SAF-ADAPT

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Climate Adaptation
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Partnership

RESEARCH BRIEF
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Investigating Weather Information Needs of Smallholder Farmers in the Eastern Cape Province of South Africa

Abenathi Mantshiyose

RESEARCH BACKGROUND

Smallholder farming plays a critical role in livelihoods, food security, and income across Africa. It is particularly significant in South Africa's Eastern Cape province which is home to the second highest number of smallholder farmers in the country and faces poverty rates of around 70.6%. Climate change threatens crop yields and smallholder farming in South Africa is further challenged by historical patterns of dispossession and impoverishment. Despite low productivity, smallholder farming holds the potential for reducing the vulnerability of rural households if the unique challenges faced by these communities can be addressed effectively.

Smallholder farmers in South Africa confront substantial challenges due to climate change, impacting food security, water resources, employment, and health. Reliance on rainfed agriculture makes them vulnerable to erratic rainfall patterns, amplified by the El Niño Southern Oscillation (ENSO). This is compounded by inadequate infrastructure, financial constraints, rural locations, illiteracy, and limited skills. Considering the diminishing efficacy of traditional indigenous knowledge, access to current weather information is crucial for effective farming practices.

PROJECT SUMMARY

This study investigates how to enhance the communication of weather information to farmers, focusing on improving the format, language, source, and frequency of the information to align with resilience-building efforts. Despite the availability of weather information, issues such as poor communication hinder its effective use by farmers.

KEY FINDINGS

- **Farmers primarily rely on TV and radio for weather information**, but these sources often provide generalised content with limited engagement, highlighting a need for more tailored and engaging communication methods.
- **Language barriers and varying education levels significantly impact the understanding and effective use of weather information**, underscoring the importance of using local languages and considering educational outreach.
- Farmers require **detailed and frequent updates on weather conditions**, including droughts and rainfall, with a preference for local language communication and increased access to internet-based information for younger farmers.
- Extension officers **need better training in weather information dissemination** to become more effective in their roles, with an emphasis on reliable sources and additional information on pests and diseases to support farmers, especially the elderly.

Weather information is vital for rainfed agriculture, aiding resource management and adaptation. Furthermore, timely weather and climate services (WCS) facilitate informed farming decisions. Tailored, frequent, and accessible weather information is crucial for minimising losses and enhancing adaptation strategies.

RESULTS

DEMOGRAPHIC PROFILE

Over 60% of the participants - 69% of which were female and 31% male – had over 10 years farming experience. 21% of participants had a matric qualification and 3% had tertiary education. Crop farming was the primary source of income for the farmers.

BASELINE WEATHER INFORMATION FARMERS RECEIVE AND ITS CHARACTERISTICS

Farmers primarily received rainfall (97%), temperature (97%), and heavy rain (34%) updates, with few receiving information on hailstorms and thunderstorms. Daily television (97%) and radio (67%) broadcasts were the main sources of weather information, with no farmers receiving weekly, monthly, or seasonal weather information from either of these sources.

Older farmers (35+) attributed limited use of weather apps to minimal internet, smartphone, and computer access as well as challenges with comprehension. All farmers younger than 35 reported using apps and the internet. Social networks also played an important role in disseminating weather information, with 21% of farmers receiving information from neighbours or through random social interactions. Many farmers still relied on indigenous knowledge, especially older generations, which influenced decision-making.

Farmers reported receiving weather information in map (97%), audio (55%), image (24%), and text (7%) format, with 66% receiving the information in more than one format. Information from maps and audio was mostly received in IsiXhosa (97%) – the most widely spoken language in the area. Information shared via apps was delivered exclusively in English, leading to difficulties with comprehension. While rainfall and temperature were perceived as crucial, other weather aspects like wind and hailstorms were less valued in decision-making.

PROBLEM STATEMENT

Weather information is crucial for farmers to understand extreme events and weather patterns, guiding farming practices and resilience strategies (Werndl, 2016). Despite available weather information, studies indicate that poor communication related to format, frequency, and language hinder its usefulness (Ncoyini *et al.*, 2022; Vaughan & Dessai, 2014; Fitt, 2014). User-centric communication processes are necessary for efficient utilisation. **This study aims to explore improved communication of weather information** in terms of its format, language, source, and frequency to improve comprehension and application, aligning with resilience building efforts (Lugen *et al*., 2018).

METHODS

The Eastern Cape province, known for its temperate forests, semi-arid coastlines, and diverse climate, faces significant challenges with poverty levels reaching up to 70.6%. Farming is the primary economic activity, especially in areas like Maclear, which focuses on sheep, goat, cattle, and maize farming, the latter heavily dependent on seasonal rainfall for local food security. Limited internet access, affecting 79.2% of the population, along with low employment and education rates, restricts access to essential weather information.

To address this, the study employed a mixed-methods approach, conducting interviews with twenty-nine smallholder farmers and three extension officers to capture a broad range of demographics and experiences. The study used both open-ended and closed-ended questions to collect qualitative and quantitative data on the weather information needs of the farmers and extension officers, with a mixed-methods analysis employed to interpret the findings comprehensively.

