75th International Executive Council meeting & 9th Asian Regional Conference

CATALYSING SUSTAINABLE DEVELOPMENT GOALS THROUGH THE WATER-ENERGY-FOOD (WEF) NEXUS

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The Water-Energy-Food-Nexus: Applications & Impact on Societies, Environment and Ecosystem

Working Group on Water Food Energy Nexus (WG-WFE_N)

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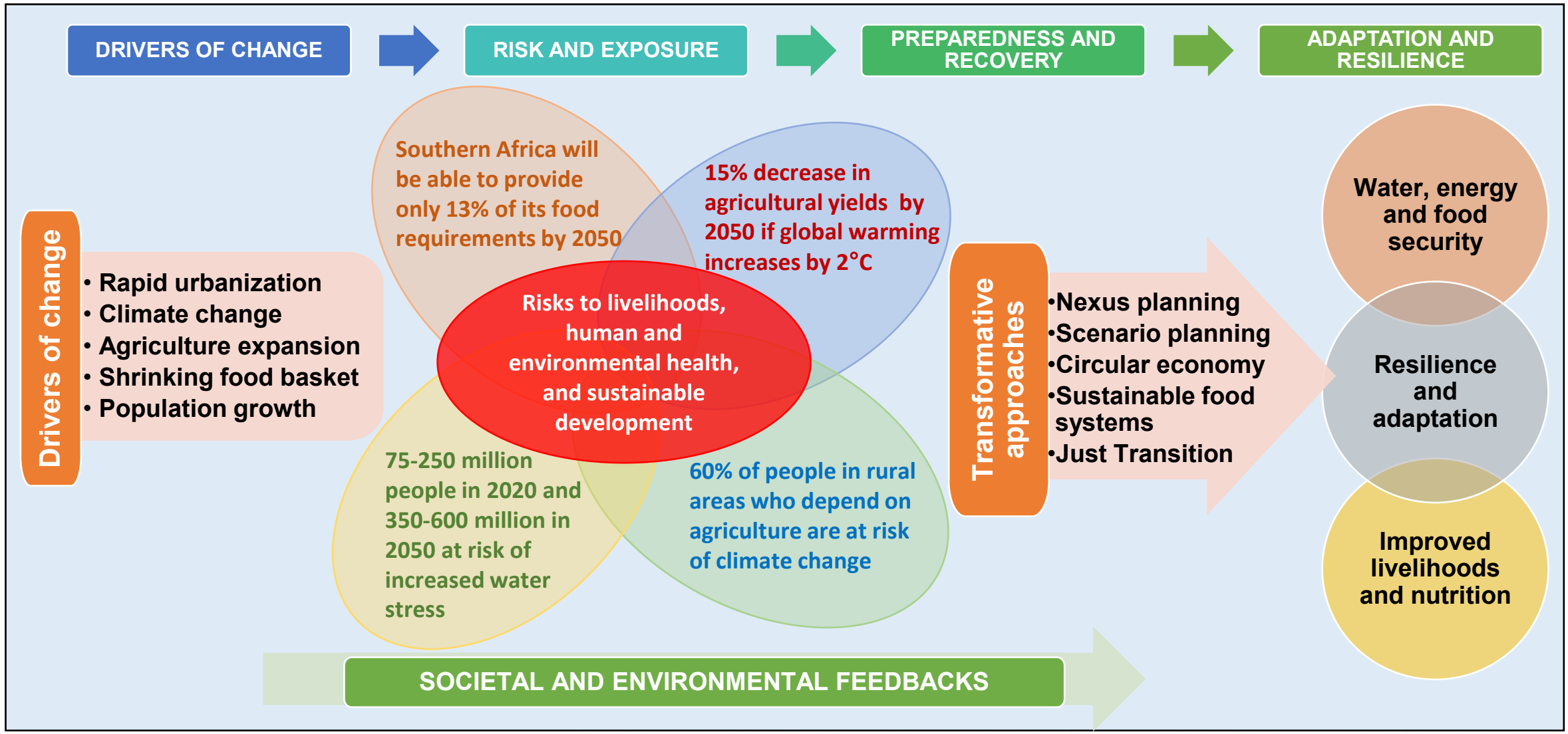
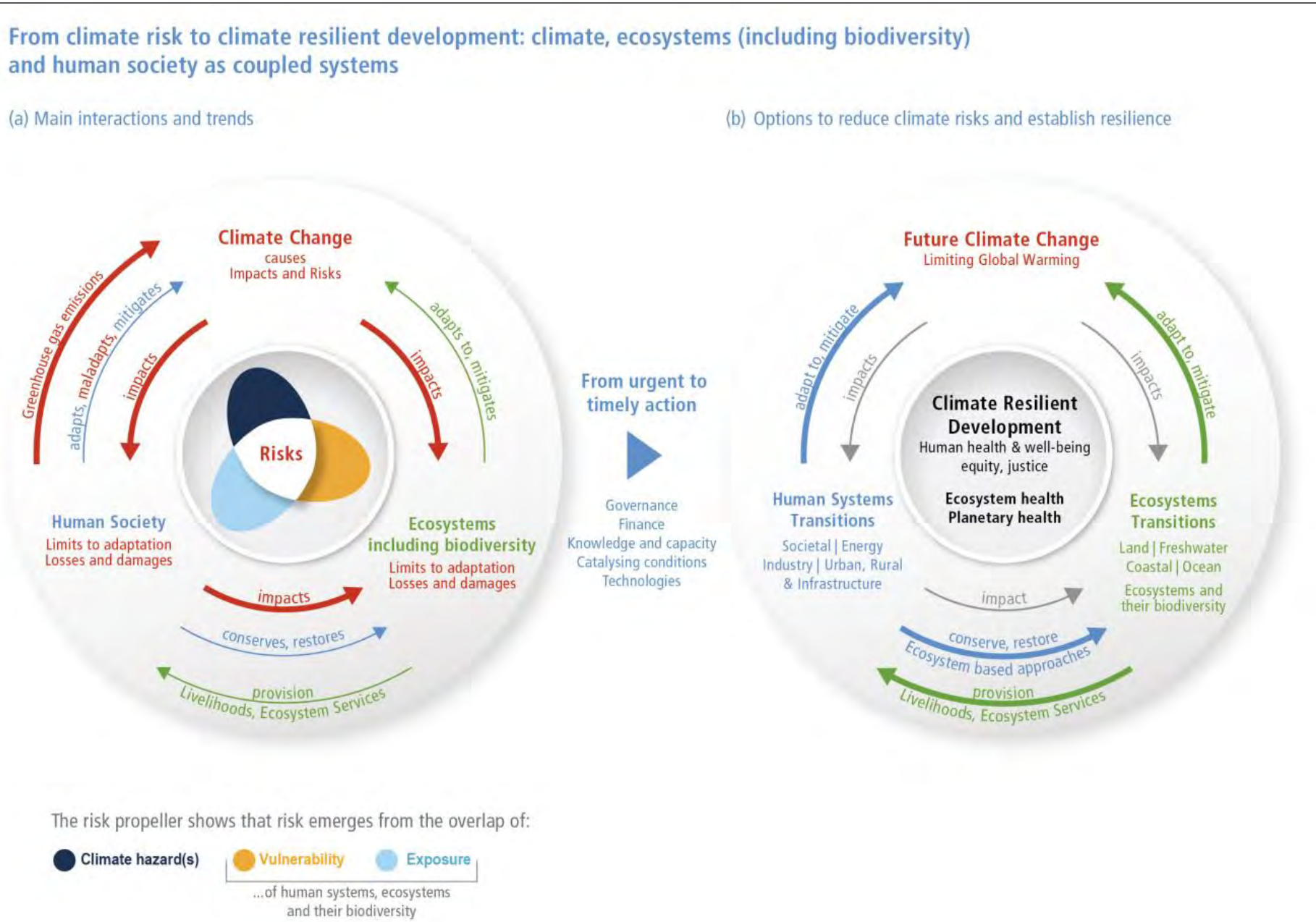
Sydney ICC

