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# COMMERCIAL TOBACCO PRODUCTION AND CLIMATE CHANGE ADAPTATION IN MAZOWE, ZIMBABWE

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# ACRONYMS

| | |
|---|---|
| **AEZ** | Agro-Ecological Zone |
| **APRA** | Agricultural Policy Research Africa |
| **AREX** | Agricultural Research and Extension Services |
| **CA** | communal area |
| **DoV** | Dimensions of Vulnerability |
| **ENSO** | El Niño-Southern Oscillation |
| **FTLRP** | Fast Track Land Reform Programme |
| **GHG** | greenhouse gas emissions |
| **GMB** | Grain Marketing Board |
| **GNU** | Government of National Unity |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **ITCZ** | Inter-Tropical Convergence Zone |
| **JV** | joint venture |
| **LSCF** | large-scale commercial farmer |
| **PAR** | Pressure and Release |
| **RCPs** | Representative Concentration Pathway |
| **SSCF** | small-scale commercial farmer |
| **TTL** | tribal trust lands |
| **ZINGSA** | Zimbabwe National Geospatial and Space Agency |

# EXECUTIVE SUMMARY

There has been an increasingly well-documented, rapid rise in tobacco production over the last couple of decades in Mazowe, Zimbabwe, despite growing public health concerns about lung cancer and nicotine's addictive capacities in the wealthier countries of the West – even affecting the South African market. This has been accompanied by a shift away from its production almost completely on large-scale farms towards predominantly small-scale farms, chiefly as a result of the Fast-Track Land Reform Programme (FTLRP) which oversaw a redistribution of roughly 10 million ha of farmland to 1.3 million smallholder farmers. To date, less consideration has been given to the implications of climate change for tobacco production. Given the hopes that it can make a serious contribution to poverty reduction and food security, it is of increasing importance to understand these implications, to identify the most relevant and/or effective adaptation options and to assess the viability of their successful adoption. Here, we present (to our knowledge) the first fine-grained, qualitative bottom-up analysis of the implications for commercial tobacco production of climate change impacts in Zimbabwe. This report outlines the broad effects of climate change on cropping strategies in communal land, A1 and A2 farms in Mvurwi, and analyses the differentiated vulnerability, resilience and adaptive capacities found across the farmers inhabiting these different types of land tenure.

The central message of this report is that when production is rainfed, tobacco is among the riskiest of the crops that are locally grown, both from a climate and a commercial perspective. These risks are accentuated by a rainy season which, since the 1980s, has become shorter, characterised by more erratic rainfall and more consecutive days with no rainfall. Our key findings are as follows:

1. Climate change and variability are already causing problems for tobacco production and have in the past 20 years already been, at times, catastrophic for Zimbabwean agriculture.

2. Tobacco production appears to be implicated in higher levels of deforestation in Mvurwi.

3. Farmers are already adapting, but even with these adaptations tobacco and maize are riskier crops to grow than traditional grains.

4. There are broad differentiations in vulnerability and resilience across and within communal area (CA), A1 and A2 farmers, resulting from uneven access to 'the means of adaptation'.

5. Tobacco farming can credibly be considered a land reform 'success story', but for whom?

6. Contract farming and the Makoronyera (the black-market) appear to be key 'push factors' in choices around tobacco production, especially at the margins.

A consideration of these findings prompts us to recommend the following adaptation options aimed at those most vulnerable to climate impacts, whilst identifying some of the underlying factors which will impinge upon their viability:

1. Investment in infrastructure which provide access for farmers who lack it

2. Explore possibilities for switching, in some cases, from tobacco to better-adapted crops

3. Stronger support for the commercialisation of better-adapted crops

4. Stronger support for existing agricultural extension services

5. Form cooperatives to strengthen collective bargaining capacity in tobacco price negotiation

# 1 INTRODUCTION

The implications of climate change for agricultural commercialisation – and the implications of agricultural commercialisation for climate change – are profound. On the one hand, agricultural production is by nature highly sensitive to climate change and variability. On the other, commercial agricultural production for international food markets is one of the lead sectors generating the levels of greenhouse gas emissions (GHGs) that are driving anthropogenic climate change (Vermeulen et al., 2012; IPCC, 2014). And yet, while perhaps most farmers across the Global South bear little or no responsibility for the sector's carbon footprint, they are disproportionately exposed to climate change and variability right now. These are not just abstract or trivial effects: Zimbabwe is ranked in the top 20 countries in the world most affected by the impacts of extreme weather events from 2000–2019 (Eckstein, Künzel and Schäfer, 2021). This research takes place against a background in which different parts of Zimbabwe have experienced three to six bad rainfall seasons between 2014–2019 (FEWS NET Southern Africa, 2021). Moreover, the Zimbabwe National Geospatial and Space Agency (ZINGSA, 2020) finds that Zimbabwe's climate has changed so dramatically since the 1980s – principally via a reduction in rainfall and an increase in average and maximum temperatures – that its agro-ecological zone classification system has needed to be redrawn. One of the changes is the identification of a new zone that is so dry, it is unsuitable for the cultivation of even the best-adapted crops (see Section 3 for more detail).

The complicity, globally, of large-scale commercialised agricultural production in this deeply unjust outcome is a bitter irony, one which raises fundamental questions about the fairness and sustainability of the intensive agricultural model (see i.e. Newsham et al., 2018a; Struik & Kuyper, 2017). More immediately, the risks posed by climate change and variability are becoming acutely evident for Zimbabwe's small- and medium-scale tobacco producers in areas of the country such as the Mazowe District, where tobacco is grown commercially. Tobacco has long been part of the history of Mazowe, and readily finds its way into international markets (Scoones et al., 2020). Its production has historically been the preserve of large-scale landowners. However, this changed from the early 2000s onwards, with the implementation of the FTLRP. This phase of land reform redistributed approx. 10 million ha of farmland to 1.3 million smallholder family farmers in plots known as A1 farms (with farm sizes of 5–20ha), and 32,371 medium-scale farms of 50–200ha (Hanlon, Manjengwa and Smart, 2013, p. 20; Ngarava, 2020), inducing two large changes in tobacco production. First, whilst prior to the FTLRP, 98 per cent of tobacco was grown on large farms, by 2012, 53 per cent was grown by small scale farmers and 26 per cent by medium-scale farmers (Sakata, 2018). Second, while in 1980 there were not much more than 1500 tobacco producers, by 2018 that number had soared to 124,000 registered tobacco producers (TIMB, 2018; Garwe, 2019). Meanwhile, although the quantity of tobacco grown plummeted at the start of the 2000s, when large farms were seized and redistributed it has now increased almost to its former levels (TIMB, 2016).

