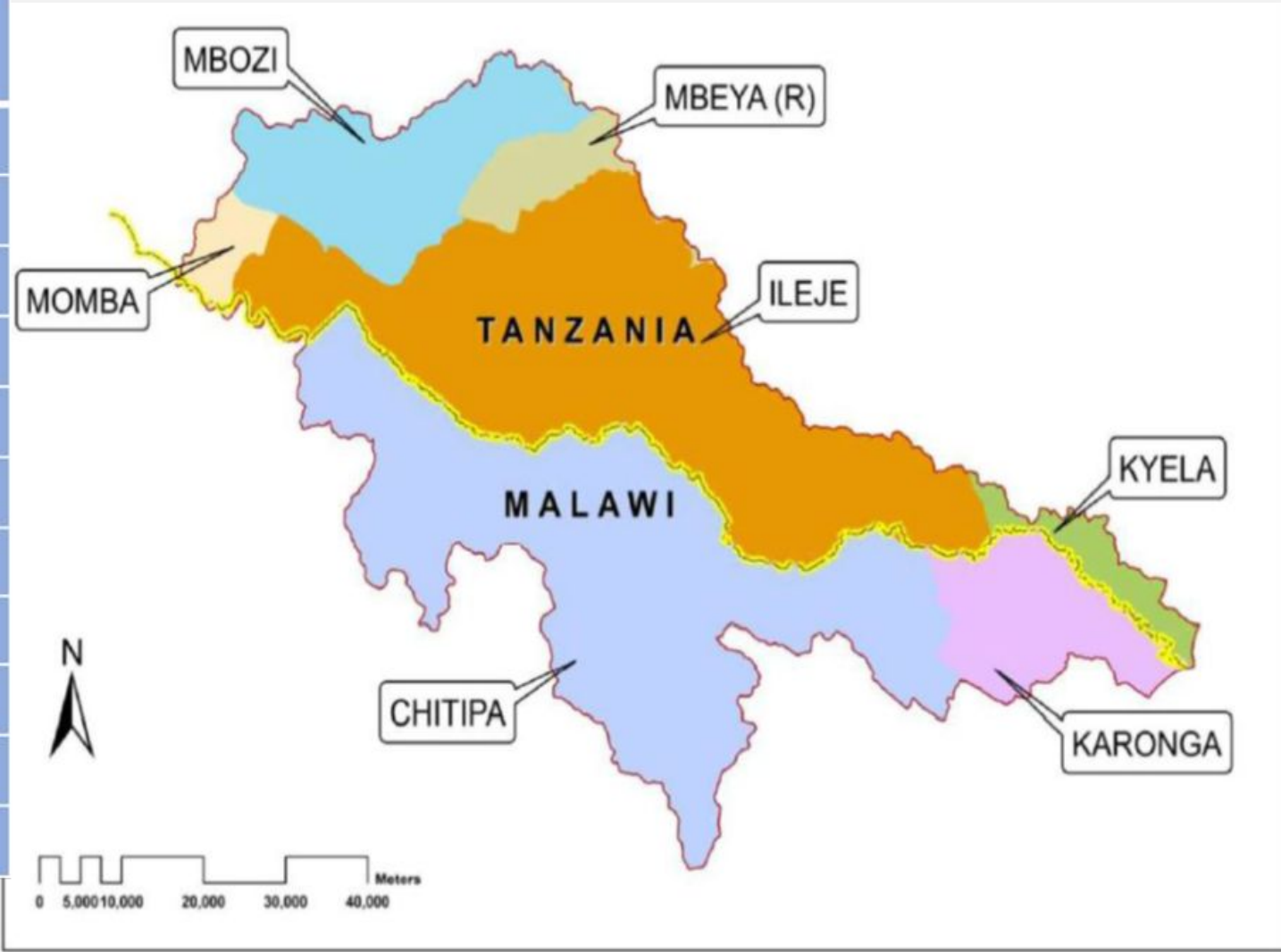


POLICY

Provide policy recommendations based on coherence and policy gaps results.

5. STUDY AREA DESCRIPTION

River Basin	Songwe
Countries	Tanzania 55% and Malawi 45%
Administration	Songwe River Basin Commission.
Districts Crossed	7 (2 in Malawi and 5 in Tanzania).
Catchment area	Approximately 4,200 km ²
Length	200 km
Source	Poroto-Berge (Tanzania, Malawi, and Zambia)
Outlet	Lake Nyasa/Malawi)
Population	400,000 inhabitants
Soil	Fertile alluvial soil
Rainfall	284mm average annual rainfall.
Temperature	19.05°C average annual temperature



A map of Study Area, Songwe River Basin With District Boundaries
(Africa Development Bank 2019)

6. PROJECT DESCRIPTION

Water

- Village Water Supply.
- Urban Water Supply (Kasumulu in Tanzania and Songwe in Malawi).

