

# ADAPTABILITY AND ADOPTABILITY OF SOIL AND WATER CONSERVATION PRACTICES TO DERIVE BEST-BET OPTIONS FOR SMALLHOLDER FARMERS IN KWAZULU-NATAL



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# INTRODUCTION

- ▶ In South Africa over 70% of land surface impacted by soil erosion.
  - ▶ Soil nutrient depletion
- ▶ Smallholder farmers located in areas that are significantly under-resourced.
  - ▶ Poor soil conditions
  - ▶ Low and erratic rainfall
- ▶ South Africa has 3 million smallholder farmers (du Toit, 2011).

# OBJECTIVES OF THE STUDY

- ▶ To identify the SWC practices currently used by and available to the smallholder farmers.
- ▶ To determine the adaptation and adoption of SWC practices used by the smallholder farmers.
- ▶ To determine the best-bet options fitting to the socio-economic conditions of the smallholder farmers.

# SOIL AND WATER CONSERVATION PRACTICES IDENTIFIED



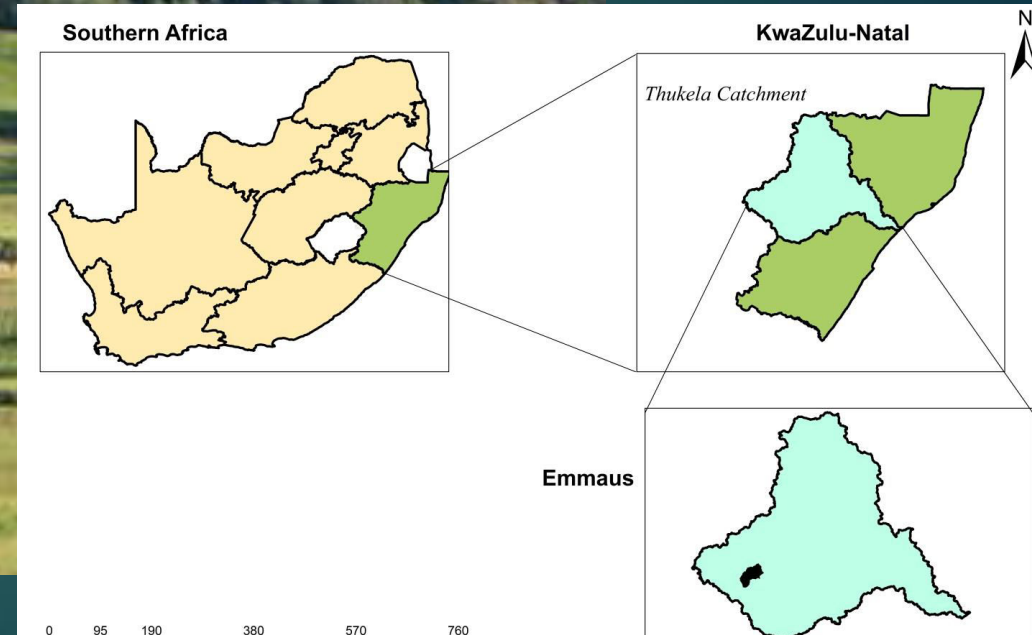
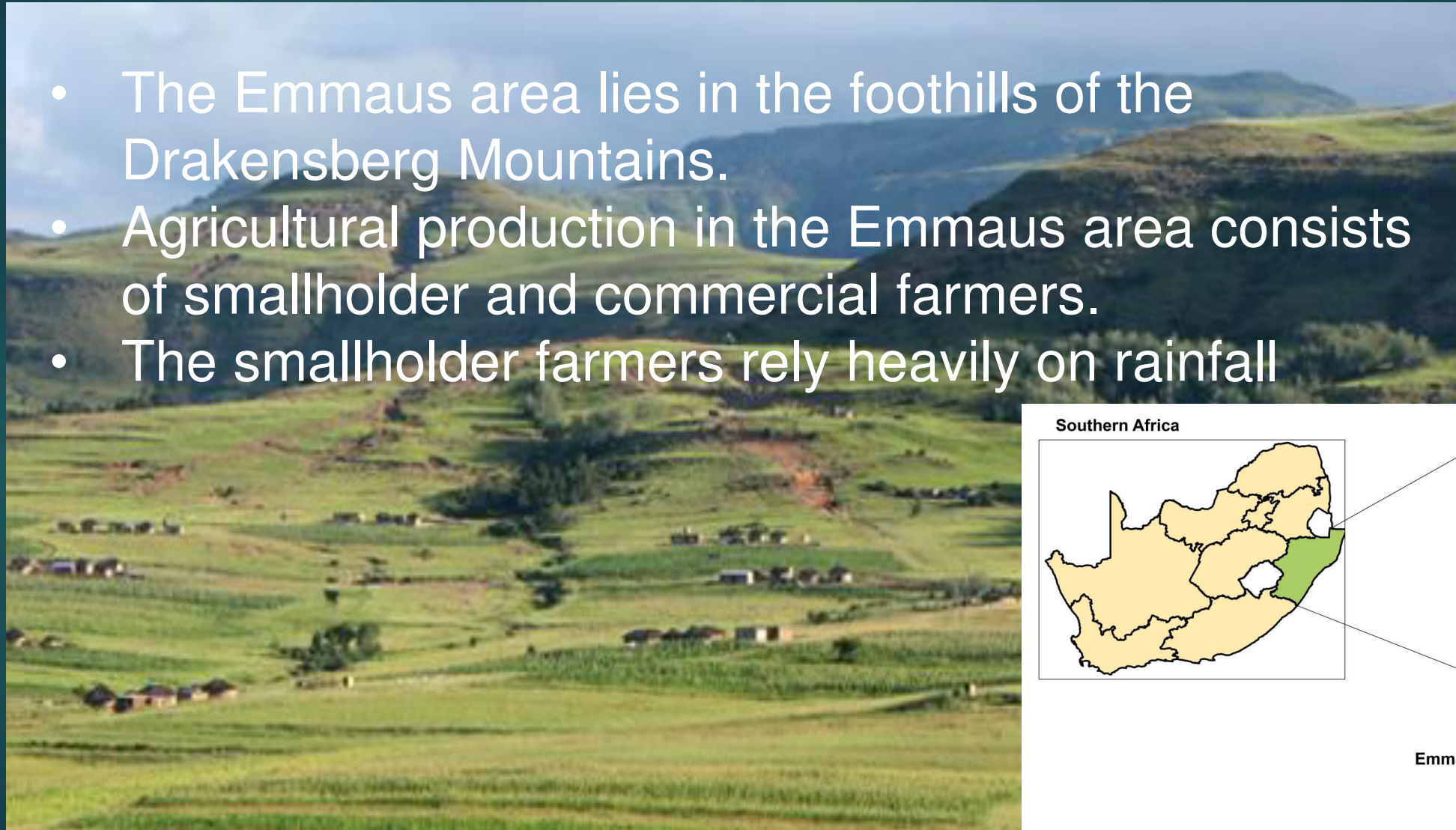
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ICRISAT spearheaded the development of planting basins

