

Interventions to improve food security in a changing climate in Southern Africa

Working Paper

February 2021

Author names

Dr Meghan Bailey, Senior Technical Advisor, Red Cross Red Crescent Climate Centre

Dr Evan Easton-Calabria, Independent consultant

Busiso Moyo, Independent consultant

Stephen McDowell, Technical Advisor, Red Cross Red Crescent Climate Centre

Dorothy Heinrich, Technical Advisor, Red Cross Red Crescent Climate Centre

Andrew Kruczkiewicz, Technical Advisor, Red Cross Red Crescent Climate Centre

Table of Contents

| | |
|---------------------------------------------------------------------------------------------------------------------------|-----------|
| INTRODUCTION..... | 3 |
| OVERARCHING RESEARCH QUESTIONS | 3 |
| METHODOLOGY | 4 |
| DATA COLLECTION AND TOOLS | 5 |
| CLIMATE MODEL REVIEW | 7 |
| LITERATURE REVIEW | 8 |
| RESULTS..... | 15 |
| CURRENT AND PROJECTED CLIMATE TRENDS PER CLIMATIC ZONE IN THE SOUTHERN AFRICAN REGION..... | 15 |
| REVIEW OF FOOD SECURITY INTERVENTIONS AND PRACTISES | 17 |
| DISCUSSION | 20 |
| CONCLUSION | 29 |
| RECOMMENDATIONS..... | 32 |
| ANNEXES | 35 |
| ANNEX 1. ANALYTICAL FRAMEWORK FOR EXAMINING INTERVENTIONS AND PRACTISES AIMING TO INCREASE FOOD SECURITY | 35 |
| ANNEX 2. IDENTIFIED INTERVENTIONS..... | 36 |
| REFERENCES..... | 37 |

Introduction

Although approximately 64 percent of the world's poor work in agriculture today (UN 2017), food insecurity prevails around the world. Socioeconomically, southern Africa¹ represents one of the world's poorest and most food insecure regions. Between them, the countries of Southern Africa represent roughly one-tenth of the people that Paul Collier refers to as the world's 'bottom billion': the share of the global population that is effectively decoupled from overall global progress (Collier 2007). It is they who will be hit first and hardest by climate change as it continues to progress. Food insecurity persists in the region due to multiple drivers, including chronic unfavourable weather conditions and extreme weather events. Among the members of the population who will suffer from changing weather patterns and extreme weather events are smallholder farmers, who must adapt farming techniques and in cases even seek alternative livelihoods if their crop production fails or reduces.

This paper explores food security in the changing Southern African climate. The report reviews existing programmatic approaches and consults a variety of experts to critically analyse options for improving household level food security in the region – both under current weather-related stressors and expected future climatic conditions. It aims to increase the Finnish Red Cross' (FRC) institutional understanding and learning on effective and relevant climate resilience programming by identifying tools, practices, and approaches that increase household/community food security and resilience to weather-related challenges such as drought. This report focuses specifically on the ten countries of Southern Africa - Angola, Botswana, Eswatini (formerly Swaziland), Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. These were selected in part due to the FRC's key partner National Societies in the region (Baphalali Eswatini Red Cross Society, Malawi Red Cross Society and Zimbabwe Red Cross Society).

Overarching research questions

- 1) *How well have/can community capacity building efforts strengthen community resilience in terms of sustainable food security?*

- 2) *What existing community food security/resilience tools and practices (primarily in the region but also in Sub-Saharan Africa more broadly) would be most effective in terms of climate change adaptation?*
 - 2.1) *Which of the tools and practices would be suitable, relevant and compatible with the Red Cross strengths and ways of working (e.g. established network of community-based volunteers)?*

¹ The International Federation of Red Cross and Red Crescent Societies defines the Southern Africa region as comprising 10 countries: Angola, Botswana, Eswatini (formerly Swaziland), Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe.

The following section provides an overview of methodology, followed by results from literature reviews, climate profiles and projections, and project searches. These are followed by a discussion of key themes identified in the research, and a conclusion summarising answers to the research questions. The report concludes with practical recommendations for the Finnish Red Cross as it explores potential areas of food security work in Southern Africa. Please note that much of the detailed information on country climate overviews and projections, as well as specific information on reviewed projects, can be found in the annexes.

Methodology

This research study is exploratory, seeking to find recommendations on the impact of climate change on rural households within the Southern Africa Development Community (SADC) region. The research uses purposive sampling, defined as the selection of cases that best enable researchers to explore the research questions in-depth (Matthews & Ross 2010: 154). A purposive sampling approach assists finding and identifying relevant participants and stakeholders with an understanding of household-level interventions within the rural settings of the region, and primarily stakeholders active in regional and national food security networks. With the aid of the research project steering group, a force-field analysis was carried out to identify relevant stakeholders and participants. Recruitment was initiated through formal letters of invitation to individuals, and the heads of departments and organisations.

Research approach

This study takes a qualitative research approach, which seeks to acquire specific information about the values, opinions, behaviours and social contexts of particular populations (Neuman 1994, Creswell 2003). A qualitative research approach allows for the provision of rich substantiated experiences and data (Mouton, 2001); in this case enabling researchers to better understand programmes addressing the impact of climate change on rural households and their farming activities within SADC. It also offers opportunities to gather data on the efficacy and impact of interventions and approaches, and in the case of this study understand the value of their being replicated or engaged with in the Red Cross context (see analytical framework in Annex 1).

While the qualitative research approach has been criticised for time-consuming data collection and analysis (Hancock 1998), it enables the generation of evidence that may not exist elsewhere. While there is a risk that knowledge obtained from this method may not generalize to other people but only those included in the study (Hancock 1998), identifying established experts in the field (which can include informed members of communities as well as formally educated experts) can mitigate this risk and justifies the careful selection of interview informants.

Research paradigm

Patton (1990) refers to paradigm as a worldview, a general perspective, and a way of breaking down the complexity of the real world. In other words, paradigms are used to define how the world works, how knowledge is extracted from the world and how one is to think, write and talk about knowledge (Dills & Romiszowski 1997). Creswell (2003) argues that depending on the objectives and questions of the study, researchers may use different paradigms. For this research, the authors adopted an 'interpretivist paradigm'. This paradigm is selected as the research was primarily concerned with identifying worthwhile interventions addressing food security taking place at the household-level within rural communities, with a particular focus on the expected impacts of climate change on different types of interventions. This information was ascertained through the use of a semi-structured interview key to guide conversations with participants. The 'interpretivist paradigm' focuses on the participants' or respondent's interpretation of the phenomenon in question, making the approach subjective (Gerber 2016).

Data collection and tools

The study relied on the use of both primary and secondary sources for data collection, namely key informant interviews and desk-based project searches. This combination of methods was chosen due to the limited publicly available evidence of impact, or of evaluations themselves, on relevant interventions. To this end, key informant interviews offered a means to 'chart' general trends in food security in SADC and international organisational approaches, as well as highlight the current and potential risks they entail. Secondary desk-based research offered the primary means to identify interventions, but findings offered very little robust evidence of impact.

Sources and data

People: (Key Informant Interviews) Participants' experiences and perceptions about viable household-level interventions in the region.

Documents: Project reports (evaluations, quarterly/annual reports, concept notes, briefs, all as available, as much of this information is not publicly accessible); current practices and approaches of international organisations addressing food security and national governments; relevant government and civil society policies, strategies and regulations.

Literature: Informational and textual analysis; desk-based research conducted on the research topic, sometimes based on suggestions of other researchers (internationally and regionally).

Key Informant Interviews

Key informant interviews served as the primary data collection instrument. Respondents for the research interviews were engaged after a rapid mapping of key

stakeholders and experts involved in climate change work across the SADC region. Of 18 key informants selected, ten were available for an interview and a further two filled out a survey version of the interview guide. This selection ensured a spread across sectors (Red Cross chapters, broader civil society, and academia) with emphasis on work with rural communities. Using the interview key as a guide, these interviews allowed for a detailed interrogation of the situational-analysis of rural farming communities as they grapple with a changing climate. Some of the respondents have played key roles in the development of community adaptation interventions in various capacities; others have come into the climate change sphere more recently, adding their voices to a broader systemic approach that includes food systems, food environments and the political economy of climate change adaptation efforts. Representation from government officials was not prioritised.

Building on the overarching research questions, the study's key informant interview questions included:

- What work has your institution been doing related to the realisation of the right to food in the region?
- What are the major food insecurity concerns that your organisation or institution is trying to address?
- Currently, what are you focusing-on insofar as community climate adaptation is concerned, and are there any negative impacts you have identified?
- What are the drivers of, or barriers to, household adaptation in rural areas?
- What do you feel are the more effective or more high-potential interventions /practises or approaches?
- According to your experience what is the most immediate threat to household-level food security facing rural communities?
- Additionally, what is the most concerning long-term threat to household-level food security?
- What interventions or practises do you think should be prioritized?
- What are the interventions that you think should be done-away with? What's working and what's not?

Digital audio or video was used for recording so that the researchers could focus on the interview, and accurately report all the information (Ruane 2005). Sessions were then re-watched by researchers in order to analyse and take comprehensive notes. Transcription services were not utilised due to the cost, and it was considered unnecessary by the researchers to transcribe interviews in full, although relevant quotes were transcribed verbatim.

Project searches

Secondary data were retrieved from national and international organisations' and networks' databases of project documentation, as well as research databases to identify interventions from academic journal articles. The aim of the searches was to

understand broad trends in food security as relevant to Southern Africa as well as to identify individual projects of interest to FRC. Projects were identified through three primary types of search: first, a broader examination of the work of key international organisations focusing on food security in Southern Africa and other regions (e.g. World Food Programme, FAO, Action Against Hunger); second, a deeper dive into regional and national organisations and networks working on food security (e.g. SADC food security projects, Southern Africa Food Lab); and third, information drawn from peer-reviewed academic journal articles on food security projects identified through literature searches and 3ie evidence gap map searches. Within each of these search waves ‘snowballing’ occurred, wherein possibly relevant citations or organisations mentioned were followed up with to increase the pool of relevant projects to capture.

Climate model review

Literature and data sets on observed and projected changes in climate were reviewed to create the country climate profiles. These were created using only robust, trusted scientific literature, most notably the Intergovernmental Panel on Climate Change (IPCC), World Bank Climate Portal, and independent academic publications.



