



2024
CONFERENCE



agriculture, land reform
& rural development

Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

Science transforming food systems for a better future

Climate Change and Agricultural-Food Systems

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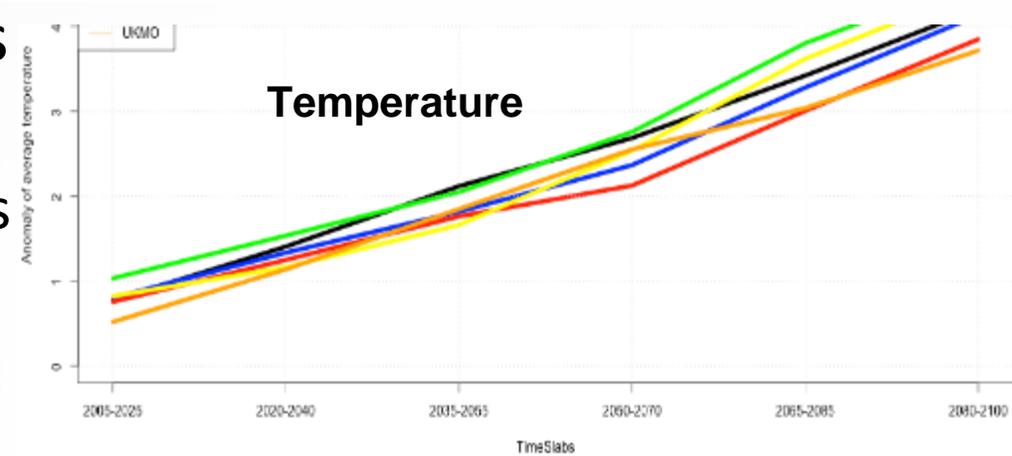
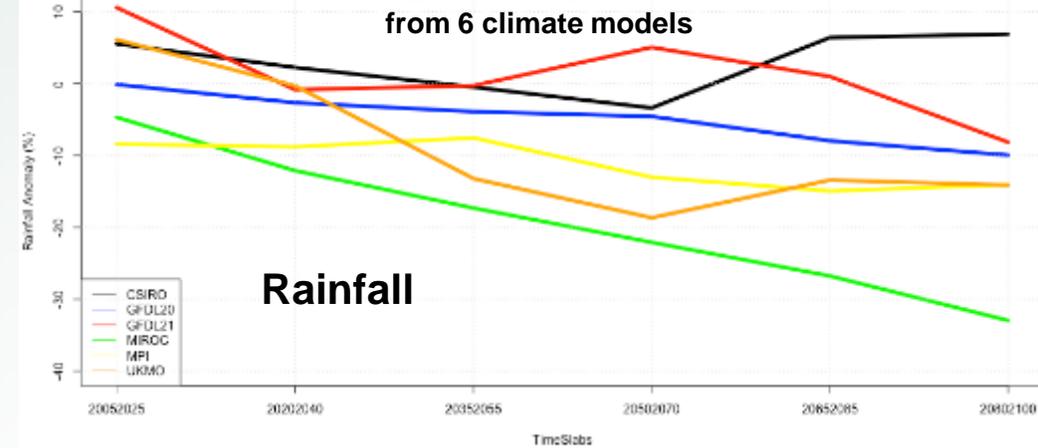
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Climate Change and Variability

- Long-term shifts in temperatures and weather patterns around the globe.
- Significant variation of mean climate conditions & other characteristics of the atmosphere.
 - e.g. warmer, wetter, or drier—over several decades or longer.
- Longer-term trend differentiate climate change from natural weather variability, & effects on other parts of the earth.
- Caused by human activity – with temperatures rising higher & faster than any time in the past.

Climate Change Projections over RSA



Generally, predictions for **rainfall** are *more difficult* than prediction for **temperatures**.

For Rainfall -

as time increases (x-axis), => rainfall deviation from normal diverge notably.

For Temperature -

Most models give similar increases in temperature with time by 2050: >+2 to 2.5°C

Agricultural – Food Systems Approach

Consider total food system with all elements & inter-relationships & effects.