Why nexus thinking? Why the transition from the linear economy

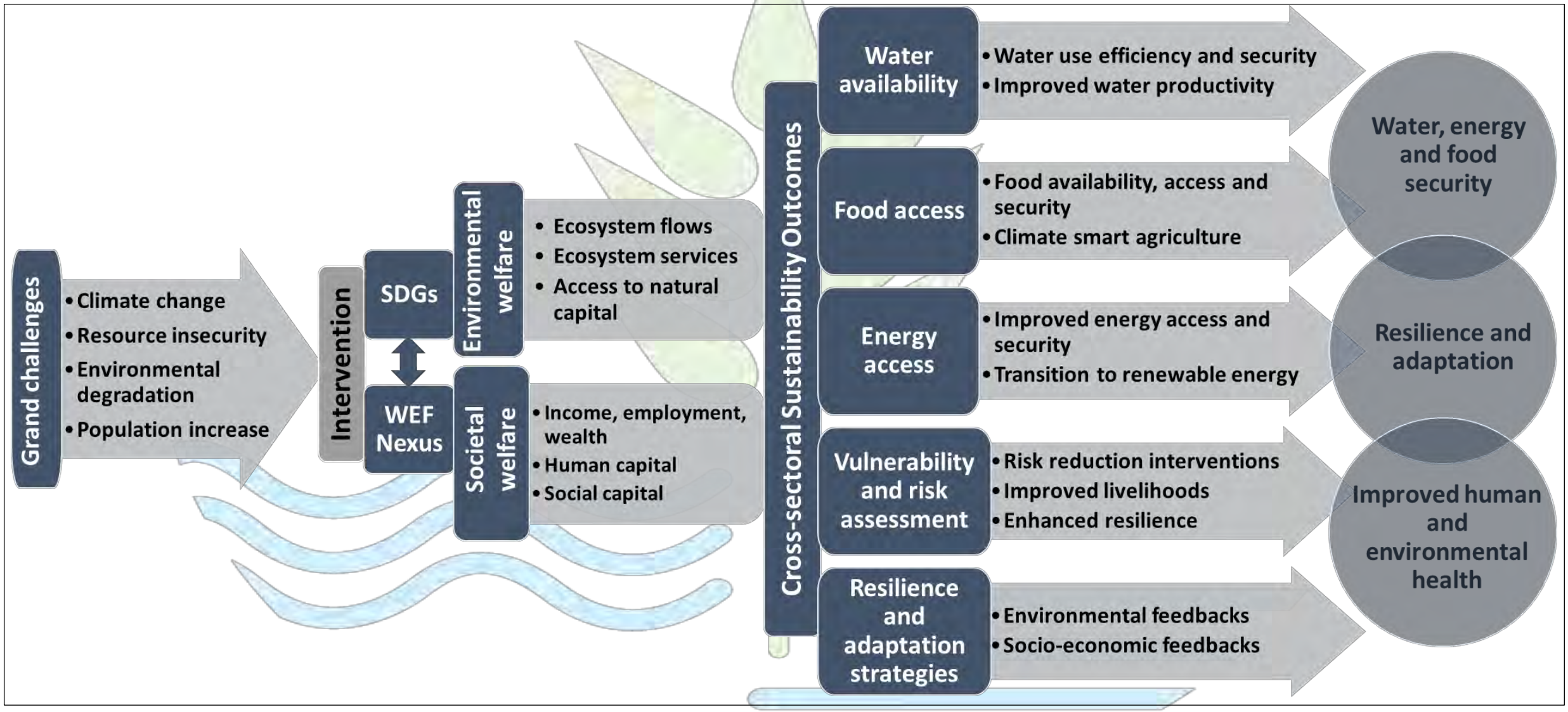


How do we prepare and get ready? Nexus Planning!!!

Climate, water, food, energy and health are all interlinked systems – need for integrated and transformative approaches to guide the management of synergies and trade-offs



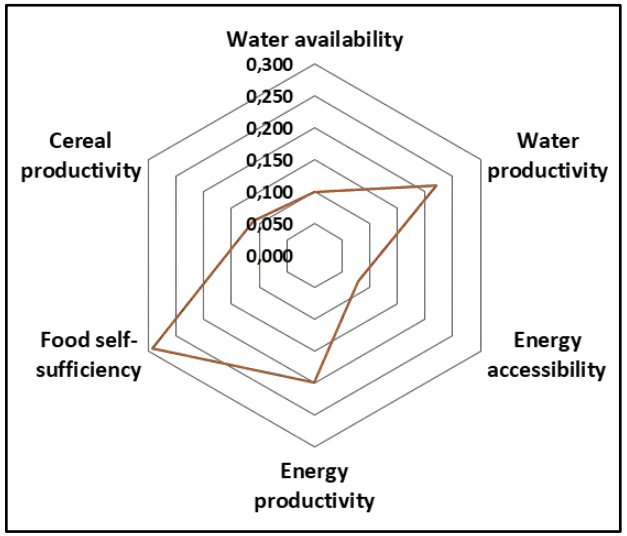
Methodological framework



WEF indicators & the pairwise comparison matrix (resource security)

Sector	Indicator	Units	Pillars
Water	Proportion of available freshwater resources per capita (availability)	m^3/capita	Affordability Stability Safety
	Proportion of crops produced per unit of water used (productivity)	$/$m^3$	
Energy	Proportion of the population with access to electricity (accessibility)	%	Reliability Sufficiency Energy type
	Energy intensity measured in terms of primary energy and GDP (productivity)	MJ/GDP	
Food	Prevalence of moderate or severe food insecurity in the population (self-sufficiency)	%	Accessibility Availability Affordability Stability
	Proportion of sustainable agricultural production per unit area (cereal productivity)	kg/ha	