Food

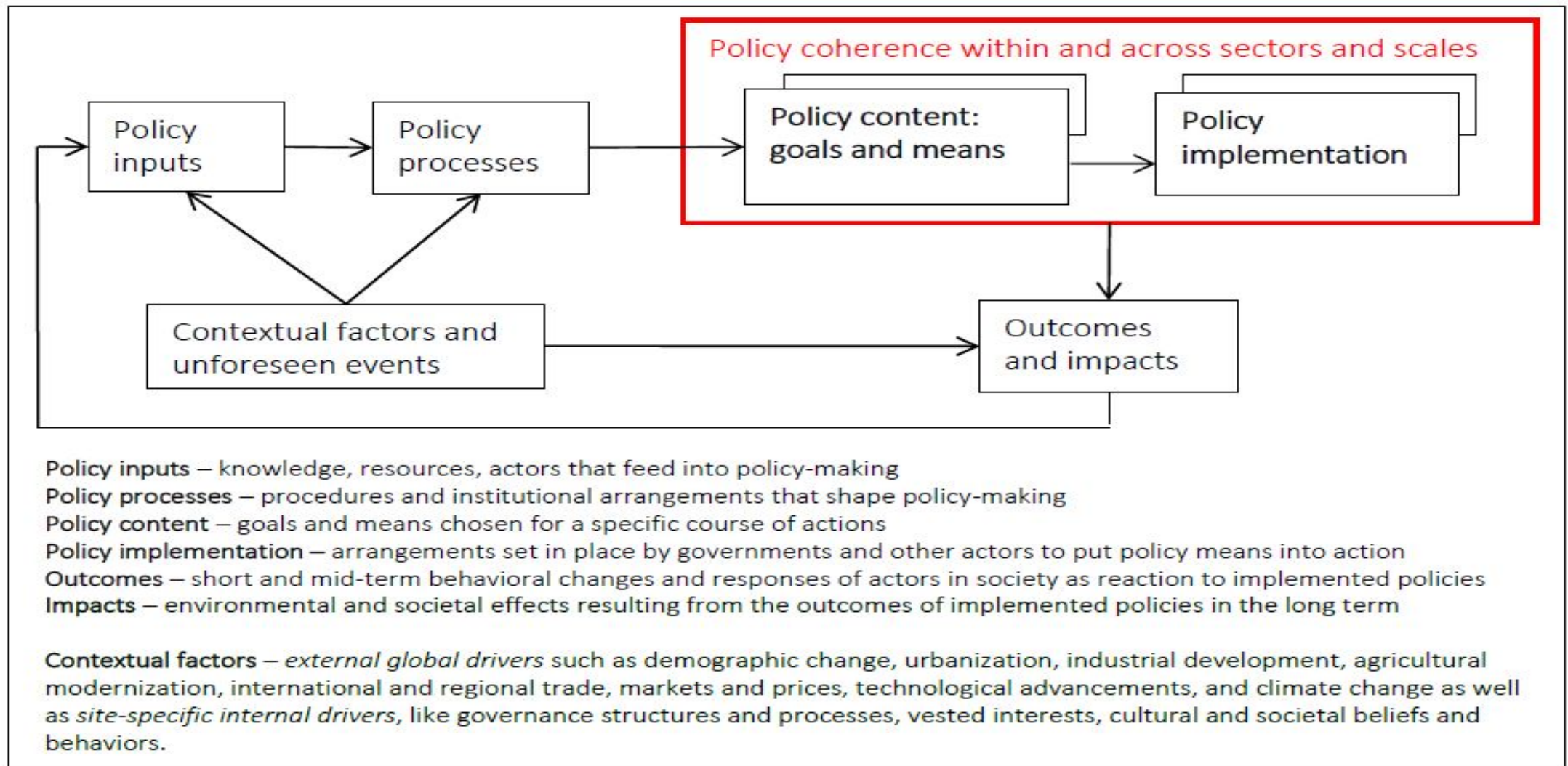
- Construction of two Irrigation schemes (3,050ha in Malawi and 3150ha in Tanzania.
- Water harvesting studies and assessment of Irrigation schemes.
- Land tenure formalization in Irrigation schemes.

Energy

- Construction of Lower Songwe Dam and hydropower plant
- Rural electrification Project.
- Detailed design for Middle Dam and Hydropower plant.