© Spratt 2016

Literature review

Climate and agriculture

There are serious concerns within the development community about the likely adverse impacts of climate change on, among other things, resource-poor small farmers and subsistence producers, food security, and biodiversity. Hence, climate experts, policy-makers and the development community more broadly have concentrated public attention on the complex interactions between climate and agriculture (FAO 2017). The 2016 Rural Development Report not only lays bare the inequities that accompany economic, social, and political restructuring in rural areas but also outlines strategies for an alternative model of 'structural rural transformation' (IFAD 2016). In addition to regional analyses, it includes various themes that focus on land, natural resources, and technological innovations in agriculture as well as employment and migration (IFAD 2016). At the forefront of its aim of analysis are the forces required to bring about inclusive rural transformation, stressing the need to strengthen the collective voice and the inclusion and self-organisation of rural inhabitants.

Vulnerability and Food (in)security

The IPCC (2007) defines vulnerability to the impacts of climate change as "the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes." Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity (Baede et al. 2008: 89). Many social scientists, however, prefer a qualified definition that accounts for the social conditions that generate vulnerability and thereby reaches beyond the immediate impacts of climate change (Horstmann 2008). In this report we reflect on the ways projects and programming can reduce the vulnerability of smallholder farmer households to climate change, in part by increasing their adaptive capacity.

Climate change and climate-change policies affect the realisation of the right to food, but vulnerabilities, however, do not just fall from the sky. Vulnerability is not an attribute of changing hazards. It is produced and reproduced through social and political-economic relations on the ground. Risk of hunger is linked to local hierarchies, government relations, national and global markets, laws and practices, and highly unequal and interlinked local, national and global political economies that provide some access to needed resources, others access to social protection, yet others voice in political and economic decisions. These relations shape how people use, depend on, and are affected by nature. The inability to sustain stresses is produced by on-the-ground social inequality, unequal access to resources, poverty, poor infrastructure, lack of representation, and inadequate systems of social security, early warning, and planning. These are the factors that translate climate vagaries into suffering and loss

(Ribot 2013), and illustrate the need for holistic thinking and programming on food security.

The Committee on World Food Security (CFS) identifies four dimensions relevant to the right to food in policy formulation, namely – availability, access, utilisation and stability (De Schutter 2014). These dimensions are hierarchical in nature: Food availability is necessary but not sufficient for access; access is necessary but not sufficient for utilisation; stability is necessary but not sufficient for utilisation (May 2020). As such, responding to food insecurity is complex in that some aspects, such as food itself, are economic goods that are privately produced and consumed, while other aspects such as food safety, are public goods. On the other hand, while measures that delay the attainment of the right to food could be acceptable if these measures form part of a ‘progressive realisation’,² measures that result in regression would not. Article 2 (1) of the International Covenant on Economic, Social and Cultural Rights recognises that economic, social and cultural rights are not always immediately realisable. Aligning policy with a human rights approach requires that possible negative outcomes that follow from growth-promoting policies be assessed in terms of their consequences on the existing rights of citizens. There is a need to ‘feel the pulse’ of the countries in the region and their readiness to adopt and implement the right to food approach in addressing climate issues.



©Spratt 2016

² The concept of ‘progressive realisation’ describes a central aspect of States’ obligations in connection with economic, social, and cultural rights under the international human rights treaties.

Household adaptation

A large body of literature has been devoted to quantifying rural households' behavioural responses (or adaptations) to climate change (see Di Falco 2014). Many studies look for direct evidence of adaptation, such as adoption of different crop varieties, livestock breeds, and water conservation methods (Bryan et al. 2009; Di Falco and Veronesi 2013). Others take an indirect approach and impute households' adaptation from changes in land prices that occur due to climate change based on the 'Ricardian framework' (Mendelsohn and Neumann 1996).

Much of the literature has been charged with having major methodological limitations. Due to the unavailability of time series data on households' behavioural responses to identifiable shifts, variability, and extreme events in the climate (Chambwera and Stage 2010), studies commonly rely on variability in weather across climate zones in cross sectional data (Deressa et al. 2009). With imperfect land markets, the cross-sectional variance in land prices and climate, which is at the crux of the Ricardian approach, underestimates households' adaptation responses to climate change (Shewmake 2008). As a result of these limitations, the broader empirical evidence on the effects of climate change on poor households' welfare is mixed, and varies depending on how adaptation, which mediates climate change effects on household welfare, features in empirical models of adaptation (Kurukulasuriya and Mendelsohn 2008).

The effect of governance on local adaptation to climate change

Through a review of analytical discourse regarding different 'framings' of adaptation and vulnerability, Bisaro et al. (2010) assess the influence of climate change discourse at international and national levels on actual adaptation responses at the local level. Their analysis of several wetlands and climate-related development projects in Lesotho concludes that there is indeed a significant influence emanating from higher governance levels. Additionally, institutions that govern the allocation of environmental rights (especially water access) in patriarchal social systems, even when it interlocks with market-based exploitation of nature for profit, often reinforce social exclusion and associated inequities.

Moreover, Bisaro et al. (2010) further suggest that variation in observed influences depends on whether policies responded to a more 'technocratic' or a more 'participatory' framing of adaptation. In their article on Malawi, Stringer et al. (2010) are also concerned with interlinkages between national-level policy processes and adaptation at local household levels. In doing so, they demonstrate how the dual challenge of adapting to climate change and desertification fails to further a comprehensive approach to national development in spite of strong connections between both agendas. Additionally, they find that Malawi's policies neglect the significance of rural-urban dynamics and conclude that accommodating the

interlinkages between rural and urban areas will be key for facilitating effective adaptation at the household level.

Chinwe & Scholz (2013), in their special issue for *Regional Environmental Change*, examine the challenges that flood disasters in the Zambezi River Basin pose for adjacent countries Mozambique, Malawi, Zambia and Zimbabwe, as well as for international humanitarian agencies. They discuss how development policies, disaster risk reduction and humanitarian interventions may reduce vulnerability to flood events and thereby facilitate adaptation to regional climate impacts. Interestingly, the review also illustrates how an incremental normalisation of ‘states of emergency’ may hinder long-term development strategies. The authors further place emphasis on the need for empirical research on the local realities of humanitarian interventions in flood-prone developing countries.

Locating the food insecure in Southern Africa

The prevalence of food insecurity in southern African countries is not the same as different countries experience different shortfalls in terms of agricultural production due to climate change and policy failures. Right to food challenges, including poverty and inequality, in Southern Africa cannot be solved using a uniform solution because the difference lies in the extent of the problem in terms of weightiness as well as the proportion of the population affected. The last two decades have witnessed the growth and consolidation of modern agribusiness food supply chains across the SADC region. This change has particularly been driven by South African capital interests with links to the global food value chain. This process, sometimes known as “supermarketisation”, is coordinated and driven by large and highly competitive local and international agribusiness companies that aim to control all stages of the food supply chain from “field to fork.” As such, agricultural policies are needed to support the smallholder, subsistence and family farming sector, with particular emphasis on climate resilient agro-ecology methods, while strengthening indigenous farming knowledge, expanding access to land, strengthening local value chains, promoting and respecting the rights of rural women food producers, and cracking down on exploitative and anti-competitive business practices.

Nearly 45 million people in 10 of the countries in southern Africa are reported to be food insecure as a result of drought, floods and more recently the impact of the coronavirus according to the latest reporting of the regional bloc (SADC 2020a). Of the 45 million people within the region, 75 percent (33.6million) represent the rural population and 25 percent (11.2 million) are of the urban population (SADC 2020a). This is a projected 10 percent increase in comparison to 2019 statistics. Significant increases in the number of people that are food insecure from last year have been recorded in Eswatini (58%), Zimbabwe (40%), and Malawi (140%) (SADC 2020a).

COVID-19 restrictions have curtailed the availability, accessibility, and affordability of food to the most vulnerable of households in both rural and urban areas. There is a

risk that households will be forced to adopt negative feeding practices, including reducing frequency, quantity and quality of foods, as they adapt to the “new normal”. This is all the more problematic given the high existing rates of malnutrition in the region. The majority of children under the age of 5, for example, have poor diets, with more than 18.7 million stunted children (too short for their age) within the SADC bloc (SADC 2020a).

Whilst the effects of the COVID-19 pandemic on malnutrition are not yet known, it is anticipated that, with the containment measures taken thus far, acute malnutrition across the region could increase by 25 percent or more over the remainder of 2020 and into 2021 (SADC 2020a). According to reports, these considerations mean that an estimated 8.4 million children will have suffered from acute malnutrition across the region in 2020, and of these, approximately 2.3 million children will require life-saving treatment for severe acute malnutrition (SADC 2020a).

Food insecurity in urban areas

Rapid urbanisation is not associated with increased incomes and better standards of living in Southern Africa as it is in some other developing regions (Ravillon, Chen and Sangraula 2007). As such, urban food security is an emerging area of development concern which is fundamentally different to questions of food security within the rural and agriculture sectors. Yet little is known about the extent of food insecurity in the cities and towns of southern Africa, making it difficult for development practitioners and policy-makers to credibly interrogate the challenge and to proactively plan to reduce the food gap and nutritional poverty that exists in urban areas.

While urban food insecurity is often characterised as “invisible” to policy makers, elsewhere it has been demonstrated that chronic food insecurity is pervasive in urban centres throughout Southern Africa (Crush and Frayne 2010). In 2008 the African Food Security Urban Network (AFSUN), focusing specifically on poor areas, found 77 percent of people suffered from food insecurity in poor areas of the 11 southern African cities it surveyed (Blantyre, Cape Town, Gaborone, Harare, Johannesburg, Lusaka, Maputo, Manzini, Maseru, Msunduzi - Durban Metro and Windhoek) (Frayne et al. 2010). In Cape Town 80 per cent of those surveyed were found to be moderately or severely food insecure (Battersby, 2011). More recently, the South African National Health and Nutrition Examination Survey (SANHANES) found 68 per cent food insecurity in urban informal areas, aligning with data from the 2017 General Household Survey which recorded that almost two-thirds of the households that were vulnerable to hunger resided in urban areas (Stats-SA 2017).

Consequently, dealing with urban poverty is a major policy and development challenge to local and national governments across Southern Africa. Although food supply is generally adequate at the city-level, there is compelling evidence that the majority of the urban poor do not have equal access to sufficient food, and that the food which is consumed is often highly processed and of poor nutritional value

(Ziergvol and Frayne 2010). This demands a new focus on urban food security at the city scale, particularly in light of the increasing possibility that smallholder farmers may stop farming and move to cities as a form of climate change adaptation.