Performance of WEF nexus indicators in South Africa in 2015



AHP Pairwise comparison matrix for WEF nexus indicators for South Africa in 2015

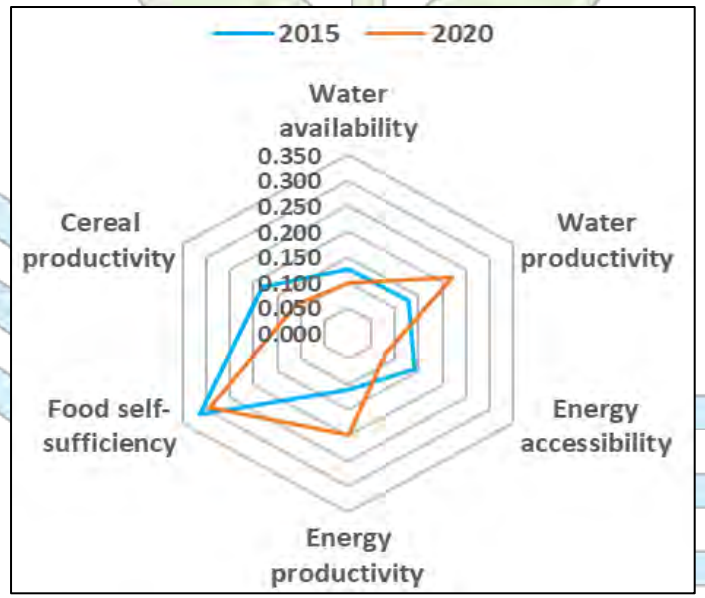
Indicator	Pairwise comparison matrix						Normalised indices
	Water availability	Water productivity	Energy accessibility	Energy productivity	Food self-sufficiency	Cereal productivity	
Water availability	1	1	1	1/3	1/3	1	0.099
Water productivity	1	1	3	3	1	1	0.221
Energy accessibility	1	1/3	1	1	1/5	1/3	0.079
Energy productivity	3	1/3	1	1	1	5	0.199
Food self-sufficiency	3	1	5	1	1	7	0.292
Cereal productivity	1	1	3	1/5	1/7	1	0.111
							∑ = 1

Consistency ratio (CR)	0.01
Composite WEF nexus index (weighted average)	0.203

WEF nexus progress in South Africa between 2015 and 2020

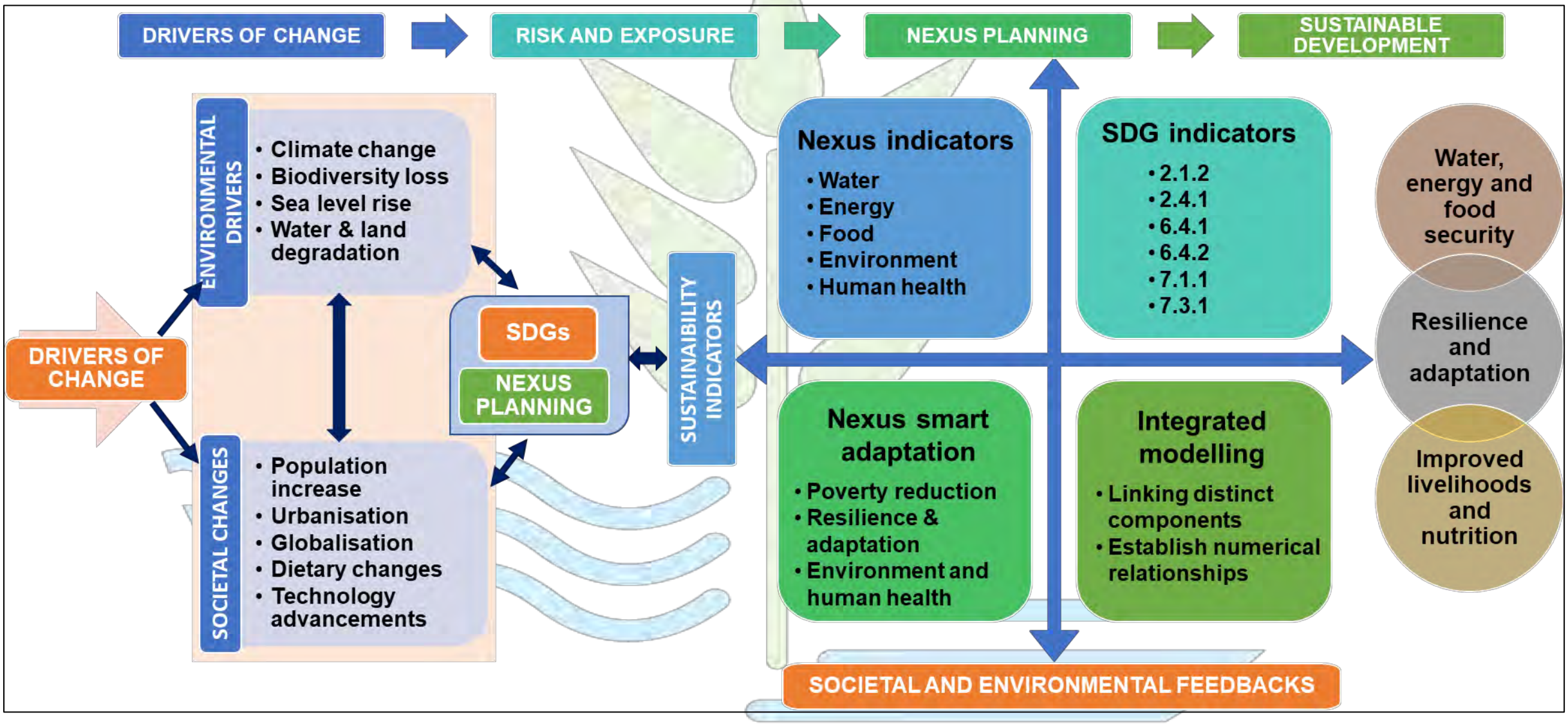
Indicator	Indicator status		
	2015	2020	Units
Proportion of available freshwater resources per capita (availability)	821.3	821.4	m^3
Proportion of crops/energy produced per unit of water used (water productivity)	26.2	26.2	$/$m^3$
Proportion of population with access to electricity (accessibility)	85.5	84.4	%
Energy intensity measured in terms of primary energy and GDP (productivity)	8.7	8.7	MJ/GDP
Prevalence of moderate/severe food insecurity in the population (self-sufficiency)	5.7	6.2%	%
Proportion of sustainable agricultural production per unit area (cereal productivity)	3.5	5.6	kg/ha