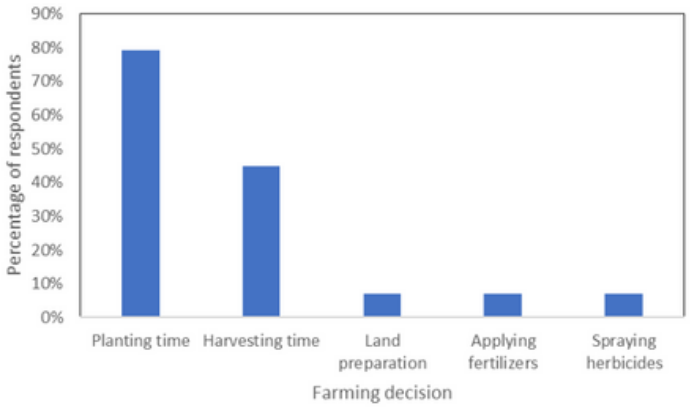

Figure 2. Farming decisions made by farmers from weather information they receive

WEATHER INFORMATION NEEDS OF FARMERS AND USE OF INFORMATION

Many farmers cited perceived inaccuracies (97%) and complexity as reasons for not using weather information, highlighting the need for training and downscaled information relevant to their local context. Farmers expressed a desire for more information on drought (83%), heavy rain (55%), and rain (21%) in IsiXhosa. In terms of source, 86% preferred the television while 24% favoured the radio. Only 7% of respondents – all young – reported preferring the internet as a weather information source.

Daily weather updates were preferred (79%) while 21% of farmers were interested in weekly information, 7% in seasonal information and 3% in monthly information. More long-term weather information was desired as it could inform planning in order to tailor farming practices to forecasted weather conditions.

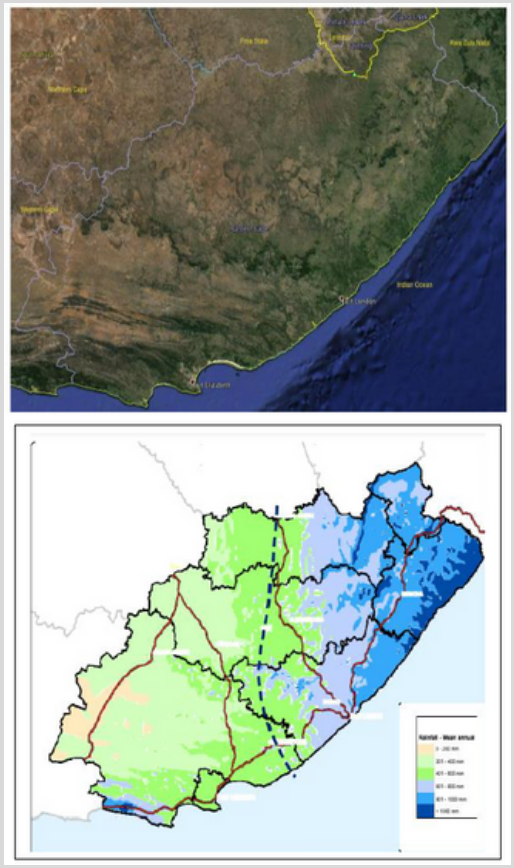

Figure 1. Satellite image of the Eastern Cape Province showing the southern and eastern borders (Source: Google Earth)(left) and the mean annual precipitation of the Eastern Cape province (Source: SAWS, 2012)(right).

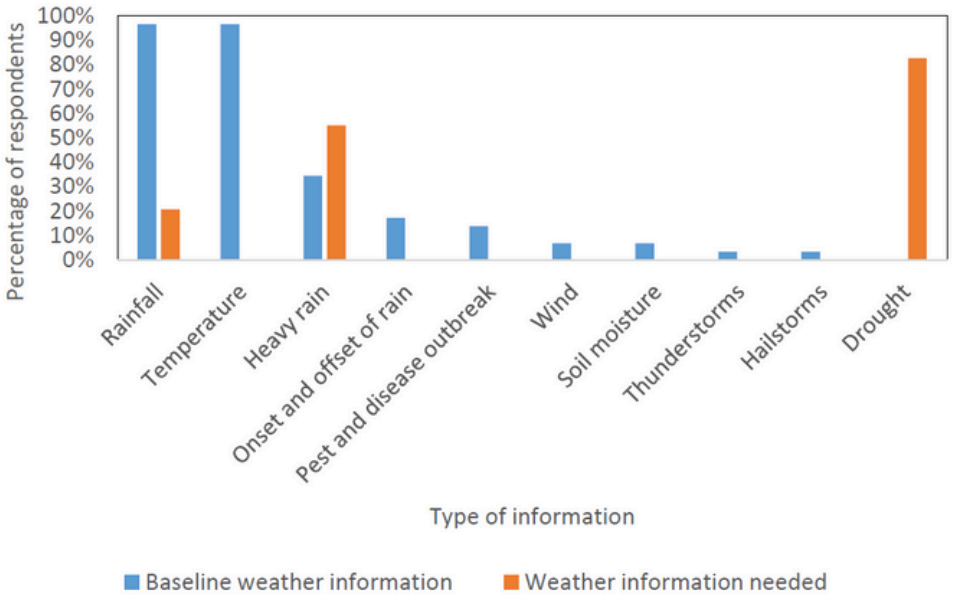

Figure 3. Comparison between the baseline weather information farmers receive and the weather information they need

AGRICULTURL EXTENSION OFFICERS' PERCEPTION OF FARMERS' AND EXTENSION OFFICERS' NEEDS

Extension officers confirmed farmers' need for drought and heavy-rainfall information. All extension officers received weekly updates in English from Disaster on rainfall, temperature, heavy rainfall, drought, and pet and disease outbreak information. They highlighted the need for long-term pest and disease outbreak information, citing an armyworm outbreak in 2021 that significantly impacted crops.