The Sustainable Development Goals (SDGs) and Rural Food (In)Security

Ten years from now we collectively hope to achieve the visions of the SDGs: a world in which, among other goals, there is zero hunger (SDG-2) while climate change remains under 2 degrees Celsius and closer to the stability demanded at 1.5 degrees Celsius (SDG-13). It follows that to be guaranteed of these targets we will need not only greater respect for the right to food amongst national governments as the principal duty-bearers but also shifts to greater sustainability in patterns of consumption universally (SDG-12). The aspiration for diets in a sustainable global food system would be everyone on the planet meeting but not exceeding their nutritional needs, while fulfilling their preferences for affordable, diverse, convenient, and healthy food (Vermeulen et al. 2019).

At the same time, we also need to be cognisant of the urgent need to mitigate climate change and adapt to the changes that we already see based on the emissions already in the atmosphere. Climate injustice is undermining a range of human rights, with disproportionate impacts on the lives and livelihoods of those who have contributed least to the problem and are most vulnerable to its effects. Climate change acts as a multiplier, compounding food and nutrition insecurity and making it even harder for poor households to secure their rights.

The reality is that the SDGs have been created for a rapidly urbanising world; horrors that rage in the cities of poor countries are detailed in Mike Davis's aptly titled *tour de force Planet of Slums* (Davis 2006). Urban areas receive attention in SDG-11 (captured in a vision for 'inclusive and sustainable urbanisation') but there is no matching goal on rural socioeconomic transitions, except for a fleeting reference to 'strengthening regional development planning' in rural areas. After all, a rural development plan is neither synonymous with nor a substitute for food, clothing or land – even if 'planning' might help hinder access to these necessities.

While there have been many hopeful statements that the food system will transform positively post-COVID-19, the southern African experience suggests that in a state of crisis, governments with wilfully poor understandings of the food systems of the masses will develop regulatory responses that will rather lead to further consolidation of the food systems (Battersby 2020).

Box 1: Placing smallholder farming in a wider agricultural context of Eswatini

The economy of Eswatini is diverse and very much bound in its relations with South Africa and Mozambique. Within this context, agriculture plays a small but important role. In 2019 agriculture comprised about 6.5% of the GDP, a decline from 35% in the 1960s.

While a largely rural, peasant society in the 1950s and 60s, Eswatini is today a lower middle-income nation. It has both considerable wealth and poverty. The economy is based on services and industry but has a very high level of unemployment, particularly amongst youth. Large proportions of men and youth move or migrate for work in South Africa (ECDPM 2019). Eswatini has also been one of the countries hardest hit by HIV/AIDS, with generational impacts still being felt.

Agriculture has evolved with these changes. Sugar is and has been growing in terms of value and the area under-cultivation (if not productivity) (USD-GAIN 2020). Sugar accounts for over half of the agricultural output (Research and Markets 2020). It employs 20,000 people. It is highly commercialised and irrigated. 70% of the production comes from large scale producers dominate but smallholders – farmers with 50 acres or less – contribute about 20% of the production. Commercial production of citrus, and some staples make a considerable contribution towards that nation's output.

Even if sugar, citrus, and commercial staples production constitute the majority of agriculture production, 11% comes from the many small farms growing staple and horticulture crops. Most of Eswatini is considered rural, with many of those people keeping small farms and small numbers of animals. Their farming systems are described as traditional, with poor and variable yields (Ministry of Agriculture 2018). They are labour dependent, historically requiring family members or youth, who now look for work elsewhere or were taken away by the AIDS crisis (Matsebula 2019). This form of farming focuses on subsistence or providing “porridge”. Such systems do not provide the economic incentive (or potential) to make improvements, particularly mechanisation or irrigation, required to be viable (Ministry of Agriculture 2018). In addition, women are often de facto farm managers (due to migration or work of the husband) but are limited by traditional gender roles and legal arrangements to make decisions to improvements (Dlamini 2019). As well, many of the country's small holders farm on Swazi Nation Land (common land) for which they have no tenure. It adds an additional disincentive to invest, make improvements, or adopt new or long-term approaches.

These different types of farming clarify the role of the changing climate on agriculture. Eswatini shows a marked upward trend in its temperature (IRI 2020a). Rainfall varies greatly year on year with no defined trend either drier or wetter. Nonetheless, despite this change and variability, sugar production has increased tenfold over the last 60 years (Knoema 2018). Eswatini is the fourth largest sugar producer in Africa and the 25th largest producer in the world. In contrast, and despite the vastly greater numbers of people farming staple crops, the country imports two-thirds of its grain (FAO 2020). This should not imply that there is no role for small farmers. It does however require small farmers to have a commitment and ability to adopt progressive approaches. In contrast, many subsistence farmers are 50 to 60 years old and may be unlikely to change. Young people, their children and heirs to their farms, have sought opportunities away from the farm (Matsebula 2019).

Source: Stephen McDowell (Red Cross Climate Centre consultant)

Results

Current and projected climate trends per climatic zone in the Southern African region

Regional climate trends in Africa were assessed by the IPCC in Working Group II, chapter 22 of the 5th Assessment Report (Niang et al. 2014). The next major IPCC report (AR6) is planned to be released in 2022. The following paragraph parses through this analysis to highlight climate trends for Southern Africa. Research on historical climate data from the 20th and 21st centuries is reported and analysed as well as climate change projections based on independent peer-reviewed research and an ensemble forecast entitled the 'Coupled Model Intercomparison Project Phase 5' (CMIP5) ensemble.

Full summaries of current and future expected climate for all ten Southern African countries focused on in this report are included in a separate document that can be downloaded alongside this report.

Observed changes

First, most of the region of Southern Africa has seen increases in annual average temperatures, most significantly over the past two decades (Zhou et al. 2010, Collins 2011, Kruger and Sekele 2012 - cited in Niang et al. 2014: 1206). Additionally, annual maximums and minimums have also increased, with high temperature increasing the most rapidly (New et al. 2006 - cited in Niang et al. 2014: 1206).

Second, major changes in rainfall patterns have been recorded on the intra-seasonal timescale, with delays or changes in the onset and offset dates of the rainy seasons, and in the frequency of dry spells and intensity of rainfall within the season (New et al. 2006; Tadross et al. 2005, 2009; Thomas et al., 2007; Kniveton et al., 2009 - as cited in Niang et al. 2014: 1209). Additionally, data from the 1950s onwards does show a signal of reduced late-summer precipitation in the western region of Southern Africa (especially in Namibia and Angola, extending north towards the Congo) - this has notably been linked to increases in sea surface temperatures in the Indian Ocean (Hoerling et al., 2006; New et al., 2006 - cited in Niang et al. 2014: 1209). Moderate decreases in precipitation have also been recorded in Botswana and Zimbabwe. It is important to note here that the authors of the IPCC chapter highlight that the lack of sufficient historical precipitation data in the region limits trend interpretations.

Rainfall trends are variable, but evidence points to an increased inter-annual variability, with extremely wet periods and more intense droughts in different countries (Niang et al. 2014). For example, in Namibia, the summer rains are projected to increase in length while winter rainfall would decrease in certain parts of the country (Ministry of Environment and Tourism 2011). Projections show that changes will not be uniform over the region, but that generally, mean temperatures in the

region may increase between 3 and 4.2 °C, and as much as 6°C, by the end of the 21st century compared to the 1981-2000 average (Niang et al. 2014). For instance, the central, southern land mass extending over Botswana, parts of north-western South Africa, Namibia, and Zimbabwe is likely to experience the greatest warming of 0.2 - 0.5°C per decade (Myers et al. 2011). Additionally, temperatures in Eswatini are projected to increase by 1.5 and 2°C between 2046 and 2065 (NCCP 2016). The frequency of extremely dry winters and springs will increase by roughly 20%, while the frequency of extremely wet summers will double (Myers et al., 2011). For instance, a study by Nkemelang et al. (2018) in Botswana highlights that the average duration of warm spells in the country could increase between 62 and 80 days per year, depending on the climate change scenario. Warming is also predicted to increase the frequency and intensity of tropical storms in the Indian Ocean.

Corrective activities may be grouped into mitigation, adaptation, education and training, and raising awareness. Research is central to all these, as it will inform identification and assessment of effects, comparison of interventions, and determination of best practices. Notably, regarding mitigation, five African countries are responsible for most of Africa's greenhouse gas (GHG) emissions, with South Africa by far the greatest emitter, responsible for 39% of the continental total – making GHG emissions in the Southern Africa Development Community (SADC) region relatively higher than in other regions of Africa (EIA, 2017). This issue is a high priority for intervention and will depend on national energy policy.

Climate changes' impact on food production

The region's 2020 maize (staple food) harvest is expected to have increased by at least 8 per cent from last year. However, poor rainfall and economic challenges are expected to see Zimbabwe experience one of its highest cereal harvest deficits of about 52 percent of national requirements (SADC 2020b). Dry conditions have also affected production in Eswatini, Lesotho, south-eastern Angola, southern Mozambique and most of Zimbabwe (SADC 2020b). Regrettably, according to reports rural food insecurity is expected to peak from November in the region (SADC 2020b).

Projected changes

First, trends in increasing temperatures are projected to continue throughout the century in Southern Africa. Mean land surface warming in the region is likely to be significantly higher than the global average, for all seasons (Sillmann and Roeckner 2008, Watterson 2009, Mariotti et al. 2011, Orłowsky and Seneviratne 2012, James and Washington 2013 - as cited in Niang et al., 2014: 1209). Under moderate climate change scenarios (A2), warming is projected to be between 3 and 4.2 °C by the end of the 21st century compared to the 1981-2000 average (Moise and Hudson 2008 - as cited in Niang et al. 2014: 1209). Under RCP 8.5 and by the end of the century, temperature increases between 3 and 6°C (compared to the 1986-2005 average) are estimated to be *very likely*. In particular, the southwestern parts of the region (over

northwestern South Africa, Botswana, and Namibia) are projected to experience high temperature increases which would only exacerbate their already arid climates.

Second, average annual rainfall over parts of southern Africa is projected to decrease by 2050, and even more severely by the end of the century. This drying signal is particularly highlighted in the southwest, through the deserts and semi-arid lands of Namibia and Botswana (Niang et al. 2014: 1210). Changes in seasonality of rainfall are also projected, with much of southern Africa experiencing drier winters by 2100 and delayed onsets of the summer rainy season in the region. However, it is important to note here the high level of uncertainty and conflicting outputs from different climate models, as noted in the AR5 chapter.