7. MATERIALS AND METHODS

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The scope of policy coherence analysis within the SIM4NEXUS project adopted from Nilsson; SIM4NEXUS put emphasis in part within the red box (Stefania Munaretto and Witmer 2017).

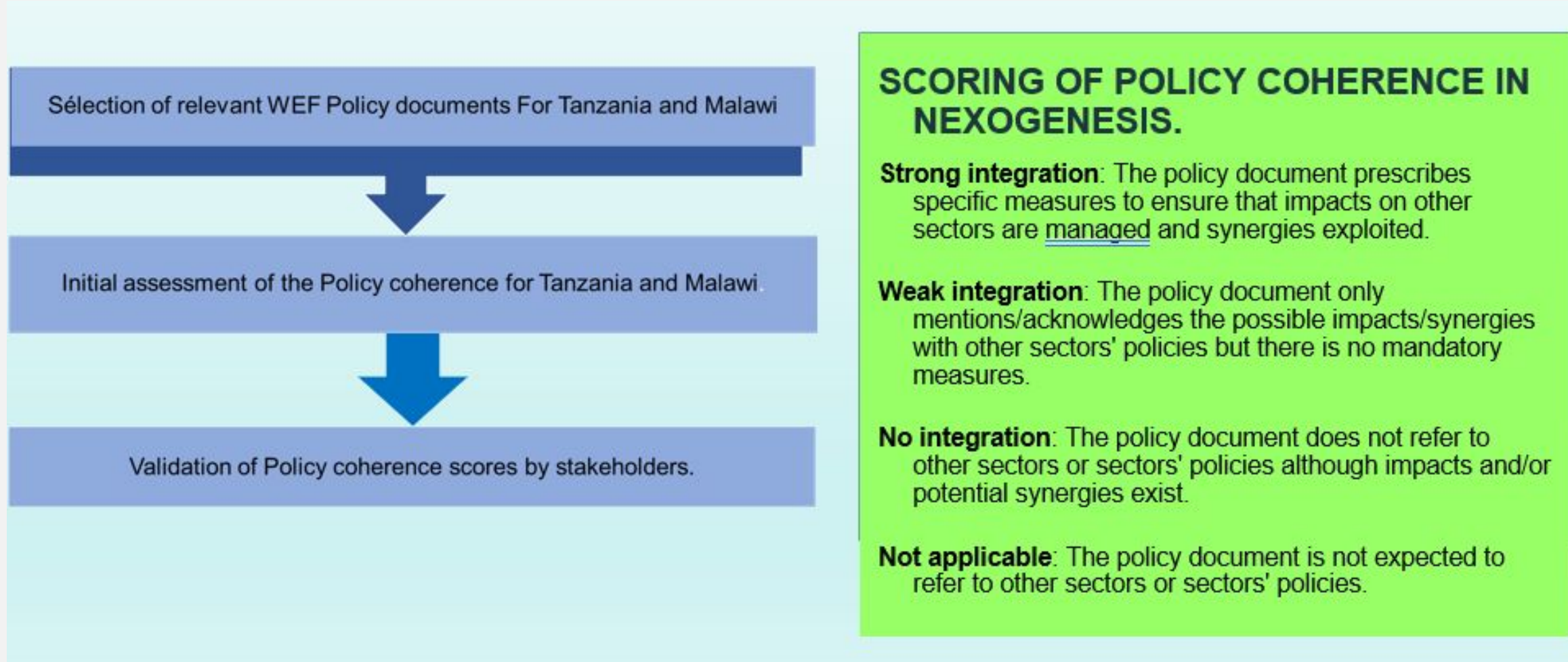
7. CONT...,

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Type of interaction	Description
Cancelling	Progress in one objective makes it impossible to reach another objective and possibly leads to a deteriorating state of the second. A choice has to be made between the two (trade-off).
Counter-acting	The pursuit of one objective counteracts another objective.
Constraining	The pursuit of one objective sets a condition or a constraint on the achievement of another objective.
Consistent	There is no significant interaction between two objectives.
Enabling	The pursuit of one objective enables the achievement of another objective.
Reinforcing	One objective directly creates conditions that lead to the achievement of another objective.
Indivisible	One objective is inextricably linked to the achievement of another objective.

