Harnessing the full potential of water resources smallholder farming systems in Southern Africa in the context of climate change

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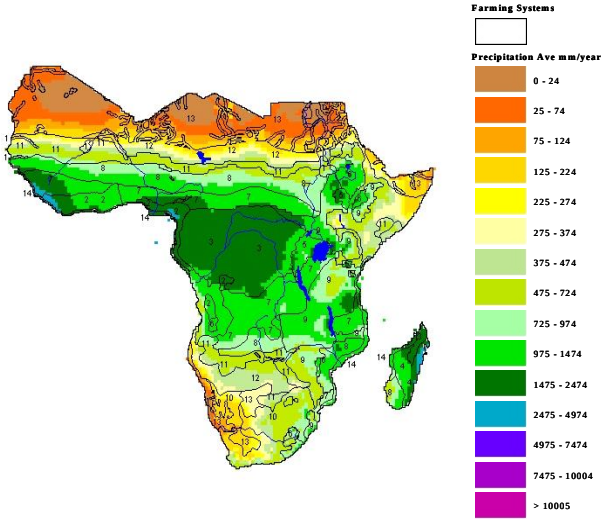
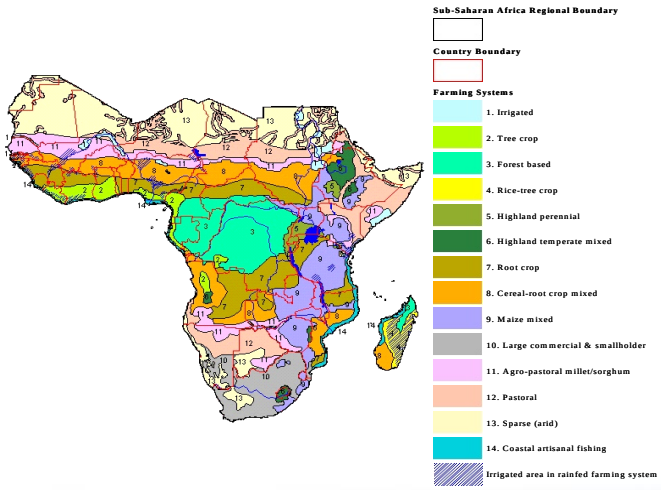
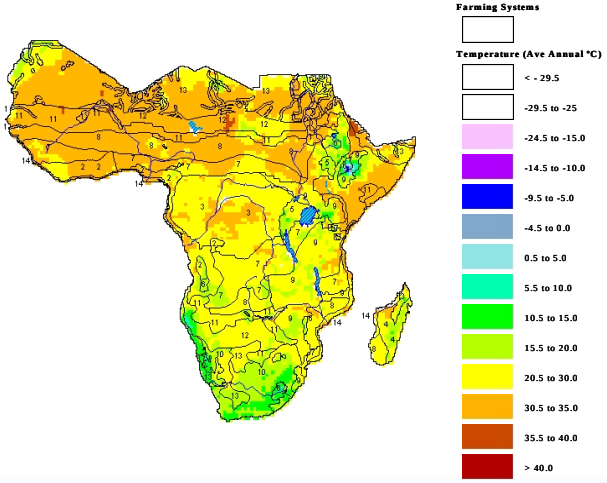
INTRODUCTION - 1

- Agro-ecosystems in S. Africa – most vulnerable to multiple stresses:
  - Climate already hot in most parts of S. Africa (Temps- 20 °C & more)
  - Most areas are already water stressed (Rainfall-974mm & less for most parts of S. Africa)
  - High dependence on agriculture – livelihoods