- consumption, nutrition, health, resource utilization, markets & services, income & labour - interlinked systems.
- Complex entities that affect diets, human health, & other outcomes
 - including economic growth, natural resource and environmental resiliency, and sociocultural factors.
- Core system includes activities thru which food products flow interconnected systems
 - embedded in a societal context and a natural environment (FAO).
- Agricultural production & food supply systems depend on many factors
 - encompass entire range of activities, services, people & institutions (FAO, 2013)
 - Many inputs across all components necessary to produce food,
 - soil, fertilizers, energy, water, seeds, pesticides, pollinators, land, supply chains.
- **@ most basic level - determine *quantity, quality, diversity & nutritional content* of foods available for consumption all along the value chain.**



Systems within Systems

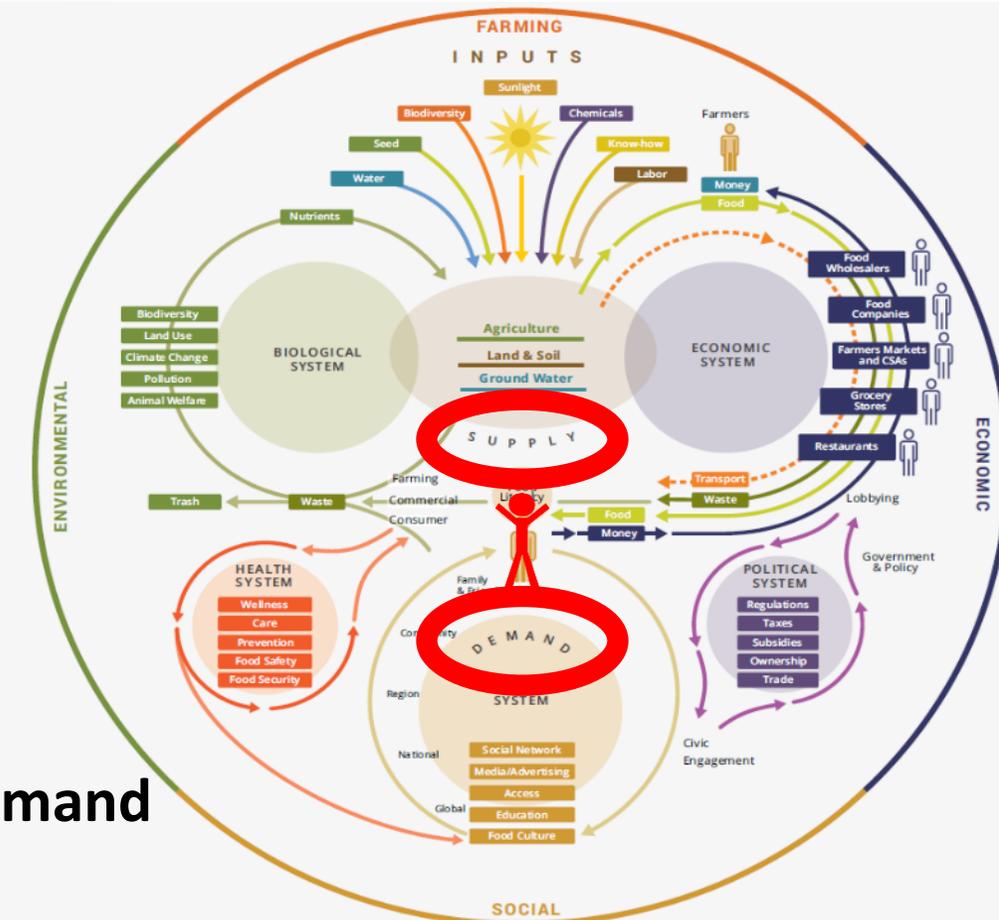
Systems theory: **transdisciplinary study of systems**

- cohesive groups of interrelated, interdependent components.
- can be natural or artificial.

Show flow of different materials:

- energy
- water
- nutrients
- seed
- food
- money
- transport / logistics
- labour