Both at the time the FTLRP happened and, in the decades since, it has been denounced as a catastrophe for Zimbabwe (Matondi, 2012). Other commentators contend that this framing of 'failure' fails to engage with the tobacco 'success' story currently underway (Hanlon, Manjengwa and Smart, 2013; Dube and Mugwaga, 2017; Scoones et al., 2018). Ngarava goes as far as to recommend "the specialisation and training of new [tobacco] farmers to improve productivity", to increase yields (2020, p. 1). Such recommendations fit squarely within the predominant agricultural development paradigm, which sees cash crops like tobacco as a key mechanism through which agriculture can reduce hunger, poverty and inequality (Christiaensen, Demery and Kuhl, 2010; Lowder, Skoet and Raney, 2016).

To date, however, there has been less research on the implications of climate change for tobacco production in Zimbabwe. Nhemachena and Mano (2007), Mugabe et al. (2013) and more recently the World Bank (2021) have produced downscaled climate projections for Zimbabwe which suggest more adverse conditions for the production of tobacco, among other crops, further into the 21st century. Yet these 'top-down' analyses feature methodological and practical limitations which, as we explore in Section 2, limit their utility to farming

decision-making processes in the short-medium term. This research starts to fill these tobacco-specific and methodological gaps. It presents (to our knowledge) the first fine-grained, qualitative bottom-up analysis of the implications for commercial tobacco production of climate change impacts in Zimbabwe. Our data collection, based upon research conducted in three field sites in Mvurwi and Mazowe, is itself small-scale, but rooted in and supplemented by larger quantitative and qualitative studies in the area that have been conducted under the auspices of the Agricultural Policy Research Africa (APRA) consortium (Chitapi and Shonhe 2020; Scoones et al., 2020).

This report outlines the broad effects of climate change on cropping strategies in communal land, A1 and A2 farms in Mvurwi, but in its analytical sections concentrates chiefly on the implications for tobacco production, as the most commercially important crop across our field sites. The key finding in this report is that when rainfed rather than irrigated, tobacco is among the riskiest crops that can be grown, both from a climate and a commercial perspective. This risk is becoming greater owing to a rainy season which, since the 1980s, has become shorter, characterised by more erratic rainfall and more consecutive days with no rainfall. This is the case even on land which, like that found across our field sites, offers ideal agro-ecological conditions for tobacco production in Zimbabwe. Our analysis focuses on, first, the differentiated vulnerability, resilience and adaptation profiles of farmers in different circumstances that correspond with varying degrees of benefit derived from efforts to commercialise tobacco; and second, the determinants of access to the resources, labour, markets, networks and other prerequisites of commercially viable, climate-resilient tobacco production.

The paper is structured as follows. Section 2 outlines the conceptual and methodological foundations of the research. At the core of our methodology is a participatory vulnerability analysis toolkit (Ulrichs et al., 2015), which is grounded in and adapted from the 'pressure and release' framework elaborated first by Piers Blaikie and colleagues (Wisner et al., 2004), and supplemented by thinking on access by other political ecologists (Ribot and Peluso, 2003). Section 3 introduces the field sites of Chiweshe, Hariana and Arowan, where we worked with communal, A1 and A2 farmers respectively, and sets them in the wider context of commercial tobacco production in Mazowe, along with a broader consideration of the agricultural implications of climate projections for Zimbabwe and Southern Africa. Section 4 is conceived in terms of two broad objectives. First, it provides vulnerability profiles for each of our field sites, and second, turns to an analysis of vulnerability, resilience and adaptive capacity across the sites more closely focused on tobacco, with a view to teasing out the implications for adaptation options. Section 5 concludes the paper with a distillation of key findings relevant to understanding the extent to which commercial tobacco production, when practised under rainfed conditions, provides a poor vehicle for resilient agriculture, poverty reduction and the empowerment of women and girls, the core concerns of APRA research. It then proceeds to discuss adaptation options and the determinants of their viability.

# 2 METHODS AND CONCEPTS

## 2.1 Conceptual and methodological underpinnings

### 2.1.1 Top-down modes of vulnerability analysis

This research is a 'bottom-up' vulnerability analysis of commercial tobacco production, understood within the context of the broader range of crop and livestock farming activities in the Mazowe district of Mashonaland Central, Zimbabwe. Here, we elaborate and contextualise this term, and explain how it relates to, complements and diverges from the 'top-down' approaches to projecting and understanding that tend to dominate climate change discourse and policy. Conway et al. (2019, p. 504) define bottom-up approaches as ones which seek to characterise contemporary and recent historical vulnerability to climate impacts, and further to "locate climate change within a broader array of vulnerabilities and behaviours". As such, bottom-up approaches are a counterpoint to "top-down" approaches, which entail "taking climate model projections as a starting point to assess physical and ecological impacts, and using multiple projections to assess ranges of uncertainty for future states" (ibid., p. 503). Top-down approaches are crucial for illustrating why a human response to climate impacts need to be international and cannot be confined to the national and sub-national level. However, they are ill-suited to understanding vulnerability, resilience and adaptive capacity contemporaneously, or for informing the short to medium-term timeframes within which farming decisions typically have to be made (Dessai, O'Brien and Hulme, 2007; Wilby and Dessai, 2010; Newsham and Thomas, 2011).

To understand this point more fully, we need briefly to consider the levels of uncertainty inherent in regional and global climate modelling. There is, of course, uncertainty over future levels of GHGs from human activity. This is commonly overcome by using different scenarios envisaging varying levels of GHGs over the course of the 21st century, often referred to as representative concentration pathways (RCPs). But there is also uncertainty over which models most accurately capture future climate change (Rowell et al., 2016). In no small measure owing to this uncertainty, ensembles of models are used which generate a range of projected rises in temperature and precipitation, and this is one key variable in the modelling of climate impacts. It is possible to represent and communicate this uncertainty at the global and regional levels by identifying a range of models and setting out the range of variance between their projections. Hence, for instance, based on four different RCPs, the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report (IPCC, 2014, p. 8) projects (with medium confidence) that global mean surface temperature change for 2016–2035, relative to 1986–2005, "will likely be in the range 0.3°C to 0.7°C". But from the perspective of formulating adaptation policy in specific contexts, this leaves us with as many questions as answers. First, projected impacts are different at 0.3° C than they are at 0.7° C. Second, this is a global average temperature projection, and the level of warming will exceed or stay below this level depending on where in the world it is happening. More crucially still, the modelling that does allow us to make this projection with some confidence is not, unfortunately, sufficiently concrete about the distribution, timing, frequency or intensity of the climate impacts at the local level – all of which are key to adaptation decision-making processes (Wilby and Dessai, 2010), be they in relation to agriculture or other activities. Unfortunately, the efforts to 'downscale' the model projections to sub-national level have not resolved these difficulties (ibid.).