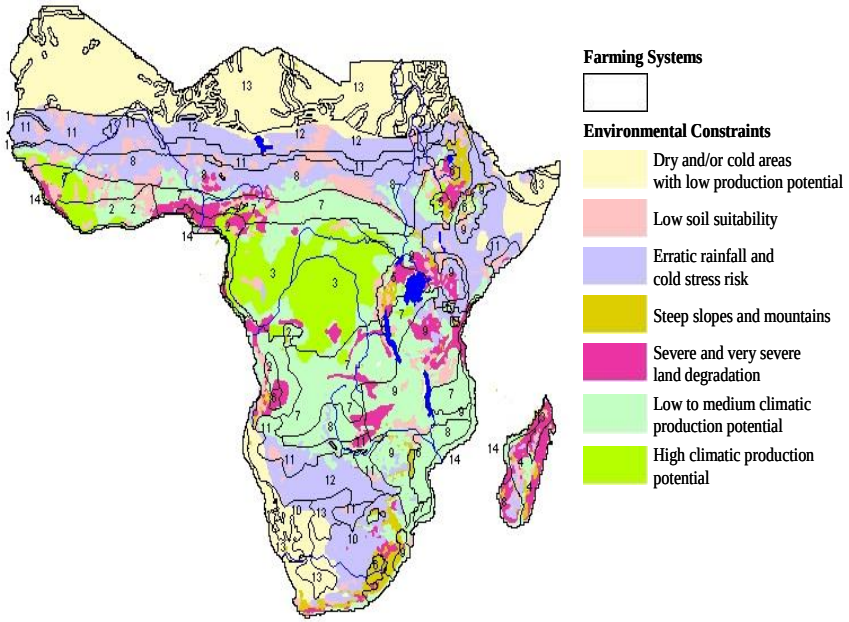






INTRODUCTION - 2

- Main environmental constraints include: erratic and low rainfall, low to medium climatic production potential, low soil quality and land degradation



- Water scarcity remains a key constraint in agriculture in S. Africa
- Water issues more important given the impacts of CC on water, agriculture etc
- The interaction of climate change, soils, and socio-economic factors greatly affect the productivity of agriculture in S. Africa

FORMS OF CLIMATE CHANGE IN S. AFRICA

- Climate change in the S. Africa region manifests in three main variables: temperature, precipitation and extreme climatic events

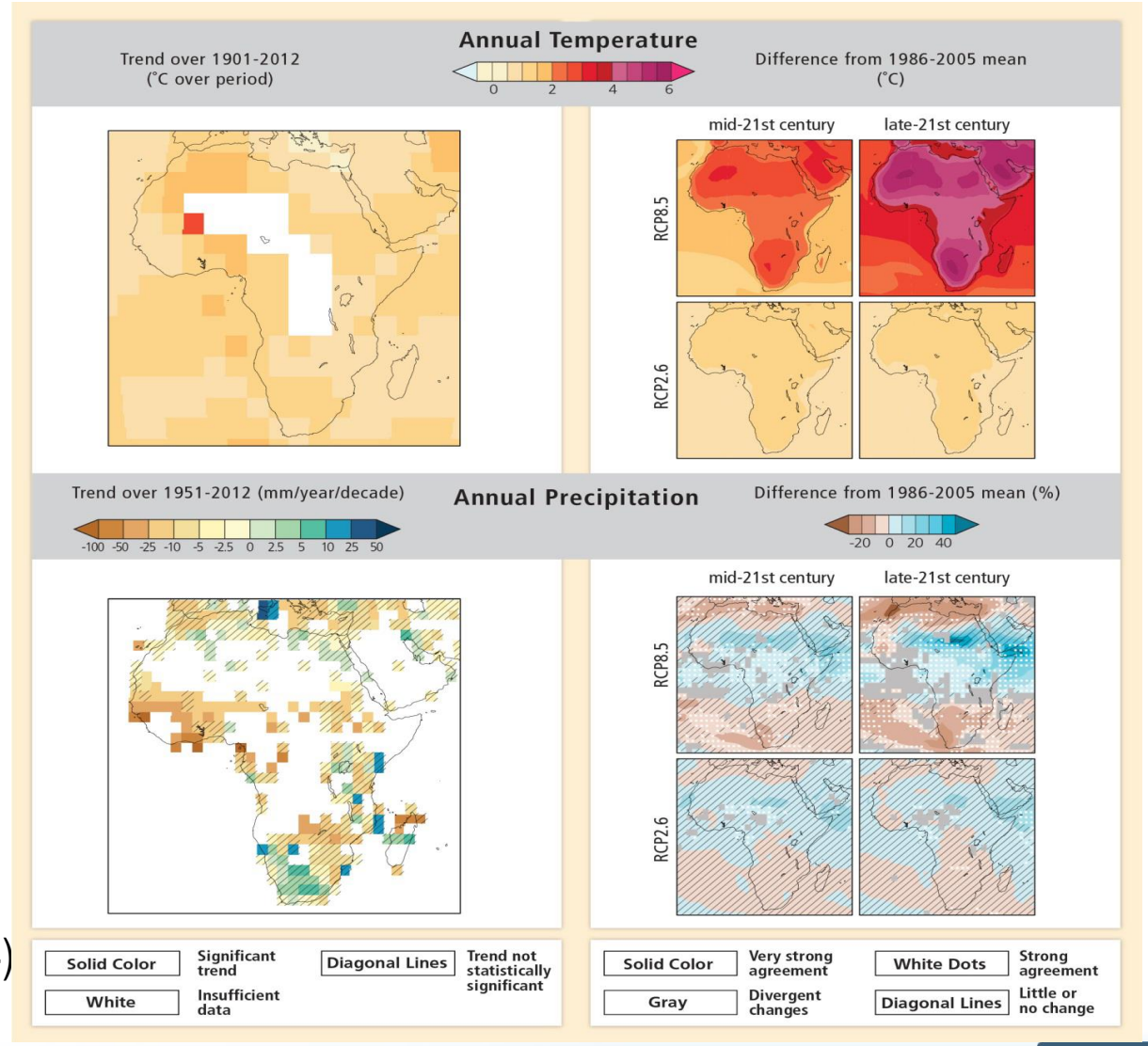
  - Temperature: historical and projected evidence show that the S. Africa region is increasingly experiencing more warming