The officers appreciated the detail and credibility of information from Disaster, preferring maps and English language content for clarity. Similar to the farmers' suggestions, extension officers emphasised the importance of training to improve weather information comprehension for themselves and farmers.

	Weather information needed	Preferred source of information	Preferred format	Preferred frequency to receive information	Language	Decisions	Ways to improve use of weather information
Farmers	Drought & Heavy rainfall	Television & Agricultural extension officers	Maps & audio	Daily	isiXhosa	• Can help famers to be able to plan on time and prevemt crop and livestock losses • Can help farmers to know when to plant, and what to plant	Training farmers using their local languages
Agricultural extension officers	Drought & pest disease outbreak	Disatser from the Joe Gqabi Municipality district	Image & maps	Daily, seasonal & weekly	English & isiXhosa	To warn farmers and advise them	Training extension officers

Figure 4. Weather information needs and agricultural extension officers according to the perspective of agricultural extension officers

DISCUSSION

EFFICACY OF THE CURRENT SYSTEM

The accessibility of rainfall, temperature, and heavy rainfall information among farmers is mainly due to the widespread use of television and radio, despite their limited engagement and generalised content. Language barriers, linked to literacy levels, impede knowledge transfer. Limited access to seasonal forecasts and detailed rainfall data hampers informed decision-making, highlighting the need for localised, comprehensible weather information. Education levels, which reflect a gendered dimension due to patriarchal social constructs, strongly influence the understanding of weather information.

The frequency of communication is also crucial, with no farmers reporting receipt of seasonal weather information, which is essential for planning. Indigenous knowledge, used by farmers to predict weather, should be integrated into communication strategies. Farmers use weather information primarily for planting, harvesting, and land preparation, but concerns about its accuracy and reliability persist. Addressing perceived inaccuracies through targeted training can improve trust in forecasts. The challenge of scale, with weather information often sourced from distant locations, exacerbates uncertainty and unreliability. The language, source, format, frequency, and localisation of weather information significantly impact farmers' comprehension and use, necessitating efforts to improve these factors to support smallholder farmers' decision-making effectively.

IMPROVING THE CURRENT SYSTEM

Farmers identified the need for weather information on droughts, heavy rainfall, and general rainfall to support adaptation strategies like rainwater harvesting. They preferred daily updates along with weekly, monthly, and seasonal information. While TV and radio are popular due to accessibility, younger farmers favour internet-based information, highlighting the importance of promoting internet access in rural areas and providing training for efficient information access. Age and education levels influence technology adoption, and farmers overwhelmingly prefer weather information in IsiXhosa, reflecting local language demographics and enhancing the information's usability and impact.

THE SPECIFIC ROLE OF AGRICULTURAL EXTENSION OFFICERS

Extension officers noted that farmers mainly get weather information from television, radio, weather apps, and neighbours, rather than from the officers themselves, indicating a gap in their role as key information providers. This inefficiency is due to inadequate training in weather information use and comprehension, leading to misinterpretation of forecasts and a lack of coping strategies for extreme weather events, as well as logistical issues like transportation constraints. Extension officers expressed a need for more information on pests and diseases and highlighted a preference for English due to their higher education levels. While officers prefer reliable sources like Disaster for weather information, engaging them in training programs could enhance their understanding and communication of weather information, addressing the communication gaps identified by both officers and farmers, particularly benefiting elderly farmers who need help accessing weather information.

KEY RECOMMENDATIONS

This study aimed to identify the weather information needs of smallholder farmers in South Africa's Eastern Cape province. Farmers heavily rely on weather information - especially regarding rainfall, heavy rainfall, and temperature - for critical farming decisions like planting, harvesting, and pest management. However, the lack of seasonal weather information poses challenges to effective planning.

Enhance training and communication

Train extension officers comprehensively to improve their understanding and communication of weather information, addressing gaps particularly for elderly farmers.

Improve weather information systems

Provide diverse, timely weather updates, including drought information and downscaled local forecasts, in easily comprehensible formats and local languages.

Integrate indigenous knowledge

Recognise and incorporate indigenous knowledge in weather prediction and decision-making, leveraging its social nature for better forecast dissemination.

Increase resource allocation

Address logistical and resource challenges, such as transportation constraints, to enable extension officers to effectively support farmers in remote areas.

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Corresponding author: Abenathi Mantshiyose (abenathimantshiyose@gmail.com) or **FIND THE THESIS HERE**

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