### 2.1.2 Bottom-up approaches and political ecology

These limitations of top-down approaches to adaptation decision-making provide entry points for a bottom-up approach, and at least in part explain why we have used a bottom-up approach in this research. Attempts to analyse contemporary and historical vulnerability to climate impacts can give us a sense of the extent to which agricultural practice has been able to withstand climate impacts, and where the limits to what can be withstood lie (Broersma, Downing and Thomas, 2004). Understanding where the limits lie, and gaining insight into previous adaptations to climate impacts and how they modified these limits (Newsham and Thomas, 2011), permits an analysis of (the limits to) current levels of adaptive capacity and, therein, a basis for identifying what adaptation policy support might be used further to bolster existing capacity.

This vein of thinking to a significant extent informed the proliferation, in the 2000s and 2010s, of vulnerability (and adaptive capacity) analysis toolkits (e.g. Daze, Ambrose and Ehrhart, 2009; Ibrahim and Ward, 2012; IISD, 2012). The toolkit we used to gather the data for this research emerged within this context. Methodologically, it is a modified iteration of a participatory vulnerability analysis toolkit (Ulrichs et al., 2015). Our toolkit is very similar to others in a number of ways, and not least in its deployment of participatory methods as a way of understanding local-level vulnerability to climate impacts. What distinguishes it from these is that it is explicitly grounded, conceptually, in a long tradition of trying to understand vulnerability not principally in terms of the effects and characteristics of a particular environmental hazard. Instead, the focus is on the interaction of environmental hazards with the causes and distribution of exposure and vulnerability to harm across a society (for overviews of these different traditions see Adger (2006) or Eakin and Luers (2006)). This concern resonates more broadly with a diffuse area of work known as political ecology, which provides a rich array of conceptual and methodological underpinnings for understanding human-environmental relations, with particular attention paid to matters of politics and justice. Here is not the place to review the field (for that, see Forsyth, 2003; Bryant, 2015; or Robbins, 2020). But in the context of climate change adaptation and agricultural commercialisation, our engagement with political ecology is chiefly concerned with:

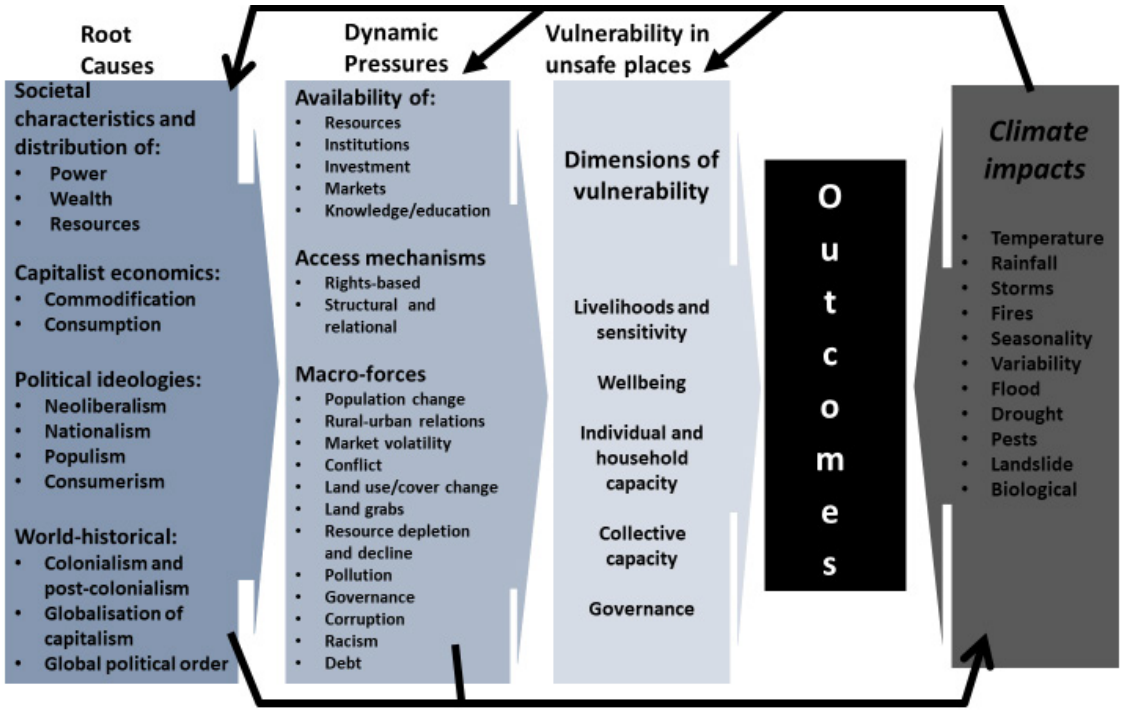
a. How vulnerability and resilience in the face of climate impacts is shaped by the power relations governing resource access (Ribot and Peluso, 2003; Wisner et al., 2004).

b. The local manifestations of national and global political economy dynamics which enable and constrain courses of action – in this case, particular forms of agricultural commercialisation – across the different social groups found in our field sites (Escobar, 2010; Peet, Robbins and Watts, 2010).

### *2.1.3 Core characteristics of our modified Pressure and Release (PAR) Framework*

The underlying causal logic of PAR is the 'progression of vulnerability': root causes, dynamic pressures and unsafe conditions, in combination with the 'trigger event' of an environmental hazard, lead to potentially disastrous outcomes. Drawing on Wisner et al. (2004, especially p.p. 21–45) and Wisner, Gaillard and Kelman (2012), the progression of vulnerability can be understood as follows. At the heart of the framework is the 'risk space' in which disasters can and do occur, and which is intended to emphasise that the occurrence of disasters can only be understood through looking both at hazards and vulnerability together. The magnitude of

**Figure 2.1: Modified PAR Framework**




Source: Adapted from Wisner et al. (2004)

the disaster, it follows from this assumption, is a function of the characteristics of the hazard, in combination with the levels of vulnerability of the people exposed to the hazard, and is captured by the mnemonic DR = H x V. The rest of the framework is geared toward identifying the causal chains which give rise to disasters, with hazards on one side and vulnerability on the other. A large part of the exercise is understanding the vulnerability profile of lives and livelihoods in a specific location and documenting patterns of differentiation in levels and types of vulnerability. The more immediate explanations for such patterns of differentiation can be accounted for through an exploration of 'dynamic pressures' upon unsafe lives, livelihoods and locations. Dynamic pressures comprise often larger-scale external factors acting on and across specific places and groups of people. Dynamic pressures might range from 'societal deficiencies', such as level of state or other forms of support for disaster preparedness (and recovery), to societal exclusionary dynamics unfolding along lines of class, gender, age, ethnicity etc. They might also take the form of broader macro-level processes, such as structural adjustment, inflation, rapid increase in urban informal settlements, political upheaval, conflict, changes in the extent to which the logic of (local variants of) capitalism modify social relations, etc. Understanding dynamic pressures, in turn, requires us to trace the root causes of vulnerability, deriving from and being driven by longer-run historical processes. These may be distributive in character, i.e., the distribution of power, resources and wealth across a given society. They may be ideological, around the nationalist, militarist, capitalist, consumerist or other ideologies which characterise the political settlement within and across societies. In all cases, attention to a deeper, longer history is required.