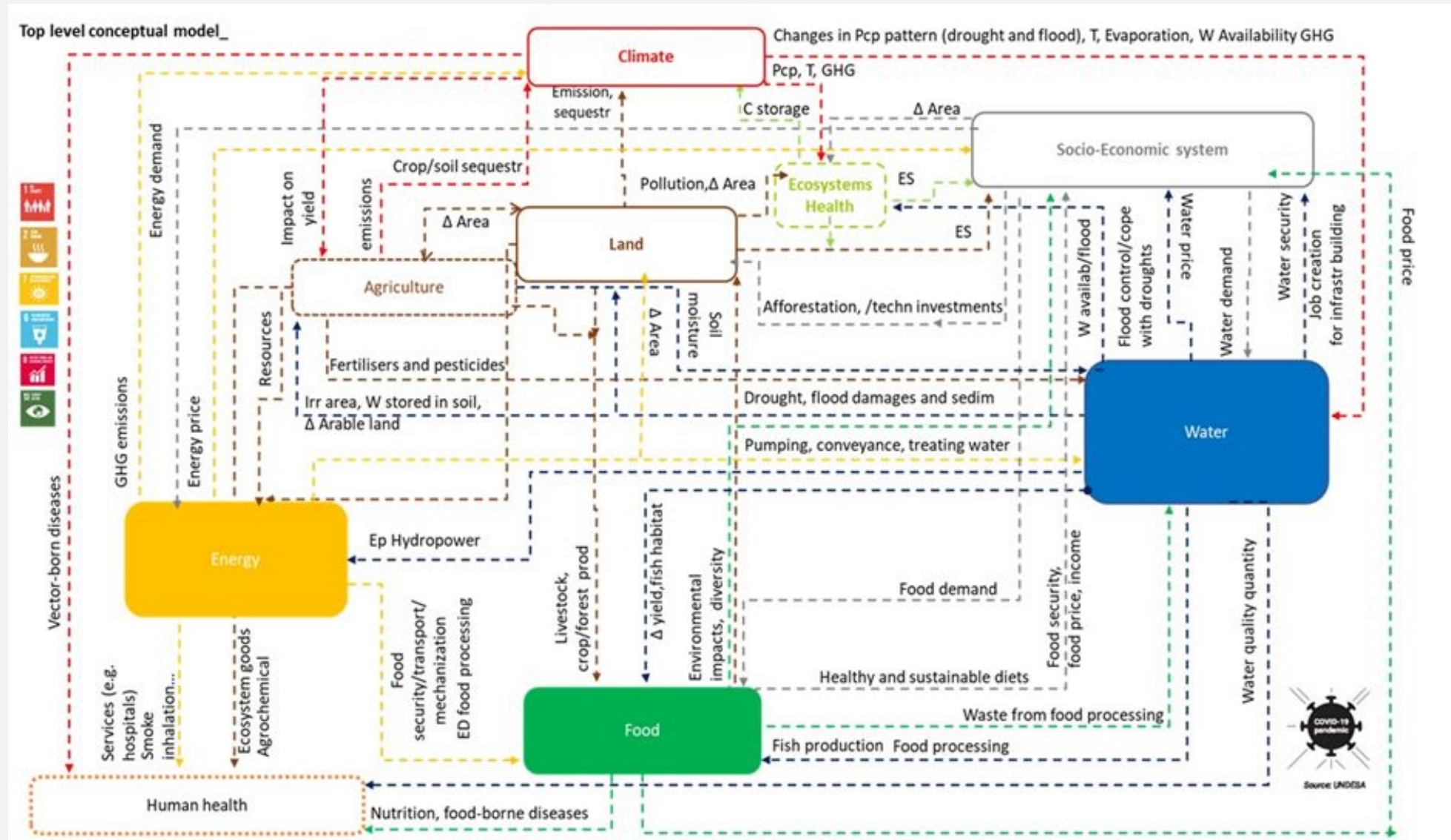
Scoring scale for coherence analysis(Stefania Munaretto and Witmer 2017).



Munaretto & Witmer 2017; Modified Framework for Policy Gap analysis as Applied in Nexogenesis Project.

8. RESULTS

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A sophisticated conceptual framework for the Songwe River basin that illustrates interconnections in nexus elements with SDG's (Masia et al., 2022)