For a detailed overview of climate profiles by country, please see the separate document, 'Climate Profiles of Countries in Southern Africa'.

Review of food security interventions and practises

Key trends in food security interventions

A review of food security programmes by leading international organisations in food security globally, including in Southern Africa (World Food Programme, Oxfam, FAO, UNDP, Action Against Hunger) as well as a range of initiatives led by regional and national organisations and networks, including those based elsewhere in Sub-Saharan Africa (e.g. CGIAR/CCAFS), demonstrates key trends in food security approaches in Southern Africa and beyond. While many of these programmes focus on smallholder farmers and community capacity/resilience, their approaches are 'macro': linking smallholder farmers to markets, investing in different stages of supply chains in ways that support farmers, and offering insurance and strengthening social safety nets. Programmes may include components aiming to strengthen or 'innovate' farming techniques, or build micro-livelihoods, but these are generally one piece of a bigger aim to sustainably integrate farmers into markets and supply chains, and to provide or help build the assets and buffers (through insurance, microloans, etc) to withstand climate-related and other shocks. As the FAO explains, these approaches take account of the structural changes needed to address current and future food security challenges, particularly as related to climate change:

The current approach to rural development aid is too fragmented and small-scale to generate transformative change. A holistic approach is required that recognizes the diverse economic, social and environmental webs in which rural people earn their living and strive to improve opportunities for themselves, their children, and their communities. The holistic approach must respond to the needs of the highly vulnerable populations and consider responses to mitigate and overcome the effects of crises and shocks. (FAO 2019)

Limited availability of evidence of impact

While approaches such as those suggested above by the FAO are undoubtedly important, this review found limited evidence of available programme efficacy and impact. This of course does not mean that programmes are not successful, but instead that the project evaluations and other documentation that would offer this type of information do not seem to be publicly available, or that these projects have not been rigorously evaluated. Instead most reports and case studies describe the type and aims of interventions, and in cases the number of people served or funds provided, but without robust evaluation attached. This represents a clear limitation of this study, and a need for more evidence to become accessible. Where possible, concrete evidence is presented in the project summaries but in most cases it was impossible to evaluate effectiveness.



©Coffin-Gray 2021

Reviewed interventions and matrices

The following table presents an overview of the types of programmes identified based on their area of intervention and how their method aims to achieve climate change adaptation. Annex 2 provides the names and links to more information of these identified programmes, and the matrices can be downloaded separately to this report. Project examples are provided in the discussion below, which presents key themes from the reviewed projects and literature, and key informant interviews.

Table 1. Overview of identified tools and practices on food security & climate change adaption

| Area of intervention | Examples of programme/project foci | How food security and climate change adaptation is targeted |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Farming types and techniques | Growing alternative crops, preserving indigenous farming techniques | - Supports ongoing agricultural production in changing climates |
| Livelihoods diversification | Beekeeping, new (weather-amenable) crop production, non-farming livelihoods training | - Create new or additional sustainable livelihoods in the face of a changing climate |
| Financial services | Micro-finance, Cash transfers, Training on asset creation | - Support asset creation and savings (buffer for shocks) - Support to adapt farming through weather-resistant seeds, new tools, fertilisers - Support to start new businesses - Mitigate effects of extreme weather events - Stimulate local markets |
| Social protection | Index-based crop Insurance, Cash transfers | - Support asset creation and savings (buffer for shocks) - Recover losses from weather-related crop losses - Mitigate effects of extreme weather events |
| Market Access/linking | Virtual Farmer’s Market; Purchase for Progress (helping smallholder farmers obtain stable demand through selling to national public institutions) | - Risk of being maladaptive: assumes a stable crop supply by smallholder farmers, who are often the most vulnerable to crop failure in the event of extreme weather events, eroding soil quality, decreased water access, etc |
| Information and expertise | Agricultural extension officers; preserving and building on indigenous knowledge; farmer support services; community whatsapp groups of farmers (informal knowledge exchange) | - Information about weather and climate changes - Exchange of good practices regarding new adaptive farming techniques |

Discussion

Interventions, practises, and approaches with higher potential to enable improved food security outcomes

Based on both the justification of interventions and discussions with interviewees it is evident that **food security in southern Africa is an elusive goal**. Even without the impacts of climate change, agricultural systems are not meeting the needs of large numbers of people, with half of the region's population defined as undernourished. While the role of food production as one component of the right to food is clear, the other components (availability, access, and utilisation) are still poorly understood. As outlined in the literature review, the right to food is considered a longstanding international human right which includes physical and economic access at all times to food or the ability to procure it. The nexus between these components represents an area for further research and intervention, particularly given projections of changing weather patterns and increased risk of extreme weather events that are likely to impede this right for many.

At the same time, in the pursuit of increasing food security, programming is increasingly casting a wider net on the kinds of supports provided and the kinds of stressors addressed. As further discussed, interventions aiming to increase food security at the household and community level often do so by addressing or linking smallholder farmers to larger food, market, and/or social protection systems, illustrating an important widespread focus on linking micro-interventions with institutions and programmes at the national and even international level. This suggests that any interventions FRC chooses to pursue may be most successful when supporting beneficiaries with existing access to other forms of structural support, as well (e.g. social protection, market linkages, etc).

The following paragraphs provide key take-aways drawn from the interventions reviewed, literature review, and the key informant interviews, followed by recommendations.

Interventions providing layers of support

The movement away from strictly small-scale agronomical interventions was highlighted in multiple interviews and is apparent in the review of recent programming by key institutional actors (WFP, ACF, Oxfam). These institutions are often layering many different types of supports (often coming from different categories of adaptive practise) in order to support food insecure rural households. For instance, the R4 Rural Resilience Initiative in Malawi and Zambia led by WFP and Oxfam America offers farmers access to crop insurance alongside risk reduction activities, with a focus also on asset creation, livelihoods diversification and micro-credit, and promoting savings. Support to increase food security from other

organisations includes supporting diversification, migration (household consumption stabilisation), resource pooling, provision of information and early warning (e.g. El Nino Southern Oscillation (ENSO) warnings), and even provision of quality childcare to allow farmer parents to more fully conduct labour. The net is cast wide to have a more holistic package of support, in recognition of the complex needs of farming households in a changing climate.

The value of this type of layered support lies in addressing many of the competing components that make smallholder farmers and communities food insecure. However, this type of intervention is resource intensive, meaning that fewer communities may be reached than other interventions that offer just one type of activity.

Targeting food and market systems

Along with this diverse layering of support, there is a **growing shift in food security practice to strengthening systems**, such as increasing local food procurement rather than offering aid, providing cash transfers, and so on. One key informant explained:

As an example of systems strengthening, cash transfers are useful but you still need local markets and access to food nearby (versus spending half the money traveling to town to get the food). So...how do you ensure that both the support services and the market that can stimulate recovery is active and resilient enough during these incidents? If I was thinking about this work [as the Red Cross], this is where I would be working, and particularly **how to use highly localised smallholder farmers or household gardens to actually connect into the humanitarian supply chain more directly.** (KII)

While connecting into humanitarian supply chains offers one option, **there is also a clear need to build on and increase the resiliency of localised, local systems.** The WFP intervention 'Purchase for Progress' in Malawi (and elsewhere beyond the region) exemplifies this type of approach through helping ensure smallholder farmers have stable demand through selling food to public institutions including schools and hospitals. Similarly, WFP's 'Virtual Farmers' Market' in Zambia, an app-based e-commerce platform, seeks to help farmers sell surplus crops through connecting them with potential buyers. In the face of projected changing climates in Malawi and Zambia that will likely decrease farmers' production, the risk is clear: these types of interventions only support those farmers who are successful enough at producing surplus crops to sell in the first place. Further, the ability to produce surplus crops is likely to be more constrained with rises in temperature and reductions in predictable moderate rainfall, which are expected with climate change, unless significant changes in agro-technology (e.g. seeds or irrigation practise) are realised.

Specific methods and aims

Developing high-temperature resistant crops and promoting efficient irrigation systems appears to be the main direct technical response to a changing climate within Southern Africa. However, informants working directly with rural farming communities highlighted that a number of hurdles remain which pose several difficulties for added investment in irrigation such as technological barriers, access to sufficient water resources and constant energy, and funds for production investment. Notably, some respondents placed emphasis on the fact that, as water resources in particular are also directly impacted by climate change, care needs to be taken not to develop ‘maladaptive’ responses or interventions around increased irrigation.

Conservation Agriculture as a solution to the multi-dimensional risk caused by climate change is a false narrative... what are the real underpinnings of the agrarian and food systems?

– KII, Professor Scott Drimie, Stellenbosch University

Speaking to climate adaptation and its importance for rural communities and subsistence livelihoods, participants pointed-out that **household-level responses to climate change are usually determined by the climatic stimuli and decision-making environment of the community.** This decision-making context is influenced by opportunities and constraints that in turn are shaped by various factors beyond the farm household scale at the community, landscape, and regional levels (such as agro-ecological, economic, political and institutional circumstances) (Tittonell 2014). As such, a clear outcome of the interviews conducted is that rural household-level responses to climate variability and change can be categorised as caught up between two approaches - ‘coping’ versus ‘adaptation’. While coping is commonly perceived as best assisted through humanitarian aid, adaptation implies long-term programming that is often more holistic in nature, taking into account both individual situations as well as broader economic and social contexts.

Small-scale household interventions promoting conservation agriculture (or the similar set of practises entitled climate-smart agriculture) can be considered adaptive, such as livelihoods projects promoting diversification and improving productivity. However, many **small-scale farming interventions have limitations of scale – both in their ability to perform well in extreme weather conditions, and in their ability to sufficiently boost productivity of the farmer such that their livelihood is demonstrably improved or more stable.** Changes in temperature and rainfall in some areas of the region are likely to render certain crops untenable. If such practises are prioritized for programmatic intervention, it is evident that larger systems-level changes and support are needed (e.g. access to social protection, stronger food supply and market chains) to increase widespread household food security.

