The use of rainfall forecasts to assist in small-scale farming decisions: case study of Limpopo and Mpumalanga Provinces, South Africa

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Presentation layout

• Introduction
• Methodology
• Results
• Achievements and challenges
• Acknowledgements
Introduction

- Previous studies (Landman&Mason, 1999; Reason & Mulenga, 1999; Reason et al. 2005) has shown that northern and eastern parts of South Africa are influenced by ENSO phenomenon

In El niño
- seasonal rainfall is severely reduced impacting negatively on maize productivity
- *Onsets of rainfall becomes late*
- *Extremely low rainfall*
- *Water requirements of maize mostly not met*

In La Niña years
- *Seasonal rainfall above normal*
- *Onsets setting early resulting to long rainy season*
- *Floods impacting negatively on maize productivity*
- *Water requirements of maize not fully met*

- Main observation
- *The extreme weather events like seasonal dry spells has intensified recently even in above normal rains*
Introduction

- Drought is the most limiting factor to productivity in most parts of South Africa
- Food insecurity in southern Africa is attributed to this agroclimatic hazard
- The most vulnerable group is the poor-resourced farmers residing in rural areas.
- These farmers have the following characteristics
  - They practice subsistence farming
  - They farm on marginal lands (poor soils, shallow etc)
  - They don’t have access to insurance
  - Mostly extended families
  - No access to any credit facility
Introduction

• Project proposed in 2003
  *Adapting day-to-day management of subsistence and small scale farming to weather and climate forecast to reduce drought risk*

• Aim
  - To enhance agricultural productivity in the subsistence farmer sector through use of climate forecasts and climate information

• *The main goal of the response farming project is:*
  - To help improve food security in poor rural communities by helping farmers to better manage agroclimatological risks associated with dryland farming.
Introduction

• **Main objectives of the project**
  - To help farmers reduce the impact of agroclimatological risks on their productivity through the use of agrometeorology information
  - To develop a mechanism of disseminate weather and climate forecasts to the farmers to support their daily activities
  - To advice the farmers on the day-to-day management of the fields based on the weather and climate information
Introduction

Long-term mean Seasonal Rainfall

Legend
- towns
- province_wgs
- district_municipal

Average seasonal Rainfall
- < 300
- 301 - 400
- 401 - 500
- 501 - 600
- 601 - 700
- > 700
## Farmers-Limpopo

<table>
<thead>
<tr>
<th>Village</th>
<th>Farmer/community farmers</th>
<th>Extension officer</th>
<th>Estimate no of farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rathidili</td>
<td>Mr Mposhomali</td>
<td>Mr Netshifhere</td>
<td>1</td>
</tr>
<tr>
<td>Makhitha</td>
<td>Mr Ramovha</td>
<td>Mr Mudau</td>
<td>1</td>
</tr>
<tr>
<td>Njakanjaka</td>
<td>Mr Shirindza</td>
<td>Mrs Rose</td>
<td>1</td>
</tr>
<tr>
<td>Makhasa</td>
<td>Community garden</td>
<td>Mr Sibiya</td>
<td>15</td>
</tr>
<tr>
<td>Caledon</td>
<td>Community garden</td>
<td>Mr Mayimele</td>
<td>20</td>
</tr>
<tr>
<td>Mashamba</td>
<td>Mrs Madia</td>
<td>Mr Mashau</td>
<td>1</td>
</tr>
<tr>
<td>Mashamba Mufeba</td>
<td>Mrs Ramalumisi</td>
<td>Mr Mashau</td>
<td>1</td>
</tr>
<tr>
<td>Mashamba Tshivhuyuni</td>
<td>Community garden</td>
<td>Mr Mashau</td>
<td>4</td>
</tr>
<tr>
<td>Vuwani</td>
<td>Community garden</td>
<td>Mrs Mufamadi</td>
<td>6</td>
</tr>
<tr>
<td>Vyeboom</td>
<td>Community garden</td>
<td>Mrs Mufamadi</td>
<td>14</td>
</tr>
<tr>
<td>Malonga</td>
<td>Community garden</td>
<td>Mrs Mudau</td>
<td>9</td>
</tr>
<tr>
<td>Malonga Makhuvha</td>
<td>Mr Mulaudzi</td>
<td>Mrs Mudau</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6 individual farms, 6 community farms</strong></td>
<td></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>
# Farmers-Mpumalanga