8. CONT

TANZANIA WATER POLICY OBJECTIVES	
W1	Promote the management of water quality and conservation.
W2	Improve the management and conservation of ecosystems and wetlands.
W3	Promote integrated planning and management of water resources.
W4	Promote regional and international cooperation in the planning, management and utilization of water.
W5	Provide adequate, affordable and sustainable water supply services to the rural population.
W6	Promotion of rainwater harvesting through creation of awareness and training of various stakeholders.
W7	Foster conditions and incentives for reliable, sustainable, and affordable urban water and sewage services.
TANZANIA ENERGY POLICY OBJECTIVES	
E1	Boost renewable energy use to expand its role in diversifying electricity generation resources.
E2	Accelerating rural electrification to foster socioeconomic transformations.
E3	Promote energy efficiency and conservation in all sectors of the economy.
E4	To improve quality of life through use of modern fuels.
E5	To mainstream sectoral plans into Energy Sector planning.
TANZANIA FOOD POLICY OBJECTIVES	
F1	Strengthen agricultural research services to boost agricultural sector productivity, competitiveness, and profitability.
F2	Increase production, productivity, and profitability through the application of agricultural biotechnology techniques.
F3	Enhance agricultural human resources to effectively address the needs of agricultural development.
F4	Agricultural extension services strengthened to increase production, productivity and profitability.
F5	Improve sustainable crop productivity and profitability in irrigated agriculture for food security and poverty reduction.
F6	Foster integrated and sustainable utilization and protection of agricultural lands.
F7	Improved agricultural product market, infrastructure, information, and quality standards.
F8	Strengthen inter-sectoral coordination and linkages to enhance efficiency and effectiveness in securing short to long-term financing for agriculture.
F9	Ensure sustainable use of agricultural resources, including land, water, and biodiversity, in bio-fuel production while maintaining national food security.
F10	Promote environmentally sustainable agricultural practices.

MALAWI WATER POLICY OBJECTIVES	
W1	Achieve sustainable and integrated water resources management and development across national, regional, and catchment levels.
W2	To promote water harvesting and conservation to make water readily available throughout the country for sustenance of socio-economic development and natural environment.
W3	Promote equitable allocation and apportionment of water to all sectors of socioeconomic production and services.
W4	Acknowledge, aid, and execute international conventions, riparian, and regional agreements while upholding national integrity, security, and sovereignty.
W5	Promote effective catchment management to safeguard and sustain ecosystem biodiversity and wetlands.
W6	To promote integrated approaches to rural water supply and sanitation services.
W7	Foster the involvement of irrigation services in Integrated Water Resources Management (IWRM).
W8	Motivate the energy sector to invest in water resources development and actively engage in integrated water resources management and conservation.
MALAWI ENERGY POLICY OBJECTIVES	
E1	To promote use of electricity in households as a substitute for biomass and other fossil fuels in homes.
E2	To ensure availability of electricity in all public institutions in rural areas and in low income households that are close to distribution substations.
E3	To make the Renewable Energy Industry properly regulated and well-coordinated.
E4	To increase access to modern, clean, affordable and reliable energy.
E5	To sustain the production of biofuels without compromising food security interests.
MALAWI FOOD POLICY OBJECTIVES	
F1	Promote innovative and high-quality agricultural extension and advisory services involving both public and non-state extension service providers.
F2	Facilitate timely and equitable access for farmers to high quality farm inputs, including inorganic and organic fertilizer, improved seed and livestock breeds, and fish fingerlings.
F3	Promote investment in climate-smart agriculture and sustainable land and water management.
F4	Stimulate significant private sector investments in high-productivity agricultural production.
F5	Facilitate the mobilization of financial resources and technical expertise for the expansion of sustainable irrigation schemes and practices.
F6	Promote efficient and sustainable use of water in all irrigation schemes.
F7	Promote mechanisation of farming, agro-processing and value addition.
F8	Promote integrated management and control of pests and diseases.

8. CONT

SRBDP WATER OBJECTIVES

W1 Increasing access to Water Supply and Sanitation

W2 Improve village Water Supply

W3 Enhance rain water harvesting studies

W4 Irrigation scheme Development

W5 Improve Water Conservation through construction of Multipurpose reservoir

W6 Sustainable management of the Songwe River Basin

W7 Improved management information system through water resources monitoring, development and management;

W8 Improved cooperation in transboundary Water Resources Management.

SRBDP ENERGY OBJECTIVES

E1 Improve access for electricity in Rural areas of the Basin

E2 Increase hydropower production.