Crop insurance

As previously discussed, crop and other types of insurance are increasingly provided to smallholder farmers in the face of increasing uncertainty over productivity due to current and projected climate variability, as well as increases in extreme weather events. It is estimated that in Sub-Saharan Africa only 3% of smallholder farmers have access to agricultural insurance coverage, illustrating the level of need (ISF 2018). In 2018, for example, the aforementioned WFP/Oxfam American R4 Rural Resilience Initiative provided crop insurance pay-outs equal to around US\$1.5 million for farmers in Sub-Saharan Africa, including Malawi and Zambia, due to weather-related losses. Examples of existing direct provision of crop insurance by Red Cross Red Crescent actors were not identified in a search completed by the authors. However, there are a few examples of quasi-insurance schemes delivered by Red Cross actors, for example paying subscription/membership fees for ambulatory services which gives a household access should the need arise (a former service of the Tigray branch of the Ethiopia Red Cross National Society). Several INGOs in sub-Saharan Africa have engaged in insurance provision less directly by simply paying the insurance policy premium on behalf of beneficiaries, which is an option that could be explored by Red Cross actors.

Technology

The use of technology came up in both interventions and interviews, with the premise being that **technology can be useful in improving food security when used correctly**. There are for instance promising examples of **whatsapp groups** of farmers in the region who exchange not just information on prices and production but practices to improve farming in changing climates. In this way a virtual community of practice is developed. WFP's 'Virtual Farmers' Market' in Zambia is one example of an app-based digital platform to facilitate selling and buying as well as information-sharing.

Blockchain technology is also being used, ranging from facilitating cash transfers to crop insurance. For instance, a project piloted in Kenya on blockchain climate risk crop insurance seeks to provide insurance to smallholder farmers through smart contracts on a blockchain that are indexed to local weather; extreme weather events will automatically trigger policies, when are then quickly and transparently digitally paid out.³

Cash Transfers

Cash transfers have been used to address systemic challenges relating to food insecurity as well as regular or one-off payments to mitigate the effects of extreme weather events for smallholder farmers and other populations. Increasing evidence points towards the ability of unconditional cash transfers to help both men and women accumulate productive assets in rural areas (Asfaw et al. 2014, Bastagli et al.

³ For more information on this project see: <https://www.climatefinancelab.org/project/climate-risk-crop-insurance>

2016), although cash transfers are not appropriate at all times or in all contexts (Bailey and Harvey 2015). As one key informant noted,

We have seen massive successes when intervening through **cash transfers to stimulate local markets**, which led to stronger environmental frameworks for those communities. Cash transfers or direct purchases/vouchers made available to local suppliers may see a different kind of possibility [for food security] to emerge. (KII)

Cash transfers have been successful for a range of actors as either a form of humanitarian intervention or longer-term adaptation as a social protection measure. Cash transfer distribution can also be very fast (ranging from 24 hours to 7 days of arrival), including through the use of blockchain. There are increasing discussions around loss and damage associated with productivity losses, with some civil society actors advocating for cash-based compensation for productive losses attributable to climate change for the world's poorest. However this has not been prioritised in recent climate negotiations.

Promoting livelihoods diversification

Given the projected climate changes in the region, it is anticipated – particularly in high emissions scenarios – that large areas of the countries reviewed will have climates that are significantly less amenable to farming. While climate-smart agriculture remains an important focus, adaptation and resilience may for many mean finding alternatives livelihoods or supplementing farming with additional sources of income. The Ruzivo Trust's beekeeping livelihoods project in Zimbabwe illustrates one way that smallholder farmers can increase their incomes and diversify their livelihoods while also promoting biodiversity. Other projects such as WFP/Oxfam America's R4 Rural Resilience Initiative in Malawi and Zambia promote livelihoods diversification in part by offering micro-finance loans that smallholder farmers can use to start new types of businesses or diversify crop production.

Targeted trainings or support for particular alternative or additional livelihoods can be useful in the pursuit of diversification, but it is important that these are based on projected as well as current climate scenarios in order to avoid the risk of promoting maladaptive practise. Unfortunately, limited robust project evidence is available regarding particular livelihoods to promote in Southern Africa. There is no one diversification effort (e.g. a miracle crop or new business type) that stands out as having very high potential. Micro-finance loans, on the other hand, can offer smallholder farmers more freedom and choice in their selection of livelihoods, but comes with its own risks, including an inability to repay loans, but also other risks such as recipients themselves making maladaptive choices (e.g investing in a pump that will deplete a water source). Some combination of trainings as well as start-up capital and material (in the form of loans or grants) may offer the strongest potential for

sustainable livelihoods, although, as noted above, limited evidence explores these in relation to climate scenarios (Barooah et al. 2019).

Power imbalances and biases

“We need to engage with all the dichotomies that impact on resilience... What are the links between acute and chronic food insecurity? How do we move technically and also politically?” – KII, IPC Regional Coordinator for Southern Africa (FAO)

Food sovereignty and externally-imposed ‘solutions’

Resilience is not just about surviving in unjust and difficult contexts, coping with shocks, or adapting to whatever is coming. Resilience is about rights, dignity, and well-being. The present so-called solutions are not a result of a lack of knowledge. Rather, they are due to selective knowledge driven by market-based ideologies such as neoliberalism. Rural communities and smallholder farmers globally have centuries-old knowledge, as well as new and evolving knowledge that needs to be transformed into practical tools for actions that align with nature’s cycles. This calls for a clear rejection of false technologies and instead the building of solidarity economies.

One real solution is a low-hanging ripe fruit clearly within our grasp. Peasant farmers led by *La Via Campesina* and other social movements are vigorously promoting this low-hanging fruit - namely, ‘food sovereignty’. Food sovereignty is used as a discursive tool by various social movements immersed in the food system for different purposes. Typically, the actors who mobilise under the discourse of food sovereignty bring different constituencies together under the term ‘local communities’.

Food sovereignty can only be secured by supporting the majority of farmers in their small-scale agro-ecological farming. With sufficient support, including through extension services, agro-ecological farming can produce more than industrial agriculture, reduce the gender gap, increase employment, increase income, protect agricultural biodiversity, promote health and nutrition, and mitigate global warming. Pointedly, **for several interviewees working directly with subsistence and smallholder farmers in rural areas of Southern Africa, so-called climate-smart seeds in particular present the biggest frustrations for rural households** as they are being presented as genetically modified (GM) or engineered varieties whereas traditional local varieties already exist which are smart in the true sense. The fact that GM crops are not a silver bullet to fight hunger in Africa or globally has been noted in various reports.⁴ **Seed saving and exchange are key to African agricultural practices.** In such

⁴ Reports include those by the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD 2009), Friends of the Earth International (2015), Health of Mother Earth Foundation (2017), African Food Sovereignty Alliance (2017) and the African Centre for Biodiversity (2017).

settings, farmers always have access to seed and this provides a strong safety net for those who may not have a large seed bank. However, this practice may soon be eclipsed by the strong external push to introduce regulatory mechanisms to make seed control, certification, and trading mandatory. It is already a given that GM seeds must be purchased at every planting season, which risks entrenching already poor smallholder farmers in an ongoing cycle of purchasing in order to produce any crops at all.

There is also a need to **be aware of old top-down approaches that are hiding behind new narratives**. Interviews highlighted several risks and tensions to avoid or address in interventions, namely organisations bringing in imposed solutions like ‘climate-smart agriculture’ or drought-resistant crops. It was emphasised that ‘conservation agriculture’ and ‘climate-smart agriculture’ risk being buzzwords attached to interventions that do not really focus on farming itself, or on the actual underpinnings of what’s happening in a particular context. Instead, these interventions risk creating a space where powerful, outside (commercial) actors can enter with new solutions and ‘innovations’ that may in fact be harmful.

There is a need to shift from relief responses to recovery and adaptive-oriented interventions. Several organisations that focus on food security appear to largely offer emergency food relief, although some like Action Against Hunger often combine this support with cash transfers, which in instances may support longer-term food security through the recovery of assets for farming or other livelihoods.



© Ackley 2018

A short-term focus is also present within certain programmes of the Red Cross Red Crescent movement. While this is undoubtedly needed, some feel that a different perspective is also required. A member of the Namibian Red Cross explained,

Interventions have been focussed on response-relief but not recovery strategies. Community engagement and accountability is missing from the work of the Red Cross. What is the interface with actual/intended beneficiaries?" (KII, Namibian Red Cross)

Another key informant stated,

There is a need for more localised action, for local leadership, and ensuring that the interventions we undertake in the humanitarian space actually contribute to resilience, DRR, or whatever framework you want to use that deals with these issues of dampening the cycles of disaster. (KII)

Interviews highlighted that one important way to undertake more localised action is to **understand and act with farmers' indigenous knowledge and perceptions of climate change**. Several KIIs stressed that rural populations have always been deeply cognisant of environmental processes, thanks to indigenous and traditional knowledge systems. In southern Africa, farmers have a long history of applying local knowledge in response to increasing climate variability and change.⁵ As much as science provides evidence of climate change, local understandings – including the cultural and religious dimensions that have traditionally been central to climate prediction and analysis – should not be ignored.

It is notoriously difficult (and morally fraught) to assess the extent to which indigenous knowledge is made less useful given large changes in weather patterns due to climate change. Although attempts have been made (largely by western individuals, academics, or institutions) to 'assess the accuracy' or 'validate' indigenous knowledge in the context of a changing climate, these are often value-laden and apply overly simplistic literal interpretations of traditional knowledge, among other problems. As such, they have not been relied upon as a source of information in this report. Discussions at major humanitarian events on this subject also tend to be divided into two camps: that the traditional knowledge is entirely robust and its applicability unchanged, or that it has been rendered entirely useless due to climate change – both of which are unlikely to be true.

Indeed, almost all interview informants drew attention to **the importance of researching farmers' indigenous knowledge and perceptions of climate change, in order to better understand local response measures**. Poignantly, no informants were aware of any humanitarian work that has actually engaged beneficiaries and relied on localised responses and community local leadership in advancing its work.

⁵ See: Sillitoe, P. 1998. Knowing the land: soil and land resource evaluation and indigenous knowledge. *Soil Use and Management* 14(4): 188-193, for a comprehensive discussion.

Respondents highlighted the need for a serious and perhaps equal consideration of farmers' perceptions on climate change as important inputs to climate change adaptation policies that aim to enhance climatic resilience in smallholder farming communities. The adaptation and responsiveness of farmers to the effects of climate change should be a social process involving the collective efforts of various stakeholders. Given this, **capacity building interventions that speak to information sharing and awareness raising may be an important niche opportunity for Red Cross actors.** Building on the extensive volunteer network, dialogue with farmers and communities so that they understand current affairs and terminology associated with climate change could prove fruitful for adaptation efforts focused on ecological cycles amongst other concerns – especially if it allows farmers to better articulate the changes they are seeing in the terms used broadly within the climate change community of practise.

