Climate change and the future for agriculture in the Western Cape: a key role for agricultural extension services

Prof Stephanie Midgley - ACDI/UCT Extension Symposium, 14 July 2016
South Africa: climate crisis 2015-2016

- 2015-2016: Worst drought in many decades, high temperatures
- Induced by El Niño and compounded by climate change
- Climate change expected to bring more of this
Revived urgency – earth’s temperature rise could reach $1.3(+/-0.3)^\circ C$ in 2016.
Responding to Climate Change in the Agricultural Sector - SmartAgri

- Urgent action needed in the agricultural sector to adapt to the unavoidable impacts of climate change, and reduce its greenhouse gas (GHG) emissions
- SmartAgri – a joint initiative between DoA and DEA&DP
The SmartAgri Plan

- Western Cape Agricultural Sector Climate Change Framework and Implementation Plan – launched on 17 May 2016

- The SmartAgri Plan builds on the Western Cape Climate Change Response Strategy (WCCCRS 2014) – first sectoral response framework and plan

- It presents the “road map” for the agricultural sector of the WC to travel towards a more productive and sustainable future, despite the uncertainties around specific climate projections

- Everyone in the sector has a role to play – *Extension Services has a particularly important role*
The SmartAgri Plan 2016

www.greenagri.org.za
X16 BRIEFS: for example

Brief for the Grain and Livestock Sector: Swartland and greater West Coast region

www.greenagri.org.za
X6 CASE STUDIES:

1. FruitLook
2. Conservation agriculture
3. Smallholder farming
4. Disaster risk reduction & management
5. (Peri-)urban agriculture
6. Renewable energy

www.greenagri.org.za
SmartAgri agro-climatic zones

1. Bokkeveld
2. Bo-Langloof - Outeniqua
3. Breede
4. Cape Town - Winelands
5. Cederberg
6. Grabouw - Villiersdorp - Franschoek
7. GrootBrak-Plett
8. Hardeveld/ Sandveld-north
9. Hex
10. Knersvlakte
11. Koup
12. Little-Karoo
13. Montagu-Barrydale
14. Mossel Bay-Herbertsdale
15. Nelspoort
16. Olifants irrigation
17. Piketberg
18. Rooikaroo-Aurora
19. Rôens-East
20. Rôens-West
21. Sandveld-South
22. Swartland
23. Tankwa-van Wyksdorp

Developed by M. Wallace, Western Cape Department of Agriculture.
Changes in maximum temperature: 2050
Additional number of hot days $>36{^\circ}C$: 2050
Rainfall changes: 2050
### Local context: key compounding influences

<table>
<thead>
<tr>
<th>WEST COAST Grain &amp; Livestock</th>
<th>OVERBERG Grain &amp; Livestock</th>
<th>SOUTHERN CAPE Dairy &amp; regional commodities</th>
<th>KLEIN KAROO Mixed farming</th>
<th>CENTRAL KAROO Livestock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy crisis</td>
<td>Input cost</td>
<td>Water infrastructure</td>
<td>Climate Risk (drought, heat wave)</td>
<td>Predators</td>
</tr>
<tr>
<td>Pastures</td>
<td>Water management</td>
<td>Farming practices (soil/pasture)</td>
<td>Aliens</td>
<td>Rainfall (intensity, amount, distribution)</td>
</tr>
<tr>
<td>Predation</td>
<td>Commodity prices</td>
<td>Land use competition (urbanisation, land reform)</td>
<td>Soil erosion/ overgrazing</td>
<td>Overexploitation of groundwater</td>
</tr>
<tr>
<td>Sk theft</td>
<td>Technology –new &amp; improved</td>
<td>Environmental Risks</td>
<td>Pollination</td>
<td>Government (taxes, support)</td>
</tr>
<tr>
<td>Water supply and management</td>
<td>Research</td>
<td>Markets and prices</td>
<td>Water infrastructure &amp; management</td>
<td>Financial costs of inputs</td>
</tr>
<tr>
<td>Social &amp; political (new farmers)</td>
<td>Responses to customer needs</td>
<td>Access to resources (financial)</td>
<td>Guidance/legislation</td>
<td>Infrastructural degradation</td>
</tr>
<tr>
<td>Biological diversity</td>
<td>Natural resources management</td>
<td>External influences (labour, legislation, electricity supply)</td>
<td>Energy</td>
<td>Labour (trust, productivity, laws)</td>
</tr>
<tr>
<td>Price/ economic viability</td>
<td>Limited farming options</td>
<td></td>
<td>Diseases</td>
<td>Fracking</td>
</tr>
<tr>
<td>Soil degradation (limitation b/c of soil type)</td>
<td>Politics/policy &amp; land reform/expectations</td>
<td></td>
<td>Labour</td>
<td>Land use change (farming to conservation, reduced production)</td>
</tr>
<tr>
<td>Natural hazard (fire, drought, disease)</td>
<td>Skills development</td>
<td></td>
<td>Finance &amp; land availability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The risks and impacts of climate change will not be the same everywhere

While agriculture is highly sensitive to climatic fluctuations, the impacts of future climate change will differ widely from place to place.