Including feedback & feed-forward **to balance supply & demand**



Main Components

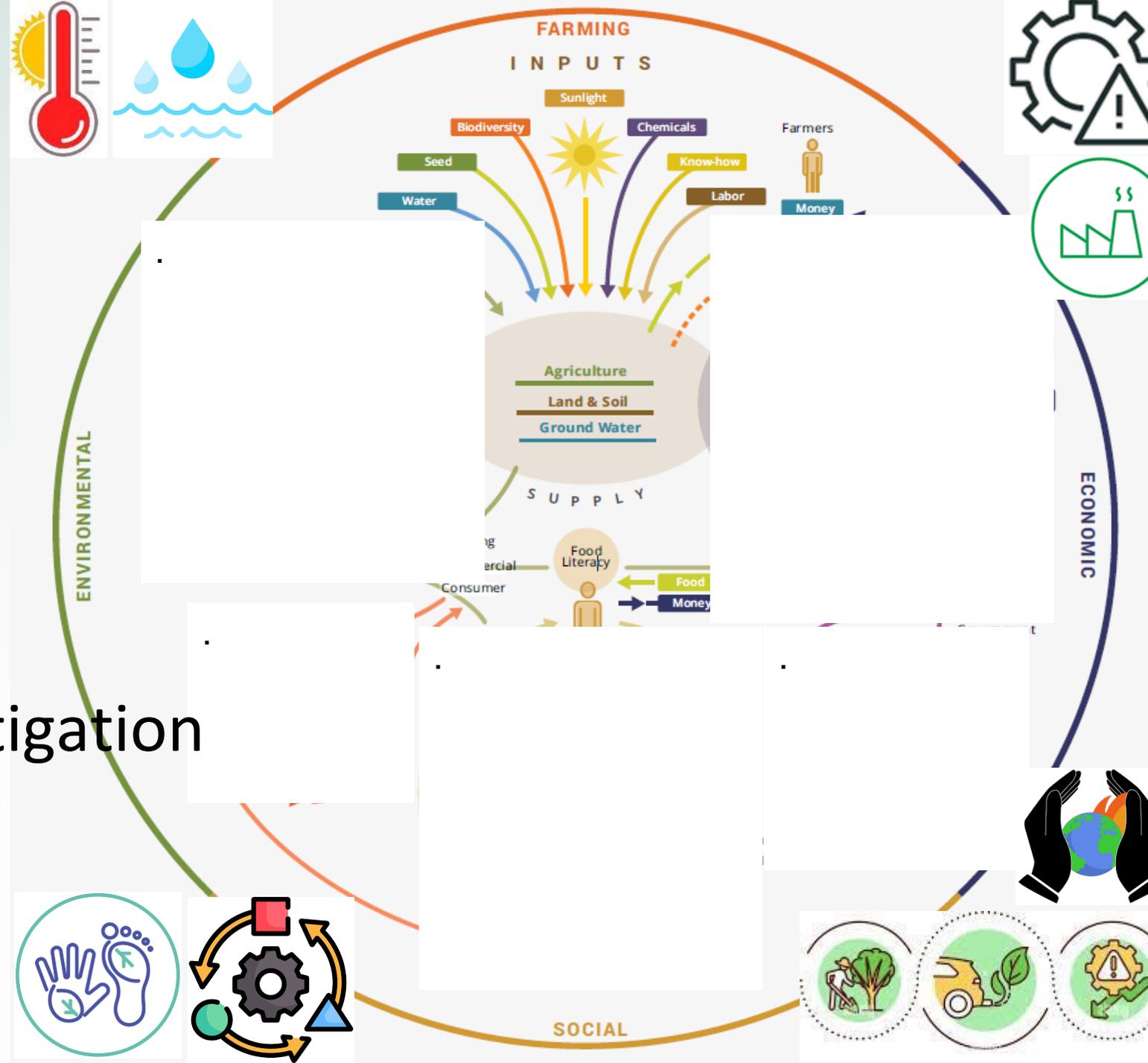
- Environmental
- Social
- Economic
- Farming

Inter-related Systems

- Biological system
- Economic system
- Health system
- Social system
- Political system

Climate Adaptation & Mitigation

- Heat & Water use
- Energy & Transport
- Health & Wellbeing
- Sustainability & Development