Information sharing and awareness raising

Adaptation is intrinsically linked to perception. To appreciate local adaptation patterns, it is vital to understand reasoning processes that shape efforts to adapt to climate change (Boilas and Berkes 2013). The dearth of empirical evidence on this is tied to the longstanding contention between the science and social science disciplines (Chanza and Mafongoya 2013). Scientists approach the climate change crisis as a problem that is adequately captured through statistical modelling. Recently, however, social scientists have objected to this claim by advocating for the streamlining of traditional knowledge into climate change issues. As such, **extension workers are vital in sharing information on adaptation to rural communities and households**, and conversely ensuring that smallholder farmer views also contribute to policymaking. Horizontal information-sharing, such as in the form of extension workers, is a progressive channel towards food security and fulfilling the right to food. Valuing and applying locally constructed considerations of climate change works to:

- (a) strengthen self-sufficiency among subsistence and smallholder farmers through integrated knowledge
- (b) formulate projects and policies that are context-specific and therefore relevant.

There are many channels through which adaptation education is distributed within Southern Africa. But, for contexts like Zimbabwe, where there is a dearth of 'Agricultural Extension Officers' in rural areas, further research is needed to understand how a lack of extension services affects the adaptive capacities and perceptions of rural cultivators. Several studies of programmes captured in this report ('Farmer Support Programmes in South Africa' and 'Outsourced agricultural extension service in the Mutasa district of Zimbabwe') illustrate their importance, tying the use of these officers to increased farmers' yields and incomes. This represents an interesting opportunity for Red Cross volunteers to be trained to impart education and training on adaptive agricultural practices relevant for particular countries' climates.

Conclusion

This report has identified a number of important themes and considerations for FRC as it continues to identify worthy areas of food security intervention in Southern Africa. It explored several research questions which are shared again below with brief summaries of findings.

1) How well have/can community capacity building efforts strengthen community resilience in terms of sustainable food security?

The projects and information identified in this research speak in particular to the value of community capacity building when it is linked to other programmes directly or indirectly (e.g. the layered approach discussed previously). Resilience can be understood as the availability of multiple formal and informal types of support, and it is generally recognised that for very vulnerable smallholder farmers a one-off intervention is unlikely to create food security. It can, however, have significant impacts for some, such as the notable increase in market access experienced by members of smallholders' cooperatives and farmer support services in one study from Zimbabwe (Sikwela & Mushunje 2013; see project 'Outsourced agricultural extension service in the Mutasa district of Zimbabwe' in Annex 2 for more information). It was noted, however, that 'collective marketing, agricultural cooperatives may not help smallholders to access markets unless these farmers have some form of support to improve their quality and volumes' (ibid.), illustrating the range of support smallholder farmers often need.

Overall, research on community capacity building efforts and resilience in terms of sustainable food security is limited. There is a clear need for more research, such as robust case studies, identifying the impact of these efforts in order to understand their outcomes on food security. In part this research is important as the key informant interviews in particular highlighted how far there remains to go in terms of truly community-driven food security projects. Community-created and -led projects (be they formal or informal) are an important part of community resilience, and more knowledge on them could provide key areas for replication or scaling up through partnerships with actors such as the Red Cross.

Identifying what is working well already (in terms of autonomous adaptive actions or traditional practises), and where possible, offering external support to take such actions to scale, or make them available to other people, is an approach that would require extensive community-level work, but holds promise to avoid the pitfalls of many food security and livelihood programming in the region. Red Cross actors, building on their network of volunteers, would be uniquely suited to approach program design in this fashion.

2) What existing community food security/resilience tools and practices (primarily in the region but also in Sub-Saharan Africa more broadly) would be most effective in terms of climate change adaptation?

Both key informant interviews and reviews of projects and literature clearly identify valuable approaches as well as specific interventions to food security in the region. These include a nexus approach that addresses both immediate crises as well as longer-term support and adaptation (through staged or multi-pronged interventions), and holistic approaches that take broader contexts and systems into account. Practically, this might mean linking smaller-scale interventions to bigger ones, such as offering individual household gardens or livelihoods initiatives to smallholder farmers already receiving assistance to connect to markets or partake in social protection schemes. In other cases it might mean selecting types of interventions, like cash assistance, that can play multiple roles, such as offering both immediate financial assistance to increase smallholder farmers' food security, which in turn can improve wider-scale food security through acting as a market stimulus.

Early warning early action programmes are a growing area within the Red Cross that can also work to improve food security through increasing resilience and helping households withstand shocks. There are currently drought-focused, forecast-based financing (FbF) programs in development in Lesotho, Eswatini, Namibia and Mozambique. All are at early stages of development, but will all likely prioritise negative food insecurity impacts associated with low seasonal rainfall or unfavourable seasonal rainfall anomalies (e.g. gaps in the rainy season, or changes in the onset or cessation of the rainy season). As these programs are not yet operational it is not possible to assess their efficacy. However, scaling up supports of some kind surrounding extreme events is likely to be an essential component of helping people live well in a changing climate. Such efforts, like all FbF systems, are most effective when implemented in addition to long term programming and conducive policies to support households in a changing climate.

Supporting national societies within Southern Africa to increase this type of programming would likely be very beneficial given increasing risks of extreme weather events projected for the region. These programmes might offer cash and/or in-kind assistance in advance of extreme weather events, or in instances offer training on addressing particular hazards for both people and livelihoods. Time sensitive training may be particularly relevant and feasible in the Southern African region, which is especially effected by the El Nino Southern Oscillation (ENSO). This is predictable at the 3-6 month timescale, offering more generous lead times to take meaningful action.

2.1 Which of the tools and practices would be suitable, relevant and compatible with the Red Cross strengths and ways of working (e.g. established network of community-based volunteers)?

Key informant interviews, in particular, clearly highlighted the need for bottom-up rather than top-down approaches, and the need to utilise and build on local and indigenous knowledge. Given the Red Cross Red Crescent movement's structure and ethos, it seems particularly well-placed to further embed a community-based approach into programming through utilising volunteers and strengthening equal partnerships between national and partner societies. This could take the form of **volunteers being trained as agricultural extension workers, or documenting different types of indigenous agricultural knowledge and practices** present in their communities.

The vulnerability of rural communities to climate change must be considered in a broader socioeconomic context. It is crucial that the Red Cross climate change vulnerability assessments analyse socioeconomic dynamics as this ensures that context-appropriate adaptation options are considered.

Participatory approaches are essential for climate change interventions at the community level. The Red Cross already uses participatory tools in its work to help fill the information gaps and validate rural communities' climate and non-climate concerns. This is an essential practise that improves ownership in the implementation of strategies, which will be key to successful interventions in the food security and climate change space.

Empowerment of women is vital to the efficacy of climate change projects and interventions at the community-level. With regards to programmatic design, every effort should be made to ensure that women and men contribute to and benefit equally from climate change interventions and policies at all levels. Investing in women as part of the climate change response leads to greater returns across the SDGs and broader development objectives.

Regional dialogues for climate change literacy and capacity building efforts geared towards systems thinking are important. In light of the Red Cross's mission and its established network of volunteers, the programmatic design could be innovative through advancing systemic dialogues around climate change and its impact on smallholder/subsistence farmers and other people's areas of focus, values and interests. In turn this would allow them to construct new meaning based on what is relevant to them.

The following section provides specific recommendations on these key areas to help FRC plan interventions that increase the resilience of smallholder farmers in Southern Africa in the face of climate change.

Recommendations

Programmatic approaches

Adopt a layered approach to support (e.g. WFP programmes in Annex 2): There is value in linking interventions that FRC may lead with other existing support, either through targeting populations receiving other assistance (e.g. members of social protection or insurance schemes) or directly collaborating with other humanitarian organisations or national governments. The kinds of activities the Red Cross is skilled at doing (e.g. mothers club, savings groups) could be part of this more holistic package of support.

Create multipronged interventions that offer fast returns as well as longer-term foundations. Projects focused on livelihoods diversification can help smallholder farmers increase their income in the short-term while also helping with 'softer landings' into other livelihoods if farming proves untenable in future climates.

Applications of science

Use climate profiles to make strategic investments in areas that are expected to have greater climate induced vulnerability – taking into consideration both how specific livelihoods are faring given changes that can already be observed, as well as expected future conditions. In particular, thinking through how interventions would fare with the cumulative effects of changes in both rainfall and temperature – for example a rise in temperature, a general reduction of rainfall, as well as an increase in rainfall variability and extremity when the rain does fall, which is a plausible scenario for many parts of the region. These variables all have implications for the relative viability of interventions. Strategic investments could be made in geographic areas (e.g. the expected reductions in overall rainfall in the northern part of the region) as well as thematic areas (e.g. surface water collection methods in areas expected to have lower, but more intense and variable rainfall).

Use climate profiles to flag potential maladaptive practises: The Eswatini climate profile, for example, suggests maize may be very unproductive in future climate scenarios. Programs to move away from reliance on maize could therefore be beneficial. As another examples, in areas that are already over-extracting groundwater resources, additional investments in ground water extraction may be especially damaging if the area is in turn expected to have lower seasonal rainfall, as this would negatively affect the re-charge rate of aquifers.

Volunteer Network

Use the volunteer network as pseudo extension workers to offer training and information to smallholder farmers, facilitate information sharing processes, document indigenous practices, and/or create linkages with other supports. This is the niche value add of the Red Cross Red Crescent movement. The national societies are unlikely to have the capacity to do the extensive layering approach of other institutions, but the volunteer network is a huge asset. Extension services (or last-mile approaches) could take multiple forms. Agricultural extension in the form of agriculture practise or provision of climate or weather information is one possibility. However, in recent years Red Cross volunteers have been increasingly engaged in linking vulnerable people to specific supports, for example by supporting registration and case-management within government social safety net programs (e.g. Fiji Red Cross National Society) which are inherently linked to increasing climate resilience as they reduce underlying vulnerability, or by linking existing groups (e.g. mothers' clubs) to sources of support provided by other institutions. All of these are important options to consider

Use the volunteer network to conduct scoping research for potential interventions, such as surveying local communities on their needs, current agricultural practices and challenges, examples of autonomous adaptation, etc.