  - Precipitation: the S. Africa region has been experiencing a downward trend in precipitation over the second half of the 20th century especially in summer
    - Other intra-seasonal characteristics of seasonal precipitation affected by climate change include distribution, onset, duration, dry spell frequencies and intensity

    - Future projections show reductions in rainfall and increased rainfall variability for most parts of the S. Africa region

    - The central and western parts are most affected by these changes

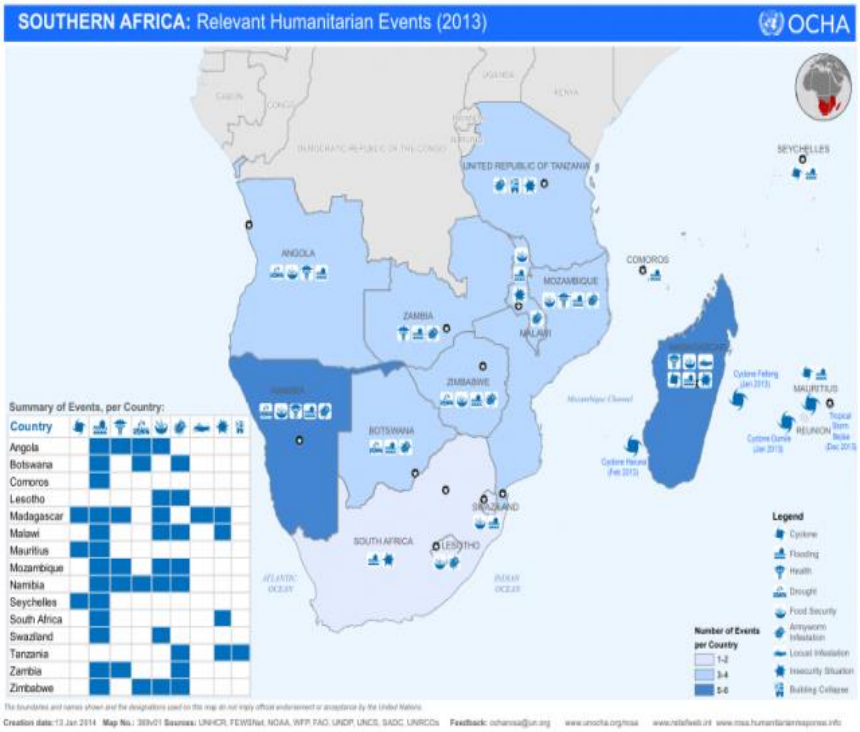
OBSERVED & SIMULATED VARIATIONS IN PAST & PROJECTED FUTURE ANNUAL AVERAGE PRECIPITATION & TEMPERATURE



Source IPCC (2014)