SRBDP FOOD OBJECTIVES

F1 Increased food production through irrigated agriculture

F2 Formalization of Land Tenure in Irrigation schemes

HORIZONTAL COHERENCE IN MALAWI

Objective X	INFLUENCING What happens in the Nexus if we make Progress on Objective X.							INFLUENCED What happens to Objective X if we make progress on other Objectives of Nexus.						
	interactions	%	Synergies		Conflicts		Syn&Con	interactions	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-				+	0/+	-	0/-	
W1	11	52%	11	0	0	0	0	20	95%	12	0	5	0	3
W2	11	52%	11	0	0	0	0	16	76%	16	0	0	0	0
W3	13	62%	12	0	0	0	1	19	90%	7	0	4	0	8
W4	17	81%	17	0	0	0	0	14	67%	13	0	0	0	1
W5	9	43%	9	0	0	0	0	19	90%	8	0	7	0	4
W6	11	52%	3	0	5	0	3	19	90%	11	0	3	0	5
W7	12	57%	11	0	0	0	1	13	62%	10	0	1	0	2
W8	14	67%	13	0	0	0	1	11	52%	11	0	0	0	0
E1	11	52%	6	0	2	0	3	7	33%	7	0	0	0	0
E2	13	62%	10	0	0	0	3	12	57%	10	1	1	0	0
E3	16	76%	14	0	0	0	2	11	52%	9	1	1	0	0
E4	16	76%	11	0	0	0	5	16	76%	12	1	1	0	2
E5	17	81%	12	0	0	0	5	18	86%	13	0	1	0	4
F1	14	67%	10	0	2	0	2	5	24%	3	0	0	0	2
F2	14	67%	7	0	3	0	4	8	38%	8	0	0	0	0
F3	20	95%	19	0	0	0	1	18	86%	12	0	0	0	6
F4	19	90%	9	0	5	1	4	14	67%	12	0	0	0	2
F5	16	76%	8	2	1	0	5	14	67%	12	1	1	0	0
F6	17	81%	15	0	1	0	1	17	81%	11	1	0	0	5
F7	10	48%	3	2	3	1	1	12	57%	12	0	0	0	0
F8	8	38%	4	0	2	0	2	6	29%	6	0	0	0	0
Total	289		215	4	24	2	44	289		215	5	25	0	44
Total % of Interactions			74%	1%	8%	1%	15%			74%	2%	9%	0%	15%

HORIZONTAL COHERENCE IN TANZANIA

Objective X	What happens in the Nexus if we make Progress on Objective X.							What happens to Objective X if we make progress on other objectives of Nexus.						
	interactions	%	Synergies		Conflicts		Syn&Con	interactions	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-				+	0/+	-	0/-	
W1	13	59%	13	0	0	0	0	20	91%	13	0	3	0	4
W2	12	55%	12	0	0	0	0	20	91%	11	0	5	0	4
W3	13	59%	13	0	0	0	0	20	91%	14	0	3	0	3
W4	13	59%	13	0	0	0	0	20	91%	15	0	4	0	1
W5	10	45%	7	0	3	0	0	15	68%	9	0	4	0	2
W6	11	50%	10	0	1	0	0	16	73%	16	0	0	0	0
W7	11	50%	10	0	1	0	0	11	50%	8	0	3	0	0
E1	15	68%	5	0	2	0	8	15	68%	13	0	2	0	0
E2	13	59%	9	0	4	0	0	8	36%	6	0	1	0	1
E3	14	64%	14	0	0	0	0	6	27%	4	0	2	0	0
E4	16	73%	8	0	8	0	0	8	36%	7	0	1	0	0
E5	21	95%	21	0	0	0	0	21	95%	21	0	0	0	0
F1	17	77%	17	0	0	0	0	7	32%	7	0	0	0	0
F2	15	68%	6	0	7	0	2	14	64%	13	0	1	0	0
F3	17	77%	14	0	0	0	3	6	27%	6	0	0	0	0
F4	16	73%	11	0	1	0	4	6	27%	6	0	0	0	0
F5	16	73%	5	0	11	0	0	20	91%	16	0	2	0	2
F6	12	55%	11	0	0	0	1	16	73%	12	0	3	0	1
F7	9	41%	7	0	1	0	1	6	27%	6	0	0	0	0
F8	21	95%	21	0	0	0	0	20	91%	20	0	0	0	0
F9	16	73%	9	0	2	0	5	21	95%	15	0	4	2	0
F10	13	59%	11	0	1	0	1	18	82%	10	0	4	0	4
Total	314		247	0	42	0	25	314		248	0	42	2	22
Total % of Interactions			79%	0%	13%	0%	8%			79%	0%	13%	1%	7%

VERTICAL COHERENCE IN MALAWI.