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# METHODOLOGY: STUDY AREA

- The Emmaus area lies in the foothills of the Drakensberg Mountains.
- Agricultural production in the Emmaus area consists of smallholder and commercial farmers.
- The smallholder farmers rely heavily on rainfall



# METHODOLOGY

- ▶ 300 smallholder farmers were interviewed.
- ▶ The farmers were randomly selected from 11 villages.
- ▶ Multinomial Logistic Regression Model used for adoption.
- ▶ Factor analysis used for adaptation.

# MODEL SPECIFICATION: ADOPTION

- ▶ The logit model of adopting a SWC practice  $P_i$  is the probability of a binary outcome.
- ▶ In the logit model (Maddala, 1992) the probability  $P_i$  distribution conditional on a vector  $\beta$  of covariates  $X_i$  is given by:

$$\ln [P_i/(1-P_i)] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}$$

$$P_i = \frac{1}{1+e^{-x_i'\beta}}$$

- ▶ The superscript  $i$  denotes the number of smallholder farmers observations in the sample.
- ▶ The  $\beta_i$  is the coefficient associated with the explanatory variables  $X_i$ .
- ▶ The  $\beta$  is the vector of the parameters.

# ADAPTATION : FACTOR ANALYSIS

- ▶ Principal Component Analysis as method for extracting factors.
- ▶ Kaiser-Meyer-Olkin Measure of Sampling Adequacy.
- ▶ Bartlett's Test of Sphericity.
- ▶ The Varimax rotation method was used.