In our model, this logic remains intact, but we have made three modifications and two innovations to the framework which better suit our purpose and focus. First, we narrow the range of hazards in the framework's rightmost column to those related most directly to climate change. Second, with a view to operationalising the framework methodologically, in the guise of a participatory vulnerability analysis toolkit (Ulrichs et al., 2015), we adjusted the third column from the left. We inserted within it what we term the five 'dimensions of vulnerability' (DoV): livelihood strategies, wellbeing, individual capacity, collective capacity and governance. Each of the five DoV was assessed by the participatory tool we deemed most useful for understanding that particular dimension (see Newsham et al., 2018b for a more detailed breakdown of methods chosen for each dimension). The tools were implemented in a particular sequence, to build up and triangulate information collected in groups, and supplemented with semi-structured interviews. Third, the impacts of climate change can be not just be immediate but also cumulative, irregular and attritional, in ways that do not always give rise to a single, time-bound 'disaster event'. They might also take a form that is implicated in the reproduction of poverty, without ever manifesting as a disaster: for instance, a combination of lower and/or erratic rainfall which adversely affects crop yield and quality annually, rather than leading to the failure of a single harvest. For this reason, we swapped the 'disaster risk' at the centre of the framework for a focus on the broader 'outcomes'.

The first innovation is to locate thinking around access within the PAR model itself, rather than as the adjunct 'access model' which appears in chapter 3 of At Risk (Wisner et al., 2004). While access is an important component of their approach, it is unwieldy, in terms of data analysis and presentation, to have to use two frameworks. We suggest that one may suffice, particularly to the extent that access can itself be conceived as a dynamic pressure, and, therein, more easily incorporated into the PAR model. Rather than trying to shunt the access model in its entirety into the PAR diagram, we use the comparatively pared-back approach of Ribot and Peluso (2003), with its focus on rights-based, structural and relational mechanisms of access. Our second innovation is an attempt to visualise better the relational, mutually constitutive character of the social, political, economic and ecological processes generative of vulnerability than we have seen in previous iterations of the PAR framework. This is the result of bringing the framework more explicitly into contact with thinking done within the ambit of the relational ontological turn. For reasons of space, we elaborate on the significance and utility of doing this only in Naess et al. (in prep).

## *2.2 Participatory vulnerability analysis toolkit*

As mentioned above, the empirical research was guided by a participatory vulnerability analysis toolkit (Ulrichs et al., 2015). It was undertaken within three field sites: Chiweshe, on communal land; Hariana, a settlement characterised by A1 farms; and Arowan, the site of larger A2 farms (see Figure 2.1). All of these sites fall within the Mvurwi area of Mazowe district, in Mashonaland Central. The toolkit was designed primarily for collecting data on the five DoV at the heart of our conceptual framework. In brief, these dimensions can be characterised as follows:

1. **Livelihoods and sensitivity–** the livelihood activities are undertaken by people within the field sites, in particular those related to farming

and agricultural commercialisation, and levels of exposure and sensitivity of these livelihoods to climate impacts.

2. **Wellbeing–** the indicators of wellbeing as locally understood, with a view to understanding the distribution of access to the determinants of wellbeing (i.e. food, housing, capital etc).

3. **Individual and household adaptive capacity–** the extent and distribution of knowledge, skills, experience, assets and other means by which individual farmers and households adapted agricultural activity to climate variability and (anthropogenic) change.

4. **Collective adaptive capacity–** the extent and distribution of access to collective mechanisms of protection and adaptive capacities, such as mechanisms of labour and resource pooling across a location, the presence of state and private actors providing resources such as agricultural extension, credit, welfare or famine relief.

5. **Governance and power relations–** the quality of relations and level of presence, locally, of key state, civil society and private sector actors involved in the provision of goods and services associated with collective protection and adaptive capacity, as well as the power relations, formal and informal, which impinge upon the distribution of such provision.

To some extent, the toolkit was also able to capture elements of the dynamic pressures bearing upon the DoV, and to characterise the environmental hazards locally deemed most harmful to agricultural activities. It was not, however, designed to furnish data on the underlying root causes of vulnerability; and indeed this lack of attention to wider historical, social, political and ecological processes has been deemed a fundamental shortcoming of much participatory research (Cooke and Kothari, 2001; Hickey and Mohan, 2005). Our main sources of data for these wider processes came in part from other elements of APRA research, and in particular, the political economy work conducted in Zimbabwe (Shonhe, 2018; 2021; Shonhe, Scoones, and Murimbarimba, 2020), and in part from engagement with broader literature focused on climate change adaptation and agricultural commercialisation against a background of agrarian change in Zimbabwe.

## 2.3 Study sites and sampling

Our study comprised three field sites: Chiweshe, a communal area; Hariana, an A1 farm; and Arrowan, an A2 farm, all found in the Mazowe district of Mashonaland Central. A detailed description of each site is found in Section 4.1; here we cover only the rationale for site selection. See Table 1 for details on sampling and participants. Such is the centrality of post-2000 land reform in refashioning the political economy of access to productive resources in agrarian Zimbabwe, that any attempt to understand vulnerability to climate impacts would be incomplete without investigating the dynamics of differentiation (see i.e. Scoones et al., 2018) already evident across these three types of land tenure. Chiweshe, Hariana and Arrowan were specifically selected in large measure because:

a. They had already featured in prior APRA studies, and therefore allowed triangulation and contextualisation of data.

b. They could be identified, using existing APRA data, as sites in which substantial levels of tobacco production were occurring.

c. They were well-known to the agricultural extension staff who facilitated field site access, had detailed knowledge of them and longstanding, good relations with their inhabitants.