© IFRC

Policy

Take part in or make contact with members of regional dialogues and multi-regional platforms on food security. The Red Cross may already be a member of several of these (as shared by a KII) and this may offer an important arena for influence on food security policy in the region.

Engage in the 2021 first-ever UN Food Systems Summit (www.un.org/en/food-systems-summit) which may offer important visibility as well as learning relating to food security globally as well as in Southern Africa.

Research

Conduct or commission research into the differentiated needs of urban and landless people. An overwhelming majority of both studies and programmatic interventions to improve food security amidst climate change focus on small holder farming families, and to a lesser extent, small-scale pastoralists/agro-pastoralists. However, the distribution of populations (especially the larger, growing population of youth) in Africa will continue to change over time, with fewer families resembling the prototypical smallholder farming family. Linked with urban migration, and increasing inequality (such that some of the most vulnerable are landless day labourers or people with no labour capacity at all), there is a clear need to divert some of the attention towards these populations.

Conducting specific research on the food security and climate vulnerability of understudied populations in Southern Africa would increase understanding of the unique needs of these populations and enable more strategic investments to support them. Focuses of such studies could include the urban poor, day labourers, and other landless people, migrants or stateless people, as well as urban and rural people with no or low labour capacity (e.g. the chronically ill, disabled, elderly).

Conduct or commission impact evaluations as well as robust case studies of community capacity building programmes relating to food security. This study identified a dearth of robust evaluations for interventions which could help guide strategic investments. Engaging in additional research to explore more deeply the effectiveness of interventions or approaches identified within this report could support future investment decisions, both within and beyond the Red Cross movement. Further, supporting evaluation efforts within the Red Cross once the FbF drought programs become operational in the region and have successful triggers would also provide guidance on if and how to scale these systems.

More micro-case study research is needed to understand how particular programmes and approaches in different countries and regions may be impacted by the projected climate changes, and how adaptations can be and are already being implemented. Engaging and training members of the volunteer network to support such research, particularly if they are already familiar with smallholder farmers in their community, could be invaluable in capturing novel and important qualitative research as climate change continues to affect food security and smallholder farming in Southern Africa and around the world.

Annexes

Annex 1. Analytical Framework for examining interventions and practises aiming to increase food security

| | Intervention: | Answer | Additional notes/explanation |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------------------|
| A | Does the intervention/practise increase food supply? | | |
| B | Does the intervention/practise improve food access? | | |
| C | Does the intervention/practise improve quality of food consumption? | | |
| D | Does the intervention/practise benefit persons who are disproportionately food insecure? | | |
| E | Does the intervention/practice capacitate individuals, households, communities, organizations? | | |
| F | Does the intervention/practice increase social capital in the community? | | |
| G | Does the intervention/practise have a positive return on investment (benefits accrued by the beneficiary are the same or larger than the cost to implement it)? | | |
| H | Does the intervention/practise target the kind of stressor (eg. heat, dryness) that we expect to see more of in the region as a result of climate change? | | |
| I | Are there climate scenarios in which this intervention/practise would be disadvantageous or be maladaptive? | | |
| J | What are the sustainability factors or potentials of the intervention/practice? | | |
| K | Is there reason to believe the intervention/practise would have similar (or better) levels of effectiveness (as outlined in section A B,C & D), in the future environmental conditions we expect for the region? | | |
| L | Is there reason to believe the intervention would have similar (or better) levels of effectiveness (as outlined in section A B,C & D) in the future socio-political-economic conditions we expect in the future (e.g. different land use or distribution situations) for the region? | | |
| M | Is the intervention/practise at the right size or scale for a household to achieve meaningfully higher food security if they are a participant/recipient (e.g. the elimination of stunting within the household's members)? | | |
| N | Is the intervention/practise socially acceptable among the recipient/beneficiary population? | | |
| O | What are the links and relevance to climate-smart agriculture, linking climate change mitigation and adaptation, wider resilience building? | | |

Annex 2. Identified Interventions

- CCAFS/CGIAR, 'Scaling Up Climate-Smart Villages (CSVs) in East Africa' (Intervention from other region): <https://ccafs.cgiar.org/research/projects/scaling-climate-smart-village-models-east-africa>
- FAO, 'Aeroponics in Rwanda: A case study of a potato farmer' [Part of the FAO's African Roots and Tubers project]: <http://www.fao.org/in-action/african-roots-and-tubers/en/>, <http://www.fao.org/fao-stories/article/en/c/1332933/>
- FAO 'Hand-in-Hand Initiative' (Mozambique, Zimbabwe, Malawi, Angola + others not in Southern Africa): <http://www.fao.org/3/cb0746en/cb0746en.pdf>
- GardenAfrica, Fambidzanai Permaculture Centre, and Zimbabwe Organic Producers & Promoters Association, 'Livelihood Security in a Changing Environment: Organic Conservation Agriculture' (Zimbabwe): <https://static1.squarespace.com/static/52f220cbe4b0ee0635aa9aac/t/5356b182e4b0e10db1994008/1398190466339/Unlocking+Zimbabwe%27s+Organic+Potential+-+web+version.pdf>
- Practical Action Consulting U.K., 'Bambara nut production in Mutoko District in Mashonaland East Province (Zimbabwe): <https://afsafrica.org/wp-content/uploads/2019/05/agroecology-the-bold-future-of-farming-in-africa-ebook1.pdf>
- Ruzivo Trust, 'Beekeeping in Goromonzi' (Zimbabwe): <https://afsafrica.org/wp-content/uploads/2019/05/agroecology-the-bold-future-of-farming-in-africa-ebook1.pdf>
- Sprout Insure/ ACRE Africa/Etherisc, 'Blockchain Climate Risk Crop Insurance': www.climatefinancelab.org/project/climate-risk-crop-insurance
- USAID, 'Outsourced agricultural extension service in the Mutasa district of Zimbabwe' (Zimbabwe): <https://academicjournals.org/journal/AJAR/article-full-text-pdf/1F5C77334381> (peer-reviewed academic article)
- Various implementers, Farmer Support Programmes in South Africa: <https://academicjournals.org/journal/AJAR/article-full-text-pdf/1F5C77334381> (peer-reviewed academic article)
- WFP 'Virtual Farmers' Market: A digital solution connecting farmers to markets' (Zambia): <https://www.wfp.org/publications/2017-virtual-farmers%E2%80%99-market-digital-solution-connecting-farmers-markets>
- WFP Malawi 'Integrated Risk Management Programme (IRMP)' (Malawi): <https://www.wfp.org/publications/integrated-risk-management-programme-irmp-lessons-malawi>
- WFP Purchase for Progress, 'Improving livelihoods to achieve food security' (Malawi): <https://www.wfp.org/purchase-for-progress>
- WFP/Oxfam America: R4 Rural Resilience Initiative (Malawi, Zambia): <https://policy-practice.oxfamamerica.org/work/rural-resilience/r4-resilience-initiative/>

References

- Asfaw, S., Davis, B., Dewbre, J., Handa, S., & Winters, P. 2014. 'Cash transfer programme, productive activities and labour supply: evidence from a randomised experiment in Kenya'. *The Journal of Development Studies*. 50(8): 1172-1196.
- Baede, A.P.M., van der Linden, P. & Verbruggen, A. 2008. Annex II: Glossary. Climate Change 2007: Synthesis Report, Intergovernmental Panel on Climate Change (ed.). IPCC, Geneva.
- Bailey, S., & Harvey, P. 2015. State of evidence on humanitarian cash transfers. *Overseas Development Institute Background Note*. London: ODI.
- Bastagli, F., Hagen-Zanker, J., Harman, L., Barca, V., Sturge, G., Schmidt, T., & Pellerano, L. (2016). Cash transfers: what does the evidence say. *A rigorous review of programme impact and the role of design and implementation features*. London: ODI, 1(7).
- Battersby, J. & Watson, V. 2018. Addressing Food Security in African Cities. *Nature Sustainability* 1 (4): 153.
- Battersby, J. 2011. The state of urban food insecurity in Cape Town. Urban Food Security Series, No. 11. Kingston and Cape Town, South Africa: Queen's University and AFSUN.
- Battersby, J. 2020. South Africa's lockdown regulations and the reinforcement of anti-informality bias. Topical Collection: Agriculture, Food & Covid-19. Agriculture and Human Values.
- Bisaro, A., Wolf, S. & Hinkel, J. 2010. Framing climate vulnerability and adaptation at multiple levels: Addressing climate risks or institutional barriers in Lesotho? *Climate and Development* 2 (2), 161-175.
- Boillat, S. & Berkes, F. 2013. Perception and interpretation of climate change among Quechua farmers of Bolivia: Indigenous knowledge as a resource for adaptive capacity. *Ecol. Soc.* 18 (21).
- Brody, A., Demetriades, J. & Esplen, E. 2008. Gender and climate change: mapping the linkages. A scoping study on knowledge and gaps. Prepared for the UK Department for International Development by BRIDGE, Institute of Development Studies (IDS), University of Sussex, UK.
- Broome, A. & Seabrooke, L., 2012. Seeing like an International Organisation. *New Political Economy*, 17(1), pp. 1–16.
- Bryan, E., Deressa, T., Gbetibouo, G.A., and Ringler, C. 2009. Adaptation to climate change in Ethiopia and South Africa: options and constraints. *Environmental Science & Policy* 12 (4), 413-426.
- Chamberwa, M. & Stage, J. 2010. Climate change adaptation in developing countries: issue and perspectives for economic analysis, International Institute for Environment and Development (IIED), London WC1H 0DD, UK.
- Chanza, N. & Mafongoya, P. 2017. Indigenous-Based Climate Science from the Zimbabwean Experience: From Impact Identification, Mitigation and Adaptation. In Ajayi, O.C. & Mafongoya, P.L. (Eds). 2017. *Indigenous Knowledge Systems and Climate Change Management in Africa*; Technical Centre for Agricultural and Rural Cooperation: Wageningen, The Netherlands, pp. 67–94.