Indicator	Composite indices	
	2015	2020
Water availability	0.126	0.099
Water productivity	0.128	0.221
Energy accessibility	0.141	0.079
Energy productivity	0.111	0.199
Food self-sufficiency	0.314	0.292
Cereal productivity	0.180	0.111
WEF integrated index	0.155	0.203



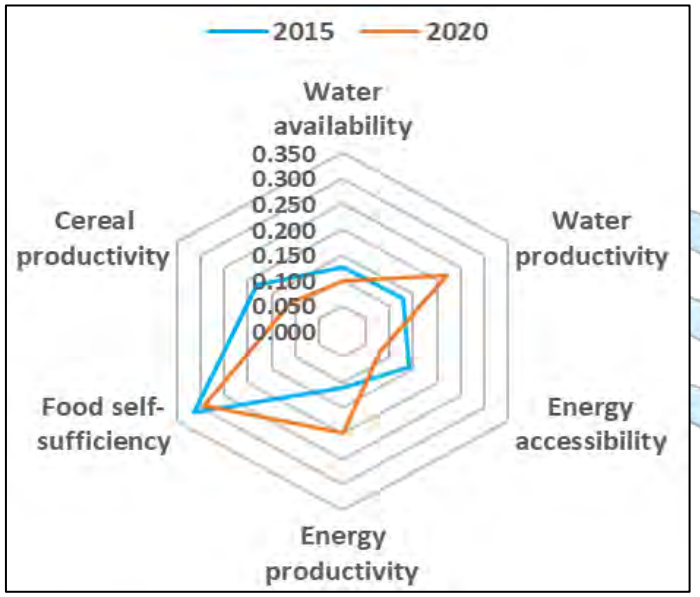
- The essence should be to achieve circularity in the centerpieces
- The shape of the centerpieces indicate priority areas for intervention from a cross-sectoral perspective

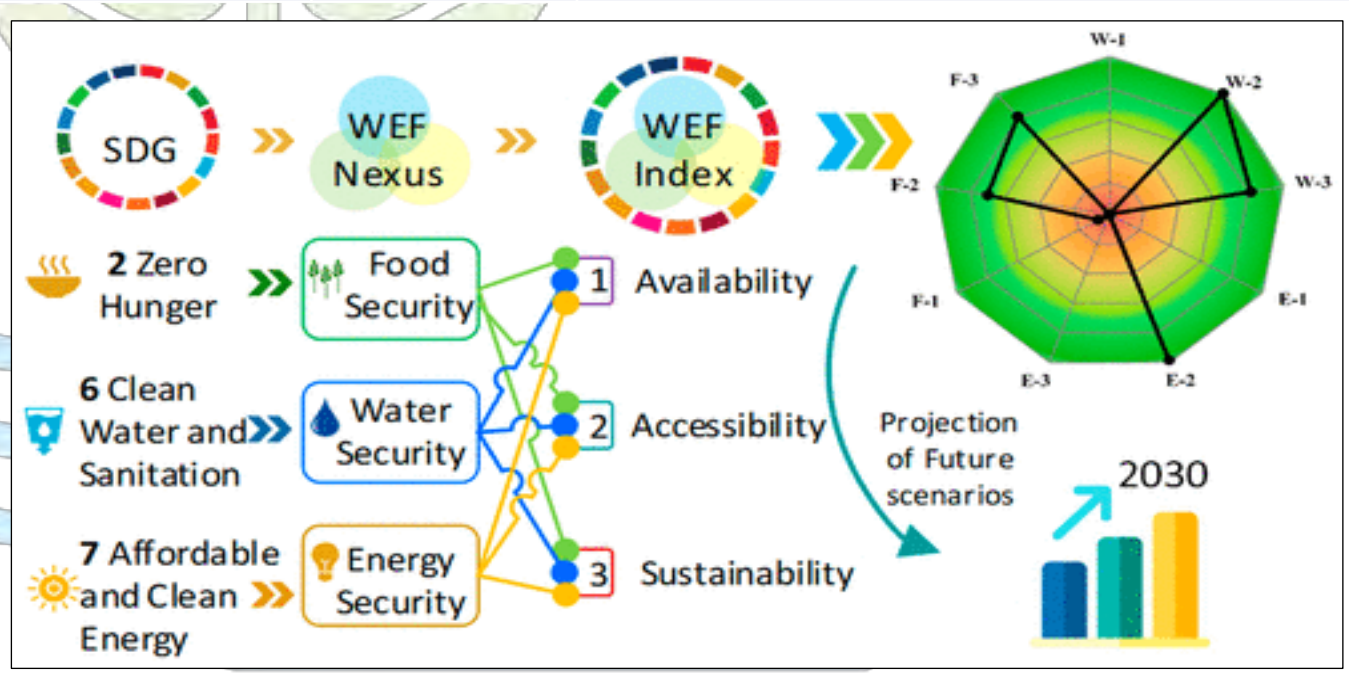
Conceptual framework linking WEF nexus processes with SDGs