	INFLUENCING What happens inSRBDP objectivess if we make Progress on Malawi National Nexus Objectives.						
Objective X	interactions	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-	
W1	10	83%	9	1	0	0	0
W2	11	92%	11	0	0	0	0
W3	11	92%	9	2	0	0	0
W4	12	100%	11	0	0	0	1
W5	12	100%	5	1	1	0	5
W6	11	92%	7	1	0	0	3
W7	11	92%	7	1	0	0	3
W8	11	92%	11	0	0	0	0
E1	4	33%	3	1	0	0	0
E2	10	83%	6	4	0	0	0
E3	8	67%	5	3	0	0	0
E4	11	92%	9	0	0	0	2
E5	8	67%	3	2	2	0	1
F1	7	58%	6	1	0	0	0
F2	5	42%	3	0	0	1	1
F3	12	100%	7	3	0	0	2
F4	12	100%	7	1	2	1	1
F5	12	100%	10	0	2	0	0
F6	11	92%	10	1	0	0	0
F7	6	50%	5	1	0	0	0
F8	3	25%	2	0	0	0	1
Total	198		146	23	7	2	20
Total % of Interactions			74%	12%	4%	1%	10%

VERTICAL COHERENCE IN TANZANIA

	INFLUENCING What happens inSRBDP objectivess if we make Progress on Tanzania National Nexus Objectives.						
Objective X	interactio ns	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-	
W1	11	92%	8	1	0	0	2
W2	11	92%	7	1	0	0	3
W3	11	92%	11	0	0	0	0
W4	12	100%	11	0	0	0	1
W5	11	92%	7	0	2	1	1
W6	11	92%	11	0	0	0	0
W7	10	83%	6	1	1	2	0
E1	8	67%	5	3	0	0	0
E2	11	92%	11	0	0	0	0
E3	11	92%	10	1	0	0	0
E4	8	67%	7	1	0	0	0
E5	12	100%	12	0	0	0	0
F1	7	58%	5	2	0	0	0
F2	6	50%	3	1	2	0	0
F3	7	58%	5	2	0	0	0
F4	7	58%	5	2	0	0	0
F5	10	83%	6	1	2	0	1
F6	6	50%	5	1	0	0	0
F7	12	100%	7	1	2	0	2
F8	12	100%	12	0	0	0	0
F9	12	100%	10	0	0	0	2
F10	11	92%	11	0	0	0	0
Total	217		175	18	9	3	12
Total % of Interactions			81%	8%	4%	1%	6%

SRBDP TO MALAWI COHERENCE

	INFLUENCING What happens in Malawi WFE Nexus policy objectives if we make Progress on SRBDP Objectives						
SRBDP Objectives	actions	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-	
W1	13	62%	9	1	1	0	2
W2	14	67%	11	2	0	0	1
W3	16	76%	15	0	0	0	1
W4	20	95%	14	2	0	1	3
W5	17	81%	14	0	0	0	3
W6	18	86%	18	0	0	0	0
W7	18	86%	17	1	0	0	0
W8	19	90%	19	0	0	0	0
E1	19	90%	18	0	0	0	1
E2	20	95%	15	0	0	0	5
F1	18	86%	13	1	2	0	2
F2	12	57%	9	3	0	0	0
Total	204		172	10	3	1	18
Total % of Interaction			84%	5%	1%	0%	9%

SRBDP TO TANZANIA COHERENCE.

	INFLUENCING What happens in the Tanzania WFE Nexus policy objectives if we make Progress on SRBDP Objectives						
SRBDP Objectives	interactions	%	Synergies		Conflicts		Syn&Con
			+	0/+	-	0/-	
W1	12	55%	10	0	0	0	2
W2	14	64%	12	2	0	0	0
W3	19	86%	19	0	0	0	0
W4	22	100%	10	1	4	0	7
W5	20	91%	16	2	1	0	1
W6	17	77%	17	0	0	0	0
W7	21	95%	21	0	0	0	0
W8	22	100%	22	0	0	0	0
E1	21	95%	17	1	0	0	3
E2	19	86%	14	0	1	1	3
F1	18	82%	11	1	2	0	4
F2	13	59%	8	5	0	0	0
Total	218		177	12	8	1	20
Total % of Interaction			81%	6%	4%	0%	9%

8. RESULTS

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MALAWI POLICY GAP ANALYSIS

Sector	Policy	Water	Energy	Food/Agriculture
Water	Malawi National Water Policy 2005			
Energy	Malawi National Energy Policy 2018			
Food/Agriculture	Malawi National Agriculture Policy 2016			
KEY				
		Not applicable.		
		No Integration.		
		Weak Integration.		
		Strong Integration.		

TANZANIA POLICY GAP ANALYSIS.

Sector	Policy	Water	Energy	Food/Agriculture
Water	Tanzania National Water Policy 2002			
Energy	Tanzania National Energy Policy 2015			
Food/Agriculture	Tanzania National Agriculture Policy 2013.			
KEY				
		Not applicable.		
		No Integration.		
		Weak Integration.		
		Strong Integration.		