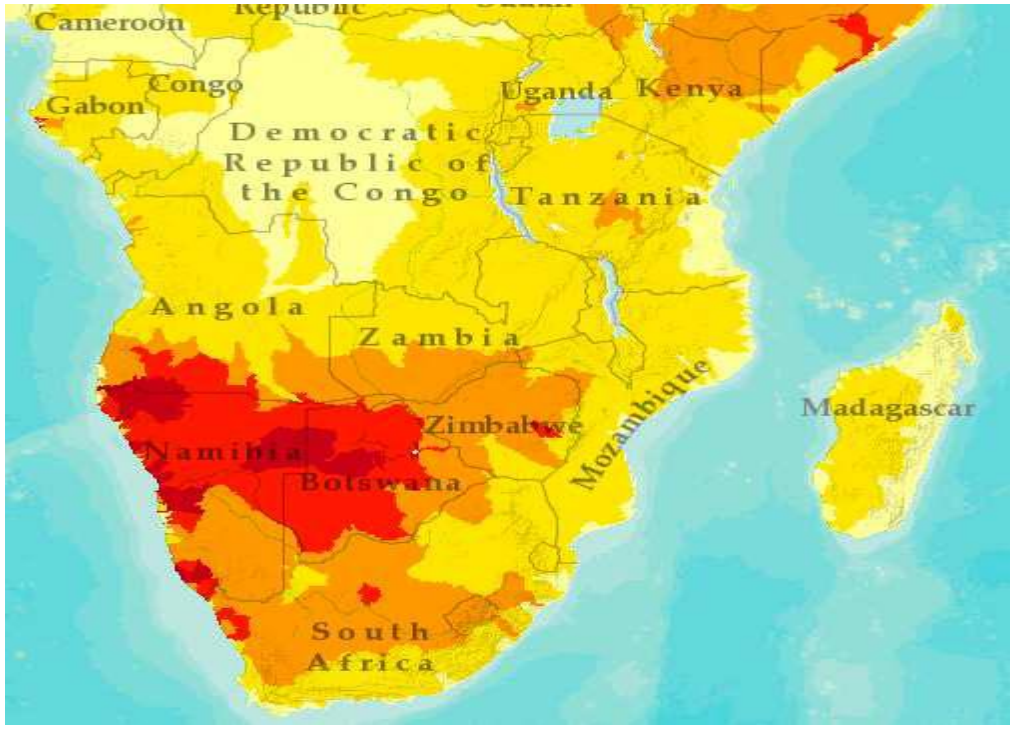
FREQUENCY & INTENSITY OF EXTREME CLIMATIC EVENTS

- **Extreme events**: historical and projected evidence indicate increasing frequency and intensity of extreme climatic events (e.g. heavy rains, cyclones and droughts)



Natural disasters in S. Africa

Source: http://reliefweb.int/map/namibia/southern-africa-relevant-humanitarian-events-2013



Severity of drought in S. Africa

Source: http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas.

RELATIONSHIP BETWEEN CC & NATURAL RESOURCES (E.G. WATER)

- The quantity and quality of productive resources (e.g. water) are projected to be adversely affected by:
  - the projected changes in temperature, precipitation and extreme events

- CC will lead to increased scarcities and competition for access and rights to the limited available natural resources such as water

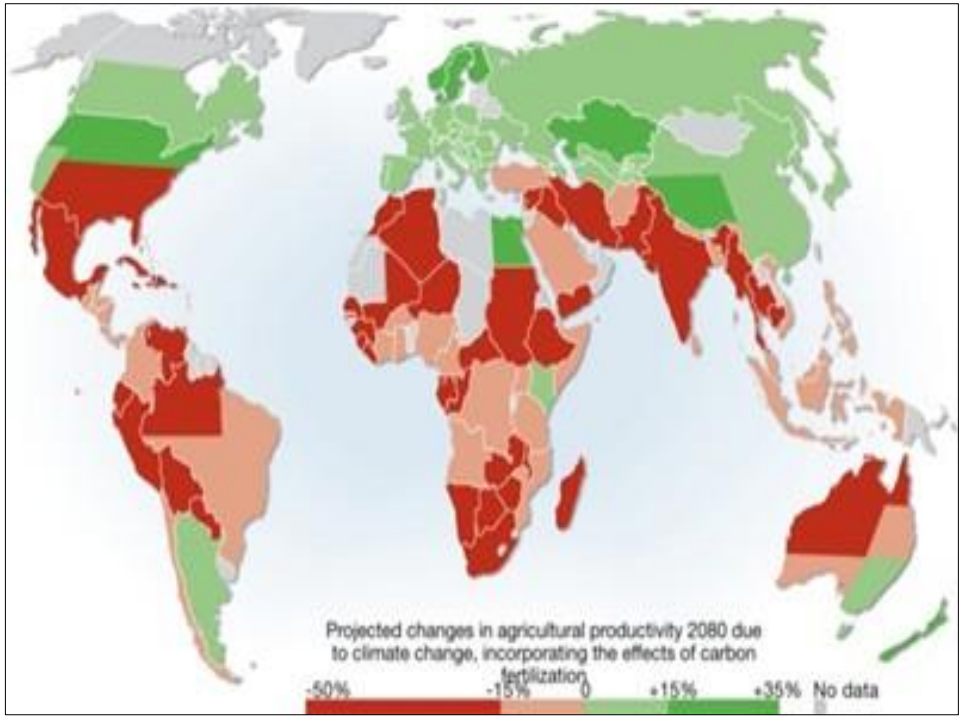
- The projected changes in climate variables (in temperature, precipitation and extreme events):
  - will alter the agricultural growing conditions in the region with resultant adverse effects agricultural activities