# RESULTS: DESCRIPTIVES

<b>Variables</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Number of household members</b>	8	4.516
<b>Landholding size</b>	1.39	2.120
<b>Age</b>	50.71	14.181
<b>Years as a farmer</b>	18.99	11.744

# RESULTS ON ADOPTION (MINIMUM TILLAGE)

## Variables that are significant

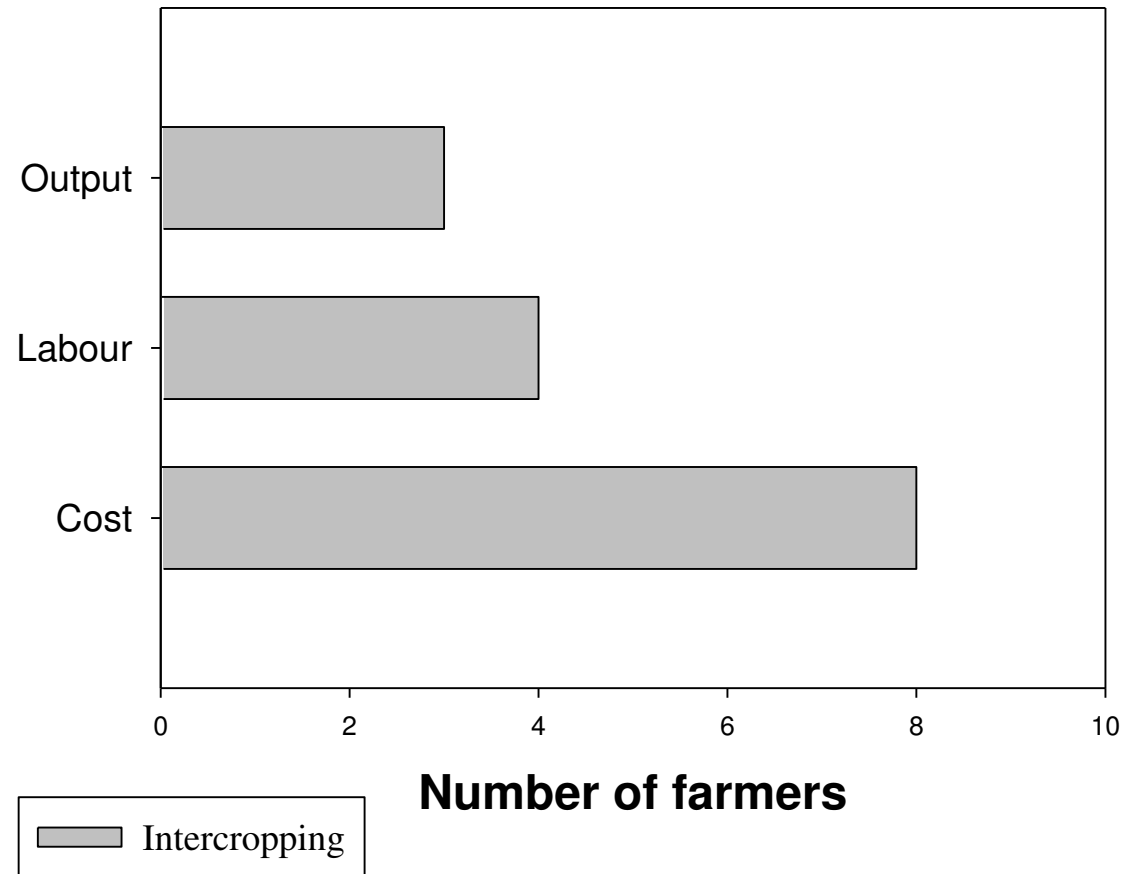
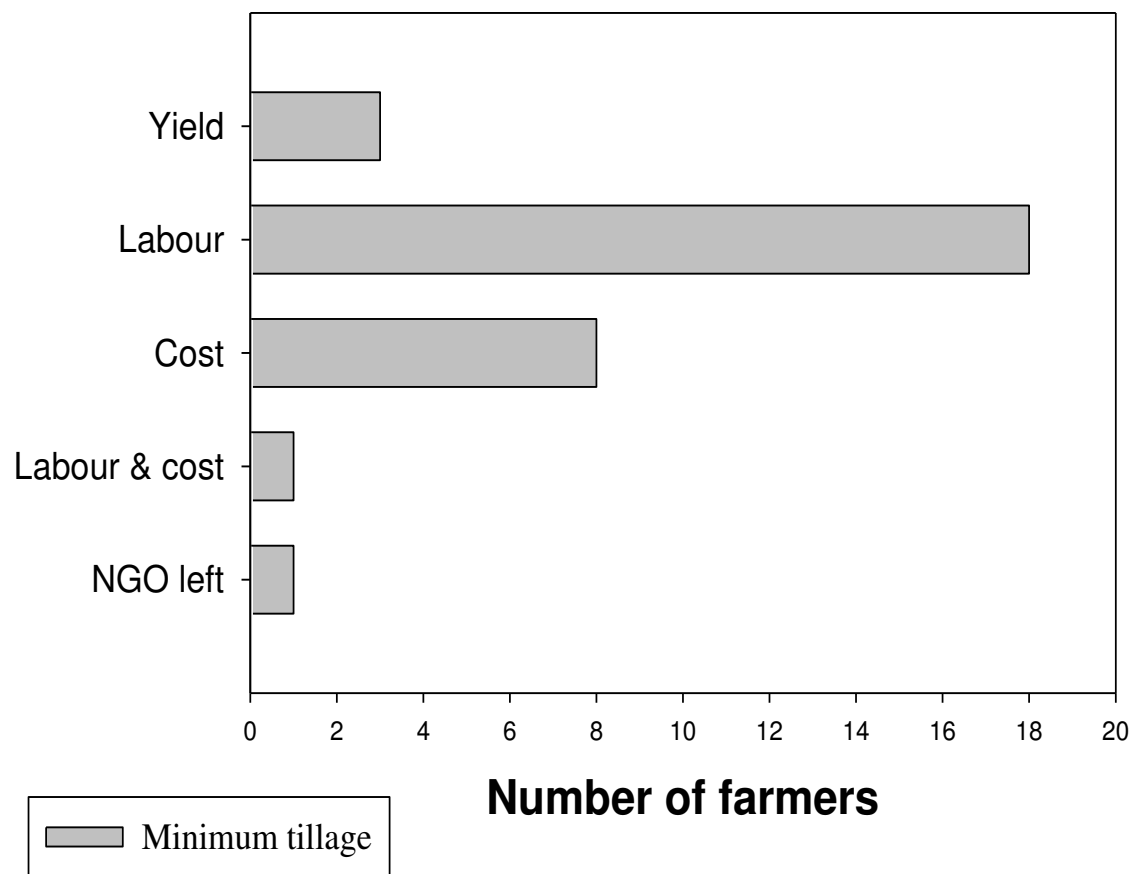
- ▶ Access and use of credit, negative effect (0.0001<sup>\*\*\*</sup>)
- ▶ Ownership of a home garden (0.0001<sup>\*\*\*</sup>)
- ▶ Number of household members, negative effect (0.05<sup>\*\*</sup>)
- ▶ Soil condition (0.05<sup>\*\*</sup>)
- ▶ Off-farm employment (0.10<sup>\*</sup>)
- ▶ Landholding size (0.10<sup>\*</sup>)
- ▶ The support of an extension officer (0.10<sup>\*</sup>)
- ▶ Fertilizer application (0.10<sup>\*</sup>)