Systems need both Time and Space Scaling

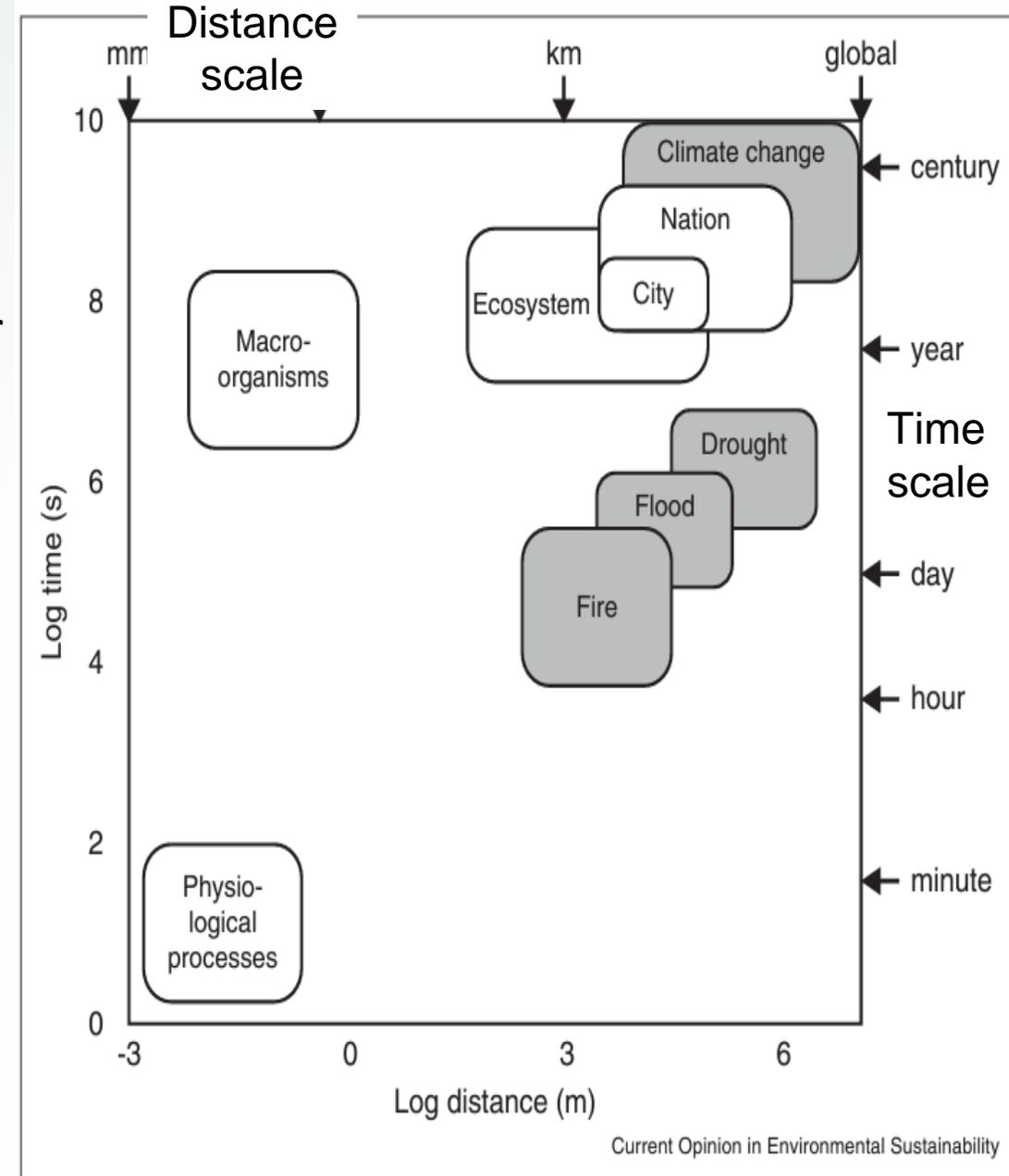
Choose what scale:

- Right scaling – for stakeholders application
- Multi-scaling – for synthesis of processes
- Cross scaling – how they interact with each other

Reasons:

- Assess individual ecological & social processes at scale where operate & link to processes at different scales & levels of social organisation.
- Considered progressively greater spatial, temporal, or causal detail as scale becomes finer.
- Allows independent validation of larger-scale conclusions by smaller scale studies & context at larger scales for findings at smaller scales.
- Reporting & response options to match scales of social decision-making, people can relate, and act on - local community, province, nation, regional bloc, and the planet

(Scholes et al.,



Challenge to you-all



Which part of the Food System are you working on?

Bring your expertise and make a contribution to integrated research on transformation of African food systems under a variable future climate. Together we can ensure nutritional food security despite the weather!

Reach the Sustainable Development Goals together

2 To End Poverty, and **# 13 Climate Action**

through economic growth, social inclusion and environmental protection & promote sustainable food systems under an unknown future climate.