<table>
<thead>
<tr>
<th>Village</th>
<th>Farmer/community farmers</th>
<th>Extension officer</th>
<th>Estimate no of farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazyview</td>
<td>Andrew</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Hazyview West</td>
<td>Alfred</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Hazyview</td>
<td>Joyce</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Lepongh</td>
<td>Maboza</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Mpeneyatsatsi</td>
<td>Raephy</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Numbi</td>
<td>Frank</td>
<td>Bob Hlongwane</td>
<td>1</td>
</tr>
<tr>
<td>Paola</td>
<td>Susan</td>
<td>Bob Hlongwane</td>
<td>1</td>
</tr>
<tr>
<td>Rooiboklaagte</td>
<td>Galina</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8 sites</strong></td>
<td></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>
Farmers

Caledon
Farmers

Mashamba
Farmers

Mashamba Mufeba
Farmers

Mashamba Tshivhuyuni
Farmers

Vuwani
Farmers

Vyeboom
Farmers

Malonga Mukhuvha
Farmers

Malonga
Training workshops

- Two training workshops for the farmers
  - Farmers Day 2008
  - Farmers Day 2009
- One training workshop for the extension officers
  - 2008
- Combined Final farmers workshop at Haizyview
Installation of rain gauges

• Rain gauges were installed at all the farmers plots.
Soil sampling and analysis

• Soil sample taken before the start of the season
• Samples were taken from the top soil to access the fertility
• Samples were also taken to determine the water holding capacity of the soil and profile characteristics
Planting and other activities

- Most activities (Planting, weeding, harvesting etc) done by hand
Seasonal forecasts

- Seasonal forecast and its implications was conveyed to the farmers & extension officers before the start of the season
- Monthly updates were also communicated during meetings/workshops
weather forecasts

- 2 weeks rainfall forecast is obtained daily in 3 categories probability > 1mm (light rainfall), > 5mm (medium rainfall) and > 20mm (heavy rainfall)
Farmers advisory

The main output for the project is Coded forecasts send via SMS
-Recommendations done in collaboration with extension officers
  The forecasts contain 4 parts
  1. Dates of the forecast
  2. Weather types (e.g. cloudy)
  3. Rainfall probabilities
  4. Recommendations

14-day Weather Forecast for Limpopo Province Lowveld
F= 21 SSMTWT

Lim ppppccp
>1 5343345
2w 8889889
>5 1111111
2w 77798878
>20 1111111
2w 56676656
Rec: prepare to plough next week.
Drought monitoring

Mashamba field

Rainfall/Evapotranspiration (mm)

Rain 07_08, Rain 08_09, Eto 07_08, Eto 08_09

Graph showing Dekadal Rainfall/Evapotranspiration (mm) from Sept_1 to May_3.
Drought monitoring
Mashamba 2008/09

Actual Planting dekad

Seasonal Rainfall/Crop water requirement

Yield 1.7tons/ha

Crop water Requirements  Seasonal Rainfall  Final WRSI  Dekads with water deficit
Achievements of project

Survey conducted during the lifetime of the project and at the conclusion of the project showed farmers improved in the following areas:

- Planning of agricultural activities
- Improvement in record keeping
- Increased understating of climate and environmental factors/issues
- Improvement in agronomic practices
- Good adoption of use of climate forecasts
- Improvement in yield in most places
Challenges-technical

1. Accuracy of seasonal forecast issued
2. Resolution of the medium forecast maps very low
3. Verification processes show low forecast skill beyond 8 days except in cases of major synoptic systems
Challenges - farmers

1. Literacy level variation
2. Language barrier
3. Tractor unavailability
4. Delayed response due to distance
5. Commitment and responsibility towards farming in community farms
6. Conflicting use of Indigenous knowledge
7. Labour problems
8. Communication problem
Acknowledgements

• Government of France through FIRCOP funding
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• Provincial departments of Agriculture (Limpopo and Mpumalanga)
  ➢ Agricultural Extension officers
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