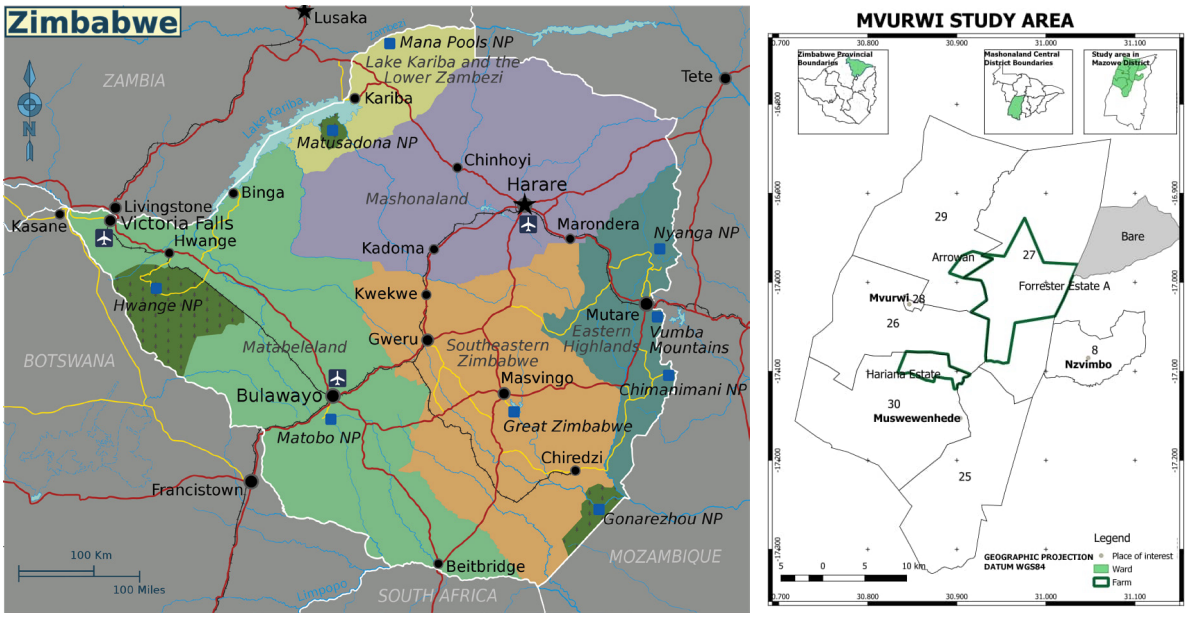
**Table 2.1: Sampling and participants details**

| Farming models | Number of households per sector per site | Number of in-depth interviews carried out per field site | Number of focus group discussion participants | Participation in focus group discussions in percentage per gender | | Average area owned (ha) |
|---|---|---|---|---|---|---|
| | | | | Women | Men | |
| A2 farmers | 319 | 2 | 5 | 20 | 80 | 54.2 |
| A1 farmers | 4529 | 8 | 17 | 59 | 41 | 4.9 |
| Communal lands | 2709 | 8 | 15 | 33 | 67 | 2.5 |

Source: Authors' own

The participatory methods were conducted with research participants over four to five days per site, entailing a mix of group exercises and semi-structured interviews. On day one participants engaged in a transect walk and village mapping wellbeing ranking exercise. On the second day, they produced historical timeline and climate trends and livelihood strategies and seasonal calendar. On day three, participants were involved in changing farming practices and crop ranking exercises. On the fourth day, participants completed a climate risk and coping mechanism matrix. Lastly, on day five, participants conducted institutional mapping and Venn diagrams. The group exercises and interviews took place mostly in Shona, the most widely spoken local language, facilitated and run by lead Zimbabwe researcher Shonhe, and co-researcher Bvute, with initial training and facilitation input, as well as climate change adaptation expertise from Newsham. Access to field sites was expertly facilitated by Mr Athanas Chimombe of the Ministry of Agriculture's Agricultural Research and Extension Services (AREX) arm, with assistance from Mr Edwis Bonga and Mrs Selina Simende.

**Figure 2.2: Map of field sites within Mvurwi, Mazowe District**




**Note:** The district is situated nearly 100km north-west of Harare and is classified as a high potential farming region, (natural region 2 – NR II)
Source: (WT-shared) Shaund, Wikimedia Commons (2010), CC-BY-SA 4.0; Authors' own

# 3 CONTEXTUALISING TOBACCO FARMING, COMMERCIALISATION AND CLIMATE CHANGE IN ZIMBABWE

To inform the analysis of vulnerability to climate impacts in our field sites, this section sets out the consideration of historical, contemporary and future climate change and variability against a background of changes in key dynamic pressures, rooted particularly in changes to land ownership and access brought about since 1980 and accelerated dramatically from the early 2000s, via the FTLRP. We briefly chart the consequences of these changes for the production of maize and tobacco, the two key crops grown in Mvurwi for subsistence and commercial purposes.

## *3.1. A brief history of land reform and tobacco production in Zimbabwe*

European settlers established commercial farms and mines in the Mazowe District of colonial Zimbabwe between 1890 and 1930 (Kwashirai, 2006). The establishment of farms followed the change of focus from mining to agriculture, especially in 1908 when the British South African Company discovered that the second Eldorado that Rhodes had anticipated would not be found. A series of laws were introduced to facilitate the appropriation of land from Africans who had to be resettled in barren and drier lands in the reserves, now known as communal lands. The colonial agrarian economy during this time was largely dependent on state support which ensured that colonial settlers got agricultural funding while the production and accumulation potential for the black producers, who were eventually converted into labour in the white economy (farms, mines and nascent industry) (Arrighi, 1970; Phimister, 1974). Zimbabwe was divided into five agro-ecological zones (AEZs) which receive varying rainfall amounts and are endowed with dissimilar soil types (Vincent and Thomas, 1960; ZINGSA, 2020). Capturing and classifying the agro-ecological characteristics of these zones, as well as their changing spatial distribution and extent (see Section 3.2.2 for more detail), has not solely been a neutral matter of scientific curiosity or an innocent aid to land use planning. It has also been entangled in the politics of land distribution and redistribution throughout Zimbabwe's colonial and post-colonial history. Colonial dispossession relegated Africans to barren and drylands in the formerly tribal trust lands (TTL) – now communal areas – while the white farmers occupied the best lands in regions I, II and III. Where they occupied the drier areas, it was by choice and in line with the planned agricultural production. The land sizes for the drier regions IV and V were large to enable livestock production which was more predominant in these areas.