9. POLICY RECOMMENDATION

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Strengthening
Multisectoral
Coordination

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Monitoring and
Evaluation.



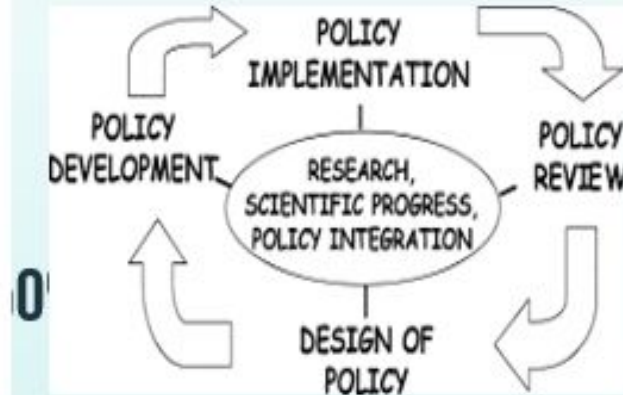
Capacity Building.



Stakeholders
Engagement.



Conflicts
resolution
mechanism



Enhance Policy
Integration.



Enhance Policy
Research on WFE
Nexus.



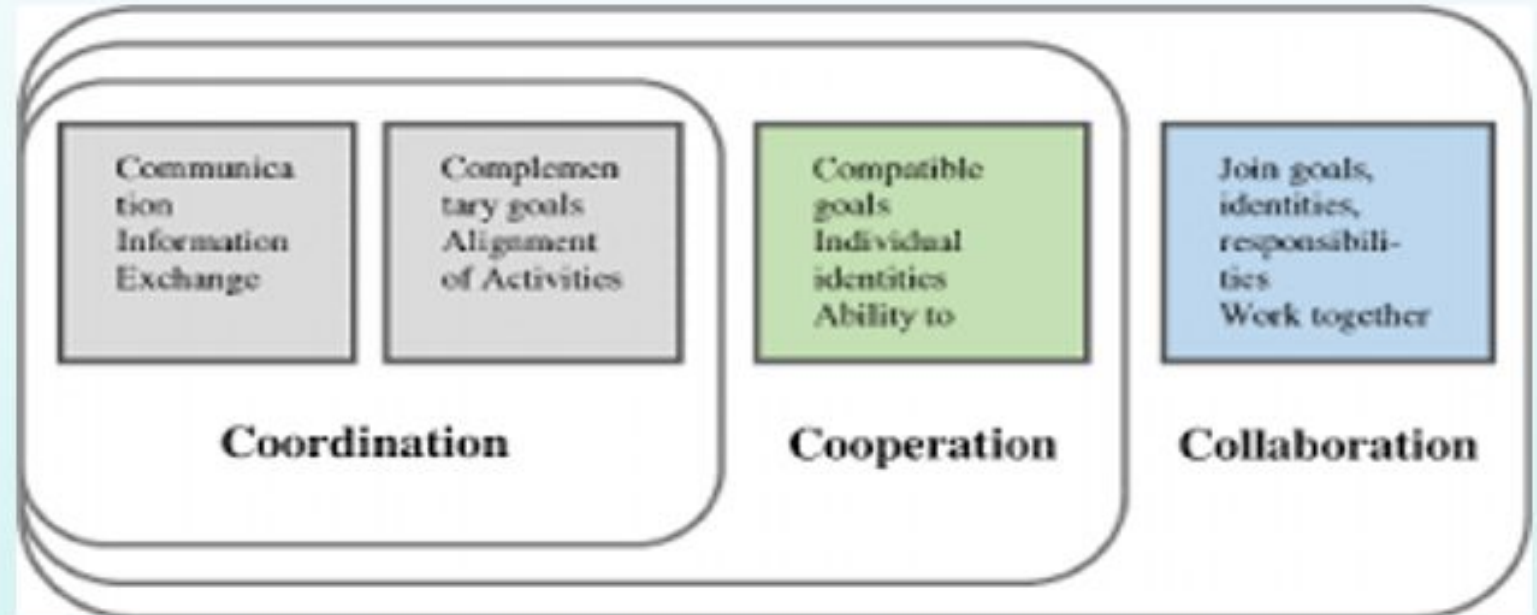
Criteria for trade
off selection.

10. CONCLUSION

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Both Horizontal and
Vertical policy
Coherence exists.



Key for the successful Implementation of
SRBDP.

Thank You