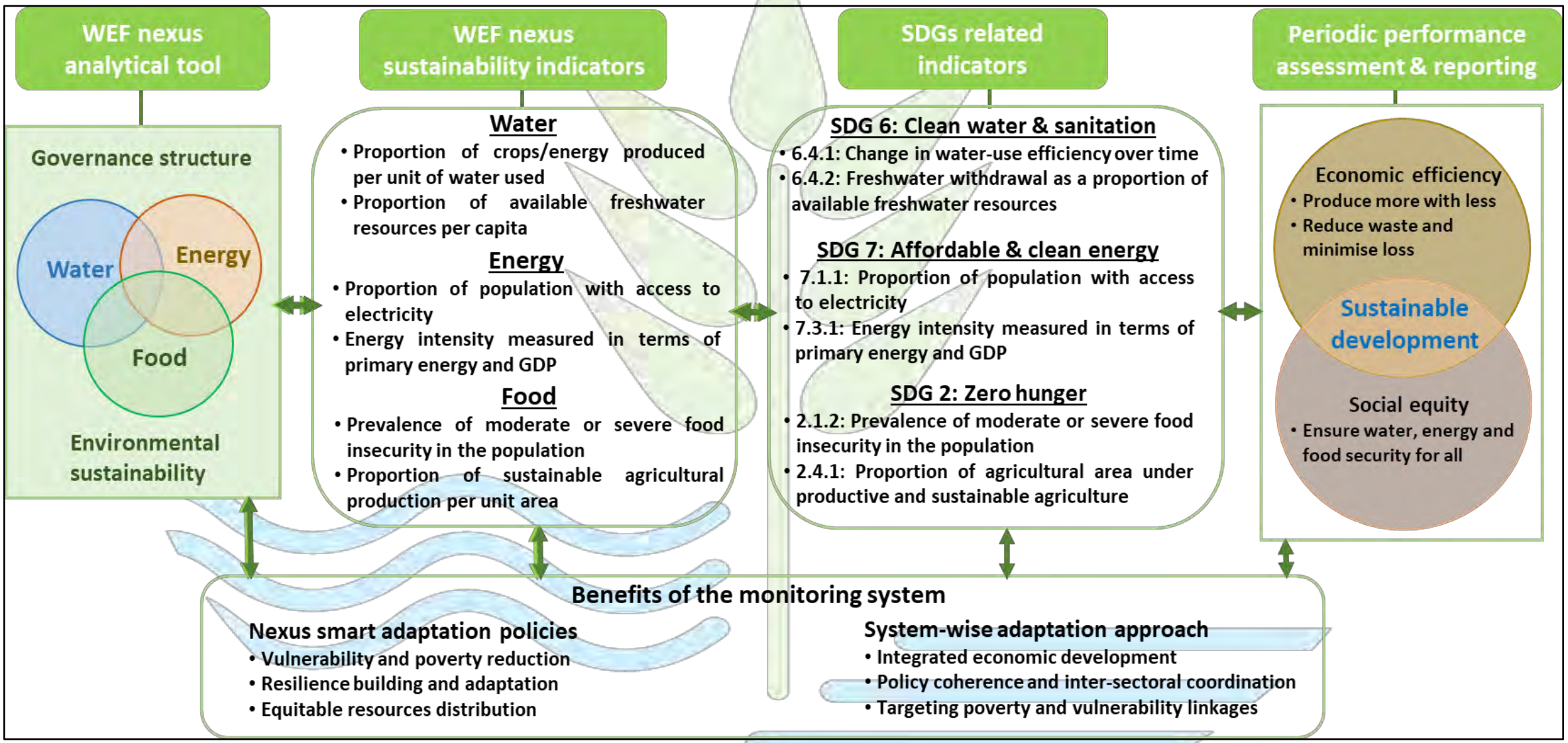
Linking WEF nexus and Sustainable Development Goals (SDGs)