RELATIONSHIP BETWEEN WATER, CC & AGRICULTURAL PRODUCTIVITY

- Projected increases in water scarcities for agricultural and other uses in the S. Africa region affects agricultural productivity:
  - Reduced quantity, quality and distribution of water resources affect crop and livestock production activities especially for rainfed systems which constitute more than 95% of smallholder production activities in the Southern Africa region
  - Less and less water resources due to climate change means more areas become marginal and unsuitable for production for certain crops (e.g. the staple maize crop)
  - Flooding also results in crop and livestock production losses as well as destruction of transport and other food system infrastructure
  - The nutritional content of the crop and animal produce is also affected by reduced quantity and quality of water resources

IMPACTS OF CC ON AGRICULTURE

Projected changes in agriculture in 2080 due to climate change



Source: Hugo Ahlenius, UNEP/GRID-Arendal, http://www.grida.no/graphicslib/detail/projected-agriculture-in-2080-due-to-climate-change_15f0

- The IPCC FAR mentions without appropriate adaptation measures:
  - cereal yields in western and southern Africa could decrease by up-to 50 percent:
- Projected changes in climate will also affect other dimensions of food security e.g.
  - Quality of food
  - Prices of food

TYPES AND EXAMPLES OF AGRICULTURAL ADAPTATION STRATEGIES RELATED TO WATER RESOURCES - 1

TYPE OF ADAPTATION	EXAMPLES
Technological developments	**Resource management innovations:** • Develop water management innovations, including irrigation, to address the risk of moisture deficiencies and the increasing frequency of droughts • Develop farm-level resource management innovations to address the risk associated with changing temperature, moisture and other relevant climatic conditions
Government programs and insurance	**Resource management programs:** • Develop and implement policies and programs to influence farm-level land and water resource use and management practices in light of changing climate conditions
Farm financial management	**Household income:** • Diversify household income to address the risk of climate-related income loss

Source: Scott et al (2012) & Smit and Skinner (2002)

TYPES AND EXAMPLES OF AGRICULTURAL ADAPTATION STRATEGIES RELATED TO WATER RESOURCES - 2

TYPE OF ADAPTATION	EXAMPLES
Farm production practices	• **Farm production:** diversify crop and livestock types and varieties to address environmental variations and economic risks associated with climate change • **Land use:** use alternative fallow and tillage practices to address climate-related moisture and nutrient deficiencies • **Irrigation:** implement efficient irrigation practices to address the moisture deficiencies associated with climate change and reduce the risk of income loss due to recurring droughts • **Timing of operations:** change farm operation timing to address the changing duration of growing seasons and associated changes in temperature and moisture

Source: Scott et al (2012) & Smit and Skinner (2002)

CONCLUSION/ RECOMMENDATIONS

- CC will worsen local production conditions affecting agricultural productivity in Southern Africa and there is urgent need for action e.g.:

  - Improve information dissemination regarding short-term projected changes in climatic variables (temperature, precipitation and extreme events) to help farmers plan appropriately

  - Improve sustainable management and efficiency of use of natural resources (such as water)

  - Address barriers to adaptation to facilitate use and adoption especially by smallholder farmers in the region

Thank You!