- Collier, P. 2007. *The Bottom Billion. Why the Poorest Countries are Failing and What Can Be Done About It.* Oxford University Press, Oxford, UK.
- Cresswell, J. 2003. *Qualitative, Quantitative, and Mixed Methods Approaches*, SAGE Publication.
- Crush, J. & Frayne, B. 2010. *The Invisible Crisis: Urban Food Security in Southern Africa.*
- De Schutter, O. 2014. *The Reform of the Committee on World Food Security: The Quest for Coherence in Global Governance.* CRIDHO Working Paper 2013/8. University of Louvain. 10.1007/978-94-007-7778-1_10.
- Denscombe, M. 2003. *The good research guide: second edition.* Philadelphia, USA: Open University Press, Long Beach.
- Deressa, T., Hassan, R., Ringler, C., Alemu, T. & Yesuf, M. 2009. Determinants of farmer's choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change* 19 (2), 248-255.
- Di Falco, S & Veronesi, M. 2013. How can African agriculture adapt to climate change? A counterfactual analysis from Ethiopia. *Land Economics* 89 (4), 743-766.
- Di Falco, S. 2014. Adaptation to climate change in in Sub Saharan agriculture: assessing the evidence and rethinking the drivers. *European Review of Agricultural Economics* 41 (3), 405–430.
- Dills, C.R. & Romiszowski, A. J. 1997. *The Instructional Development Paradigm: An Introduction.* Englewood, NJ. Educational Technology Publications, Inc.
- Dlamini, L.N. 2019. Determinants of commercial orientation and the level of market participation by women maize farmers in Eswatini: A case of the Highveld region. SA-TIED Working Paper #71. Southern Africa – Towards Inclusive Economic Development (SA-TIED). https://sa-tied.wider.unu.edu/sites/default/files/pdf/SATIED_Y5_WP71_Dlamini_Sep_2019.pdf
- FAO (Food and Agriculture Organization of the UN). 2017a. Achieving the Sustainable Development Goals requires investing in rural areas. FAO Agricultural Development Economics Policy Brief No.3. www.fao.org/economic/esa/policy-briefs
- FAO (Food and Agriculture Organization of the UN). 2017b. *The future of food and agriculture – Trends and challenges.* Rome: FAO.
- FAO (Food and Agriculture Organisation of the UN). 2020. Country Briefs: Eswatini. GIEWS - Global Information and Early Warning System. <http://www.fao.org/giews/countrybrief/country.jsp?code=SWZ>
- FAO, ECA and AUC. 2020. *Africa Regional Overview of Food Security and Nutrition 2019.* Accra. <https://doi.org/10.4060/CA7343EN>. Available at: <http://www.fao.org/3/ca7343en/CA7343EN.pdf>
- Frayne, B et al. 2010. *The State of Urban Food Insecurity in Southern Africa.* Urban Food Security 2: 1-56. Available at: www.afsun.org/wp-content/uploads/2013/09/AFSUN_2.pdf
- Gerber, R.E. 2014. *Applied Research Skills: Study Guide.* Nelson Mandela Metropolitan University, South Africa

- Hancock, B. 1998. Trent Focus for Research and Development in Primary Health Care: An Introduction to Qualitative Research. Trent Focus. University of Nottingham, UK.
- Horstmann, B. 2008. Framing Adaption to Climate Change: A Challenge for Building Institutions. Discussion Paper 23/2008. German Development Institute, Bonn.
- International Fund for Agricultural Development (IFAD). 2016. The rural development report: Fostering inclusive rural transformation. Rome: IFAD. www.ifad.org/www.ruralpovertyportal.org
- IRI (International Research Institute). 2021a. Temperature Time Scales. Available at: https://iridl.ldeo.columbia.edu/maproom/Global/Time_Scales/temperature.html?bbox=bb%3A30.459%3A-27.469%3A32.994%3A-25.639%3Abb®ion=bb%3A30.459%3A-27.469%3A32.994%3A-25.639%3Abb&seasonStart=Oct&seasonEnd=Mar
- IRI (International Research Institute). 2021b. Precipitation Time Scales. Available at: https://iridl.ldeo.columbia.edu/maproom/Global/Time_Scales/precipitation.html?bbox=bb%3A30.459%3A-27.469%3A32.994%3A-25.639%3Abb®ion=bb%3A30.459%3A-27.469%3A32.994%3A-25.639%3Abb&seasonStart=Oct&seasonEnd=Mar
- ISF. 2018. Protecting Growing Prosperity: Agricultural insurance in the developing world.
- Knoema. 2020. Eswatini – Sugar cane production quantity. World Data Atlas. <https://knoema.com/atlas/Eswatini/topics/Agriculture/Crops-Production-Quantity-tonnes/Sugar-cane-production>
- Kurukulasuriya, P. and Mendelsohn, R. 2008. Crop switching as an adaptation strategy to climate change. African Journal of Agriculture and Resource Economics 2 (1), 105-126.
- M. Ravillon, S. Chen & P. Sangraula. 2007. New Evidence on the Urbanization of Global Poverty, Population and Development Review 33 (4), 667-702.
- Matthews, B. & Ross, L. 2010. Research methods: A practical guide for the social sciences. England: Pearson Education.
- Matsebula, S. 2019. Bringing Eswatini's youth into agriculture. *Opinion Editorial*. Eswatini Economic Policy Analysis and Research Centre (ESEPARC). <https://www.separc.co.sz/2019/07/30/bringing-eswatinis-youth-into-agriculture/>
- May, J. 2020. Integrating a human rights approach to food security in national plans and budgets: The South African Development Plan, Chapter 2. In: Durojaye, E. & Mirugi-Mukundi, G. (eds). 2020. Exploring the link between poverty and human rights in Africa. Pretoria University Law Press (PULP).
- Mendelsohn, R., Nordhaus, W.D. & Shaw, D. 1996. Climate Impacts on aggregate farm value: accounting for adaptation. Agricultural and Forest Meteorology 80 (1), 55-66.
- Ministry of Agriculture. 2018. Strategic Plan (2018 – 2023). Government of the Kingdom of Eswatini.

http://www.dairyboard.co.sz/images/MOA%20STRATEGIC%20PLAN_WP_2020.pdf

- Mouton, J. 2001. How to succeed in your Master's and Doctoral Studies. A South African Guide and Resource Book. Van Shaik Publishers, Pretoria.
- Myers, J et al. 2011. Responding to climate change in southern Africa – the role of research. South African Medical Journal 101 (11), 820-822. www.samj.org.za/index.php/samj/article/view/5268/3675
- Neuman W.L., 2011. Social research methods: Qualitative and quantitative approaches. 6th ed. Boston: Pearson Education.
- Patton, M.Q. 1990. Qualitative Evaluation and Research Methods. 2nd ed. Newbury Park, CA: Sage.
- Pharatlhathe, K. & Byiers, B. 2019. Youth unemployment and the role of regional organisations: The Case of the Southern Africa Development Community (SADC). Political Economy Dynamics of Regional Organisations in Africa. European Centre for Development Policy Management (ECDPM). <https://ecdpm.org/wp-content/uploads/DP-252-Youth-unemployment-and-the-role-of-regional-organisations.pdf>
- Research and Markets. 2020. Sugar Manufacturing Industry in Eswatini, 2019 Report - Sugar Production is forecast to Increase by 10% to 800,000 Tons in 2019/2020. January 22. *GlobeNewsWire*.
- Reddy, P. S. 2016. Localising the Sustainable Development Goals (SDGs): The role of local government in context. African Journal of Public Affairs 9(2): 1 – 15.
- Ribot, J. 2013. Risk and Blame in the Anthropocene: Multi-scale Climate Change Analysis. Conference Paper #7, Food Sovereignty: A Critical Dialogue International Conference September 14-15. Program in Agrarian Studies, Yale University. *Journal of Peasant Studies*.
- Rogerson, C.M. 2016. Responding to Informality in Urban Africa: Street Trading in Harare, Zimbabwe. *Urban Forum* 27(2): 229-51.
- Ruane, J. 2005. Essentials of research methods: a guide to social science research. Cornwall: Blackwell Publishing.
- Shewmake, S. 2008. Vulnerability and the impact of climate change in South Africa's Limpopo River Basin, Discussion Paper 00804, IFPRI, Washington DC.
- Sikuka, W. 2020. Sugar Annual: Republic of South Africa. Report Number: SF2020-0018. United States Department of Agriculture (USDA): Foreign Agricultural Service. Global Agriculture Information Network (GAIN).
- Southern African Development Community (SADC). 2020a. SADC Regional Response to COVID-19 Pandemic: With focus on health system, labour, food security, law enforcement, air travel, transport and trade facilitation in the region. Bulletin No. 9. <https://www.sadc.int/news-events/news/bulletin-9-sadc-regional-response-covid-19/>
- Southern Africa Development Community (SADC). 2020b. SADC Regional response to COVID-19 Pandemic: With focus on Health, Transport and Food Security Sectors.

Bulletin No. 11. https://www.sadc.int/files/9715/9865/2361/COVID-19_11th_Report_EN_mail.pdf

- Speranza, I. & Scholz, I. 2013. Special Issue “Adaptation to climate change: Analysing capacities in Africa. Regional Environmental Change.
- Statistics South Africa. General Household Survey 2018 [dataset]. Version 1. Pretoria: Statistics SA [producer], 2019. Cape Town: DataFirst [distributor], 2019.
DOI: <https://doi.org/10.25828/9tmn-fz97>
- Stringer, L., Mkwambisi, D., Dougill, A. & Dyer, J. 2010. Adaptation to climate change and desertification: Perspectives from national policy and autonomous practice in Malawi. *Climate and Development* 2, 145-160.
- Stuart, E. 2011. Making growth inclusive: Some lessons from countries and the literature. www.oxfam.org
- The International Fund for Agriculture Development (IFAD). 2016a. Policies for effective rural transformation, agriculture and food systems transition. Rome: IFAD.
- The International Fund for Agriculture Development (IFAD). 2016b. Rural development report: Fostering inclusive rural transformation. Rome: IFAD
- UNECA, 2011. The African gender and development index. Addis Ababa: United Nations Economic Commission for Africa.
- United Nations. 2017. The Sustainable Development Goals report. New York: UN.
- van Niekerk, J. & Wynberg, R. 2019. The trade in *Pelargonium sidoides*: Rural livelihood relief or bounty for bio-buccaneers? *In* Jacobs, P. 2019. Equitable Rural Socioeconomic Change: Land, Climate Dynamics, and Technological Innovation.
- Vermeulen, S., Park, T., Khoury, C.K., Mockshell, J., Bene, C., Thi, H.T., Heard, B., & Wilson, B. 2019. Changing diets and transforming food systems. CCAFS Working Paper no. 282. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
- Ziergvol, G. & Frayne, B. 2010. Climate Change and Food Security in Southern African Cities. Urban Food Security Series No.8. Queen’s University and AFSUN: Kingston and Cape Town.