Initially, in 1907, the British South African Company which managed the colony launched a commercial farming programme for tobacco, maize, cotton, wheat, sorghum, groundnuts, and sunflower. By 1909, the Department of Agriculture was established as well as key technical institutions such as agricultural research stations which provided agriculture advisory service support to settler farmers (Kwashirai, 2006). The colonial government in 1912 established a Land Bank which was critical to settler success, which provided cheap loans for the purchase of farms, equipment, and other inputs (Kwashirai, 2006, p. 543). The production of tobacco and maize received major research and financial support because of their commercial and food value. In 1901, the first European settlers began growing tobacco in Mvurwi. By 1908, a third of settler farmers grew tobacco as a key cash crop (Rubert, 1998, p. 2; Kwashirai, 2006). Mvurwi became a major centre for flue-cured Virginia tobacco production with the crop becoming a critical contributor to the national economy by the 1920s. The Mvurwi area concentrated on tobacco production, alongside maize, wheat, and soybean production. Beef production for export to the European markets was another key activity during this era. Massive investments in infrastructure (dams, roads, etc.), as well as subsidies for inputs, made this agricultural development possible. Prior to 2000, most of the commercial farms in this area carried out year-round agriculture using irrigation with water sourced from dams (built on the farms) and perennial rivers and streams. By contrast, smallholder farming was viewed as backward and primitive and in need of improvement, rather than investment, even though most maize was produced by smallholder African farmers, especially in the Chiweshe area in Mvurwi.

A new agrarian political economy was occasioned by the FTLRP which was implemented in Zimbabwe from 2000 and reconfigured the agricultural

commercialisation trajectory in the countryside (Shonhe, 2018). There are three broad changes that prompted a series of processes that affected ecology and the incorporation of agricultural commodities in the domestic global markets. First, the FTLRP transferred over 10 million ha of land from 4,500 white large-scale commercial farmers (LSCFs), to over 145,775 A1 family farmers, who own an average of 20ha of land, and 22,896 small A2 medium and small-scale commercial farmers (SSCFs) holding an average of 142ha. There are 400 agro-estates maintaining an average of 6,051ha which were not transferred by the FLTRP (Moyo, 2011). Albeit in a manner which raised its own questions of justice, this act of redistribution reversed a historical injustice associated with the subjugation of the Africans associated with the violent land dispossessions and subsequent settlement on less fertile lands in the labour 'reserves'. Second, and by virtue of the previously mentioned development, agricultural production shifted to align with the interests of the landowners who were less incorporated into the global value chains. Towards 2000, the LSCFs had shifted from food to cash crops (Scoones et al., 2010) while from the 1980s (Weiner, 1988), smallholder farmers from A1 and communal areas led the food crop production, of mainly maize, sorghum and groundnuts. The new settlers initially continued with food crop production but soon shifted to cash crops, including soybeans, tobacco and sugar beans. For example, tobacco production rose from 6,310 to 136,000 smallholders between 2000 and 2018, while their annual contribution rose from 7,583 million kg to 179 million kg over the same period (TIMB, 2000; 2018). Additionally, millions of farmworkers were displaced when the large-scale white-owned farms were allocated for redistribution in the FTLRP (Rutherford, 2017), many of whom resettled in communal areas.

Third, the revision of the land tenure system occasioned by the FTLRP, in particular, the nationalisation of the land resulted in the replacement of the freehold tenure with 99-year leases for A2 farmers and 'permits' for the A1 farmers which extinguished the bankability of the land, resulting in inadequate access to loans for the new farmers. Besides, the Western countries had imposed sanctions on Zimbabwe, leading to capital flight (Moyo and Yeros, 2007; Shonhe, 2018) which eroded external credit lines and diminished the capacity of the banks to lend to the broad array of sectors, agriculture included. Also, as Shonhe (2021) observes, agricultural commodity markets were closed for horticultural crops.

Within this context, agricultural financing was reconfigured. Shonhe (2019) observed that from 2004, there was a rise in contract farming targeted mainly on tobacco farming, which is clearly evident across our three field sites. Contract farming is defined as "relations between growers and private or state enterprises that substitute for open-market exchanges by linking nominally independent family farmers of widely variant assets with a central processing, export, or purchasing unit that regulates in advance price, production practices, product quality, and credit" (Watts, 1994, pp. 26–27). The rise in contract farming thus led to the boom in tobacco production especially after 2009, when the marketing of the crop was liberalised and a monetary policy to pay farmers in foreign currency was introduced (Mukwereza, 2015). Even though maize and some other food crops such as sweet potatoes, sugar beans, sorghum and rapoko remain common, the shift to tobacco farming has been unprecedented.

Smallholder farmers are attracted to tobacco farming because it offers a foreign currency trading option, in a country whose macro-economic stability has been unstable for more than two decades, and inflation on locally denominated commodity prices has eroded business viability. This advantage is compounded by the lack of easily and widely available entry points into the commercialisation of other alternatives which could in theory be commercially viable, such as maize. Even though maize is supported under the government mediated command agriculture scheme – a contract farming scheme administered through the Grain Marketing Board (GMB), involving private and state funding managed through the Ministry of Land and Agriculture and a consortium of four banks, the Commercial Bank of Zimbabwe, Standard Bank, Agribank and CABS building society – access for the majority of the farmers remains low and intermittent. Besides, the pricing regime has been uncertain even though at times it is above regional price levels. The GMB has also been accused of delaying the payment for the delivered crop which affects farmers' preparations for the following season (Shonhe and Scoones, submitted). Be that as it may, the production is a crucial crop for farmers, both as a source of staple food, and therefore for food security, and is also used for payment of labour during the following agricultural season. While limited access to land and other resources may lead farmers to make a choice between the two crops, in most cases both crops are produced in varying proportions and depending on the availability of inputs.