Sector	WEF nexus Indicator	Pillars	Related SDG indicator
Water	Proportion of crops/energy produced per unit of water used (productivity) Proportion of available freshwater resources per capita (availability)	Affordability Stability Safety	6.4.1: Change in water-use efficiency over time 6.4.2: Freshwater withdrawal as a proportion of available freshwater resources
Energy	Proportion of population with access to electricity (accessibility) Energy intensity measured in terms of primary energy and GDP (productivity)	Reliability Sufficiency Energy type	7.1.1: Proportion of population with access to electricity 7.3.1: Energy intensity measured in terms of primary energy and GDP
Food	Prevalence of moderate or severe food insecurity in the population (self-sufficiency) Proportion of sustainable agricultural production per unit area (cereal productivity)	Accessibility Availability Affordability Stability	2.1.2: Prevalence of moderate or severe food insecurity in the population 2.4.1: Proportion of agricultural area under productive and sustainable agriculture

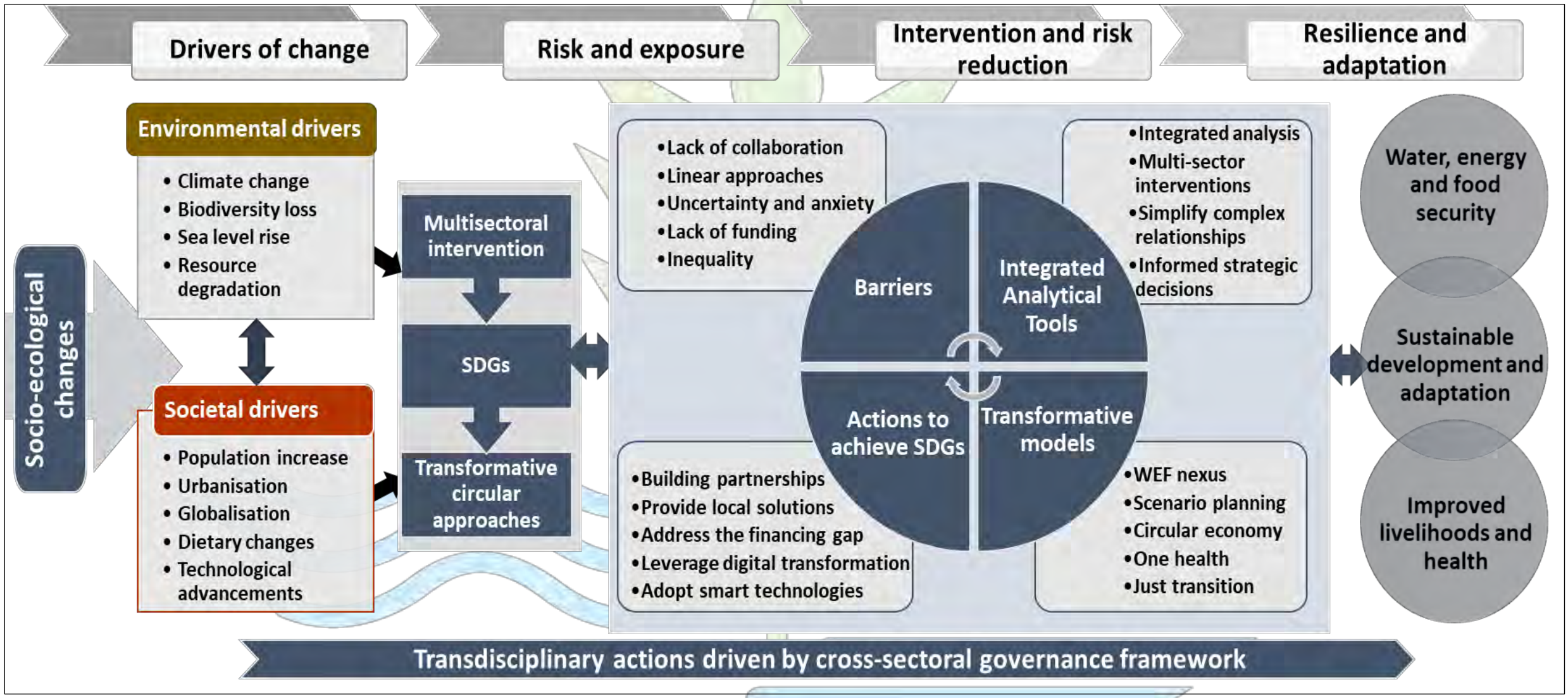




A framework linking WEF nexus and SDG performance and progress



A Nexus-based framework to drive SDGs: Towards policy coherence



Circularity: An alternative towards sustainability by 2030?