The scale of the impacts will depend on:

- Local farming systems
- Commodities
- Natural resources
- Socio-economic situations
- in combination with the expected climatic changes
Climate change and field crops, horticultural crops and livestock

- Impacts differ between production regions, species/breeds/cultivars, farms, and within-farm
- Differences between irrigated and dryland production
- Impacts escalated by multiple stressors
- Multi-year impacts (perennial crops, herd re-building, veld recovery)
- Climatic hazards: frequency, intensity, duration, recovery, sequence of events
IMPACTS

Fertility

Condition of grazing

Feed supply & price

Water supply & quality

Growth & development

Meat quality

Health management
Phenology & growth

Reproductive processes

Product quality

Irrigation needs

Pests, diseases, weeds

Floods, hail, heat, frost, wind storms

Conditions in spring & at harvest

IMPACTS
SmartAgri Plan: A key role for agricultural extension services

- Priority Projects #6 and #1
- Other short and longer term actions by and for extension services
The “Priority Projects” have been prioritised by a range of stakeholders and are supported by the current scientific understanding of urgent actions needed.

A number of the projects will link with key provincial strategic projects over the next five years and can thus benefit from existing high levels of support and resourcing.

Jointly these projects will accelerate the implementation of the SmartAgri Plan.
Priority Project 6: An integrated knowledge system for climate smart agricultural extension

**Purpose:** To empower the agricultural (and related conservation) extension and advisory system to become the first port of call for farmers requiring relevant information and decision-support on climate smart agricultural practices and technologies.

**Climate change adaptation & mitigation benefits:**

Effective adaptation and mitigation responses require a trustworthy knowledge system that is science-based, technically and financially sound, and does not have unintended negative consequences. Extension officers can ideally provide access to such climate smart knowledge in a practical and context-specific manner.
Priority Project 6: An integrated knowledge system for climate smart agricultural extension

Objectives:

• Mainstream climate change into the provincial agricultural extension services through training and skills development, and the provision of decision tools

• Tailor and package climate change impacts and response information to agri-workers and farmers at all scales and for specific areas, for use in extension activities

• Include climate and impacts related monitoring in farmer record-keeping training for smallholder and new commercial farmers
Priority Project 6: An integrated knowledge system for climate smart agricultural extension

The key areas in which extension officers can promote climate smart agriculture include:

(i) **raising awareness** and brokering knowledge on issues of climate change relevant to farming risks and practices in the specific agro-climatic zones;

(ii) encouraging farmers to adopt tried and tested **technologies** for adaptation and mitigation, and to adopt improved methods of sustainable farming;

(iii) helping to build resilience capacities among vulnerable farmers and farming communities, including efforts to improve **household food security** through the establishment of sustainable home and community food gardens;

(iv) encouraging the **wider participation** of all stakeholders in addressing climate change risks and opportunities across the whole province;

(v) informing farmers of **opportunities** in niche crops and markets, the green economy, agri-processing and agri-tourism, as means to build climate resilience through diversification;

(vi) providing the **conduit for shared learning** on local climate change risks and responses between farmers and institutions.
Priority Project 6: An integrated knowledge system for climate smart agricultural extension

- Extension officers can also play a very important role in encouraging **on-farm record-keeping** (e.g. recording of daily weather, pests and diseases, crop yields, and losses attributable to climate events; and recording of success stories relating to adaptation and mitigation), as well as **systematic monitoring on farms** to better understand the effect of climate smart practices and for early identification of changes and tipping points.

- Extension officers can also assist farmers in conducting a **carbon footprint assessment**, and guiding them to reducing their greenhouse gas emissions and energy costs.

- **Strength:** Elements of sustainable agriculture, resource-use efficiency and good record-keeping are already included in the agricultural extension programme – make the link to climate change response.
Purpose: To create conditions that encourage the adoption of CA principles across the province.

Climate change adaptation benefits:
- CA decreases wind and water erosion, siltation, soil temperature, and soil water evaporation. CA increases soil water-holding capacity, beneficial soil micro-organisms, soil fertility, and profitability.

Climate change mitigation benefits:
- CA increases the ability of soils to sequester (absorb and fix) carbon, and reduces GHG emissions through a reduction in the use of diesel and fertiliser.
Priority Project 1: Conservation Agriculture for all commodities and farming systems

- Increase the spatial extent of CA practices through awareness, education, training and extension activities.
- Mainstream CA into the curricula of agricultural courses at secondary and tertiary level and to extension services courses.
Other actions by and for extension services

Provide easy access to information products relating to climate change and agriculture:

Maintain and promote a credible, accessible, user-friendly and up-to-date information portal for a climate-resilient agricultural sector, with links to other sectoral and private portals

www.greenagri.org.za
Incentivise proactive climate change disaster risk reduction:

Provide tried-and-tested local knowledge and guidance on good financial management to survive bad years

- Collate and disseminate regional-specific tried-and-tested local knowledge regarding good financial management for surviving bad years, and develop regional-specific guidelines
- Extension officers use the guidelines to advise smallholder and new commercial farmers on good financial management for proactive disaster risk reduction
Concluding remarks

• The SmartAgri Plan presents an exciting challenge to the Western Cape’s agricultural extension services.

• A “climate smart extension” is highly prioritised by all stakeholder groups across the province; there is a real on-the-ground need.

• The service’s focus on smallholder and new commercial farmers fits well with helping those most vulnerable to the impacts of climate change; however, linkages with the commercial sector will provide the opportunity for shared learning and greater impact.
Thank you

www.greenagri.org.za