## 3.2 Climate change and variability, projected and historical

### 3.2.1 Projected changes in climate and associated impacts in Southern Africa and Zimbabwe

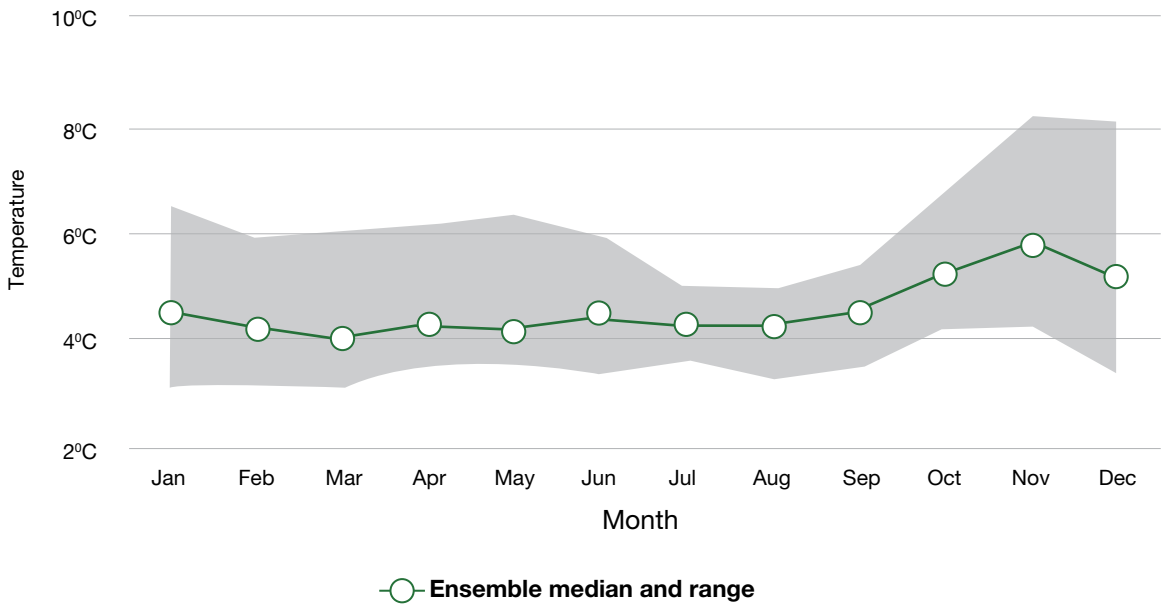
As discussed in Section 2, the uncertainty inherent in climate projections, especially when 'downscaled' to the country level, rule them out as the basis for short to medium-term agricultural adaptation decision-making processes. Nevertheless, they do give an important sense of the direction of travel. According to the projections for Zimbabwe available at the World Bank's Climate Portal (2021), 'downscaled' from the IPCC CMIP5 (Coupled Model Intercomparison Project) general circulation models,[1] annual temperatures will increase in the period 2040–59 varying between 1.2°C in RCP 2.6 (the lowest emissions scenario), and 2.2°C in RCP 8.5 (the highest emissions scenario) in 2040–2059, and between 1.0°C (RCP 2.6) and 5.1°C (RCP 8.5) by 2080–99 (see Figure 3.1).

Median annual precipitation is projected to decrease approximately between 1.2 per cent (RCP 2.6) and 4.4 per cent (RCP 8.5) in 2040–59. By 2080–99 an increase of 2.8 per cent is projected under RCP 2.6 but a decrease of 10.7 per cent is projected under RCP 8.5, as captured in Figure 3.2. Significantly, rainfall is projected to decrease more during the rainy season (Oct–Mar), and while the northern regions may see above-normal precipitation, in the west and south, below-normal precipitation levels are anticipated.

It is important to note here is that even across the range of the ensemble of models used for temperature projections, they vary only in how much they project a temperature increase. They all agree that average temperatures will rise, not fall, and the question – and focus for adaptation – becomes one of magnitude. By contrast, there is no agreement across the ensemble as to whether precipitation will increase or decrease, and particularly at the most crucial time of year for farmers, the rainy season. For instance, the projections in Figure 3.2 vary in December, from over 50mm more rainfall to almost 100mm less rainfall, depending on the model.

Uncertainty in rainfall projections feeds, predictably, into uncertainty in the projection of climate impacts on agriculture in Zimbabwe. For instance, Mugabe et al. (2013) plausibly suggest that climate change may alter the parameters of Zimbabwe's AEZs, with the driest, zone V, increasing in size, whilst zones II & IV, remain more favourable to agriculture. They also project an increase in maize yields across much of the country and losses of greater than 25 per cent in southern Zimbabwe. However, given that, as they themselves concede, the models do not even agree on a variable as crucial as what level of change there will be in rainfall, it is difficult to know whether these projections

**Figure 3.1: Projected change in monthly temperature for Zimbabwe 2080–2099, relative to 1986–2005, via an ensemble of 16 models under RCP 8.5 (highest emissions)**




Source: World Bank Climate Change Knowledge Portal (2021)

1 For an explanation of the IPCC's CMIP 5 general circulation models, see http://www.ipcc-data.org/sim/gcm_monthly/AR5/

are capturing what will happen to maize production in Zimbabwe as a result of climate change. Moreover, as they acknowledge, even where the models agree, e.g., that average temperature across Zimbabwe is projected to rise across the 21st century, one model suggests that maize will be better suited to hotter conditions, whilst another suggests the opposite. Both cannot be right, and indeed both might even be wrong; but there is no way of eliminating the uncertainty, currently. Nevertheless, observed changes in climate over the twentieth- and into the twenty-first century – the subject of the following section – suggest that further change to Zimbabwe's AEZs is highly likely.

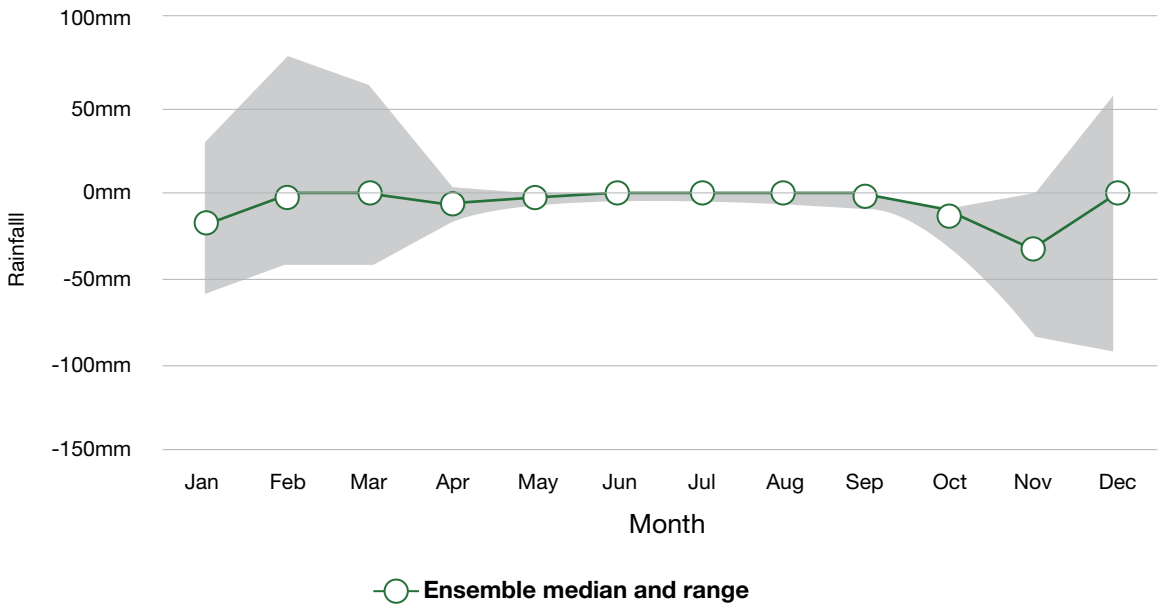
### *3.2.2 Historical climate data and contextualising climate impacts*

As we have seen, the uncertainties inherent in future climate projections throw into sharp relief the importance of understanding historical and contemporary climate and weather dynamics. These reveal that farmers are already dealing with substantial changes in temperature and precipitation, and can feed into a wider assessment of existing levels, distributions and limits of adaptive capacity.