Linear or monocentric approaches

- Sector-based resource planning and management
- Divergent sector-based policies
- Aggravation of contemporary crises
- Focus on the present situation without considering the future

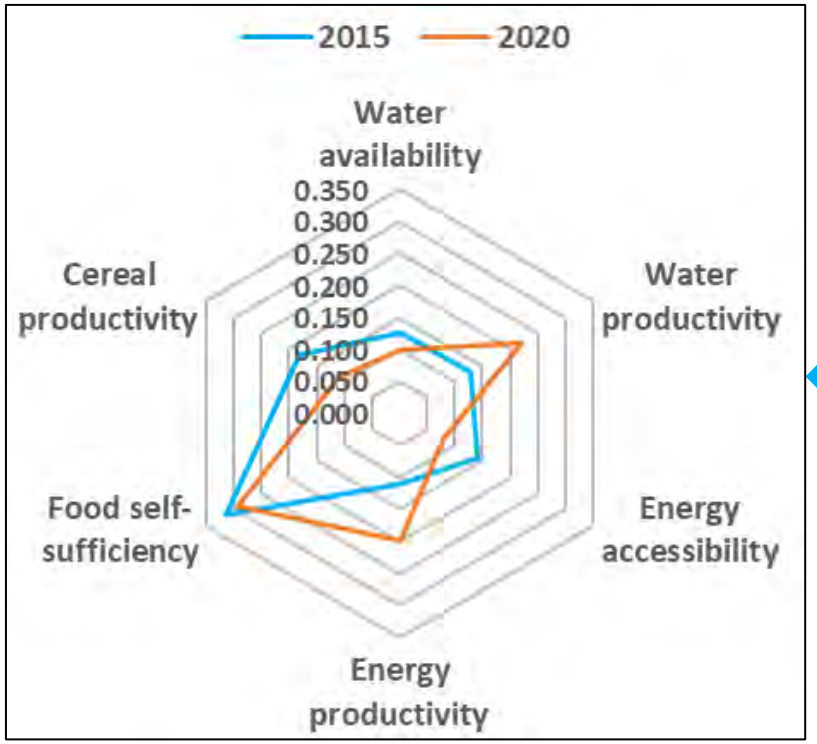
VS

Circular or polycentric approaches

- Cross-sectoral resource planning and management
- Caters for both the present and the future
- Expedite the resilience building initiatives
- Creates balanced systems through circular modelling

Consequences of monocentricism in resource management

An imbalanced economy

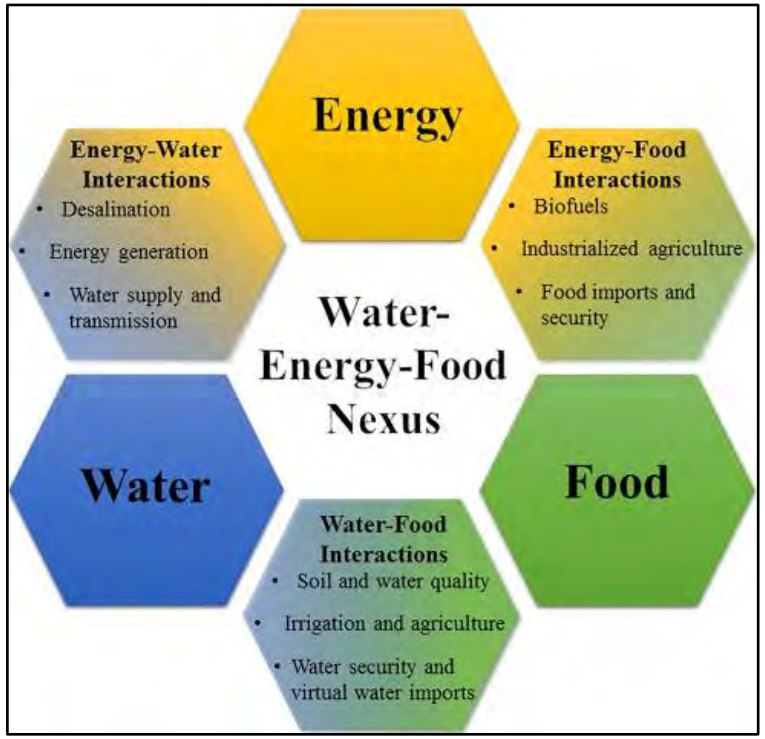


Transformative approaches seek to build resilience and adaptation through scenario planning, and achieve a circular economy

WATER RESEARCH COMMISSION

Concluding remarks

- The water-energy-food nexus draws on holistic, socio-ecological systems perspective that recognise the value of all sectors in equal terms
- Climate change is the main causes of the fluctuations in water availability as well as access to energy and food resources, triggering trade-offs across the whole WEF nexus spectrum
- Southern Africa is highly exposed to climate variability and change due to the high dependence on climate sensitive sectors of water and agriculture and reliance on hydropower for energy
- The integration of climate change adaptation strategies into the WEF nexus offers opportunities to create proper resource coordination, harmonise activities across all sectors, improve resilience, and reduce vulnerabilities to attain regional development targets




thank you!