# RESULTS ON ADOPTION (INTERCROPPING)

## Variables that are significant

- ▶ The support of an extension officer (0.0001<sup>\*\*\*</sup>)
- ▶ Ownership of a home garden (0.0001<sup>\*\*\*</sup>)
- ▶ Soil condition (0.05<sup>\*\*</sup>)
- ▶ Landholding size (0.05<sup>\*\*</sup>)

# REASONS FOR DIS-ADOPTION



# RESULTS ON ADAPTATION (MINIMUM TILLAGE)

	Component		
	1	2	3
Input costs		.834	
Adjustment costs		.799	
Divisibility			-.633
Profitability	.853		
Acceptability			
Observability	.877		
Satisfaction	.789		
Trialability			.508
Compatibility		-.533	
Cultural values	.655		

# RESULTS ON ADAPTATION (INTERCROPPING)

	Component		
	1	2	3
Input costs		-.824	
Adjustment costs		<b>-.862</b>	
Divisibility			<b>-.874</b>
Profitability	<b>.815</b>		
Acceptability	.755		
Observability	.861		
Satisfaction	.821		
Trialability			.702
Compatibility		.676	
Cultural values	.607		.

# CONCLUSION

- ▶ Key factors that determine adoption
  - ▶ Soil condition
  - ▶ Support of the extension officer
  - ▶ Ownership of home gardens
  - ▶ Landholding size.

# CONCLUSION

- ▶ Key factors that determine adaptation
  - ▶ Social conditions
  - ▶ Costs
  - ▶ SWC practice characteristics.

# CONCLUSION



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