

A Regional Application of Systems Analysis

Bongani Ncube

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The Challenges – Agriculture (Water)

- ▶ World's 500 million smallholder farms produce around 80 per cent of food (FAO)
- ▶ As the population increases (9 billion by 2050) the demand for food will also increase
- ▶ **Smallholder farmers will bear the brunt of the need to increase food production for a growing world population**
- ▶ Smallholder farmers in Sub Saharan Africa face perennial food shortages due to low crop yields
- ▶ Major causes of poor crop yields
 - ▶ Soil fertility decline
 - ▶ Poverty - reduced mechanization, labour costs, input purchasing power low
 - ▶ Frequent droughts/extreme weather, (Zimbabwe, Malawi, Mozambique floods)
- ▶ Access to markets
- ▶ **Access to agricultural water is also a challenge for smallholders (expensive or allocated to larger producers), therefore there is pressure to increase the sustainability of rain fed cropping systems**

Some of the solutions/approaches

- ▶ **Integrated water resource management** – e.g. Challenge Program on Water and Food, -2004-2013, <https://hdl.handle.net/10568/3905>
 - ▶ Water management strategies, catchment management to reduce food deficit and improve livelihoods, institutional models for water governance, capacity building (farmers, extension, water managers)
- ▶ **Soil fertility management networks** – SoilFertNet - <https://repository.cimmyt.org/handle/10883/3663>
- ▶ **Smallholder System Innovations (SSI)** - <https://ssi.un-ihe.org/>
 - ▶ Addressed environmental, social and institutional conditions required to enable a sustainable upgrading of rainfed agriculture among smallholder farmers in water scarce tropical and sub-tropical environments
- ▶ **Climate Smart Agriculture** - multi-cropping, water conservation and protection of the natural resource base – WWF in SA https://www.wwf.org.za/our_work/initiatives/climate_smart_smallholder_farming.cfm
- ▶ **Conservation Agriculture** – various projects from 2003
- ▶ **Sustainable intensification**
- ▶ **Example 1:** Africa Research in sustainable intensification for the next generation -Africa RISING, IITA and ILRI <https://africa-rising.net/>
 - ▶ Innovative farming technologies for sustainable intensification
 - ▶ Geographic focus on Mali, Ghana, Ethiopia, Tanzania, Malawi and Zambia
 - ▶ Second phase (2016-2021) focused on working to scale the innovations validated in Phase I
- ▶ **Example 2:** Sustainable Intensification of Maize-Legume Systems for Food Security in Eastern and Southern Africa (**SIMLESA, 2010-2023**) <https://simlesa.cimmyt.org/>
 - ▶ Funded by Australian Centre for International Agricultural Research (ACIAR), led by CIMMYT, NARS partners,
 - ▶ Aims to improve maize and legume productivity by 30 percent and to reduce the yield risk by 30 percent on approximately **650,000 farm households by 2023**
 - ▶ Australia, Botswana, Burundi, Ethiopia, Kenya, Malawi, Mozambique, Tanzania, South Sudan, Uganda, Rwanda, Zambia and Zimbabwe




Conservation Agriculture-based Sustainable Intensification (CASI)

- ▶ Farming practice involving disturbing the soil as little as possible; keeping the soil covered with crop residue as much as possible and intercropping or rotating crops.
- ▶ Project covers Ethiopia, Malawi, Mozambique, Rwanda, Tanzania, Uganda
- ▶ Focus – institutions, policies, markets (inputs/produce), incentives
- ▶ Agricultural Innovation Platforms
 - ▶ Farmer training on CASI, organizing farmers for collective action, value chain integration
- ▶ Use of models to project yields over time – Multi environment APSIM simulation, Integrated Analysis Tool (IAT), APSFARM (Crop-livestock interactions)



Some results include

- Increased crop yields, organic matter, infiltration, soil health
 - Farmer awareness and adoption of options increased
 - Improved agricultural extension services
 - Reduced labour costs – 41% lower
 - Improved access to markets
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References

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