Zimbabwe's rainy season runs from October to March, which is also the hottest time of year, with temperatures peaking in October to November. The dry season, lower in temperature, runs from June to August. Mean monthly temperatures have ranged between 15°C and 25°C from 1901–2016 (World Bank, 2021). Zimbabwe's rainfall patterns are sensitive to two regional and global climate regime elements. First, rainfall affected by the El Niño-Southern Oscillation (ENSO), or El Niño cycle. During the rainy season, rainfall is on average lower during the warm phase of El Niño. Conversely, rainy season rainfall is often higher than average during the cool phase of ENSO (or La Niña). Second, the Inter-Tropical Convergence Zone (ITCZ) affects rainfall seasonality, with higher levels of rainfall received when ITCZ moves south, and vice versa (ibid.). Recent research by the Zimbabwe National Geospatial and Space Agency (ZINGSA) reports that changes in climatic conditions – and especially temperature and rainfall – have been occurring over the course of the 20th century and more abruptly since the 1980s, with substantial implications for agricultural production. The ZINGSA (2020, pp. 10–11) report highlights how the rainfall season has decreased and shifted forward by at least 18 days, inclusive of Mashonaland Central, Mashonaland East, Mashonaland West, Matabeleland North, northerly areas of the Midlands and the rump of Manicaland. The report identifies a drying trend in the greater part of the country after 1982, and an early termination and thus reduction of the rainfall season by 30 days in the greater part of the country, a decrease in the number of rainfall days and an increase in the number of dry spells of up to 20 days, which affect water availability and crop productivity.

According to the Climate Wizard tool, mean annual temperature is modelled, with medium confidence, to have increased by approximately 0.01–0.02°C/year from 1950–2002, with medium statistical confidence.

**Figure 3.2: Projected change in monthly precipitation for Zimbabwe 2080–2099, relative to 1986–2005, via an ensemble of 16 models under RCP 8.5 (highest emissions)**




Source: World Bank Climate Change Knowledge Portal (2021)

According to the Zimbabwe Meteorological Service, daily minimum temperatures rose by roughly 2.6°C over the course of the twentieth century (cited in Brown et al., 2012). Daily maximum temperatures increased by 2°C over the same period and there were fewer cold days and more hot days (ibid.). These findings are broadly consistent both with the general global warming trend (IPCC, 2014) and with the ZINGSA (2020) analysis.

The significance of these changes to the climate regime appears to be fundamental. Zimbabwe has since the 1960s been categorised into five AEZs (Vincent and Thomas, 1960; Agritex 1984, cited in ZINGSA, 2020) which receive varying rainfall amounts, are endowed with a range of soil types and which vary significantly in the level of their utility from a farming perspective. The ZINGSA report (2020) has concluded that the spatial distribution and extent of these AEZs which, it contends, have been substantially altered by climate change. The report's central findings are that "a smaller proportion of the country are experiencing better climatic patterns than previously observed and were thus assigned to AEZs that are more productive than in the original classification. However, a larger proportion of the AEZs shifted towards drier and less productive categories" (ibid., p. vii). On the basis of these changes, ZINGA has revised the agro-ecological zoning scheme, partly reclassifying different parts of the country within different zones, and partly by adding an 'a' and 'b' subdividing category to zone V. Zone Vb is a zone whose chief characteristic is that it is too dry for most non-irrigated agriculture to be viable. Not only does an average annual rainfall tend toward below 450mm, but the risk of maize harvest failure is projected at 60 per cent. Even with hardier traditional crops such as sorghum, millet and rapoko, the risk is put at between 20–55 per cent.

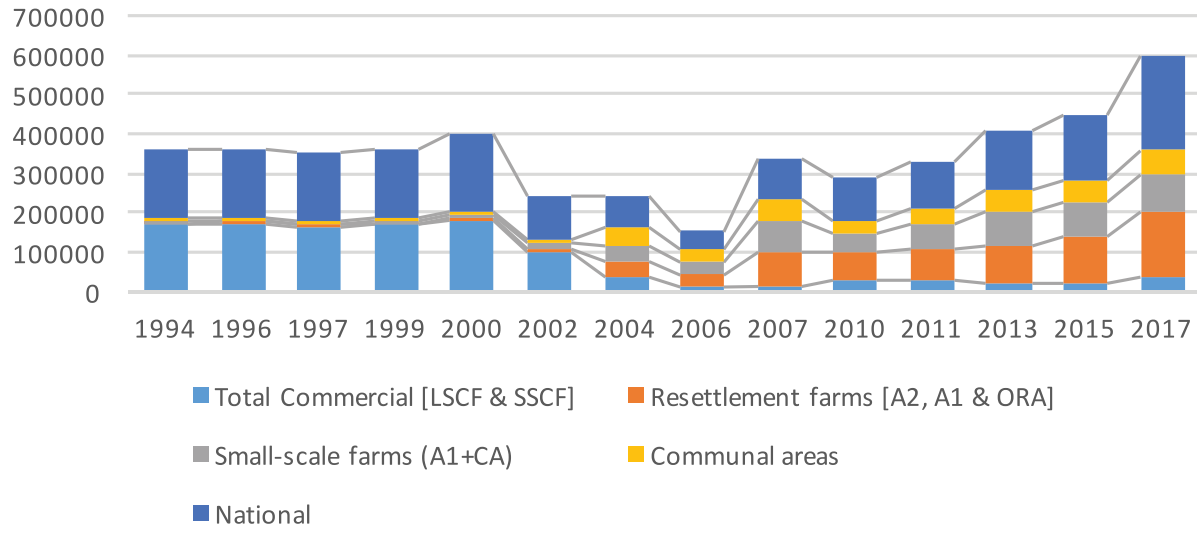
Our field sites, near Mvurwi, straddle the agro-ecological region IIa, which is considered a high potential farming region with an annual rainfall of between 750 and 1,000mm. However, as Section 4 considers in greater detail, even in an area with good agricultural potential, difficulties resulting from the late arrival of rains and (even more) erratic patterns – which can lead to longer gaps between rainfall days or too much falling in one go – are raising questions about the viability of tobacco farming when irrigation is not available.

## 3.3 Shifting commodity production patterns in postcolonial Zimbabwe

### 3.3.1 Tobacco production

The production of Virginia tobacco was mainly confined to the white commercial farmers while Africans were only allowed to produce Burley tobacco, as was the case in Chiweshe communal area (Shonhe, 2021). Before 2000, that is, before the land reform went through a fast-track phase, the production of tobacco remained dominated by LSCFs, with other farming models joining in only after 2004 when contract farming was hastened by the Chinese. As Figure 3.3 shows, despite the introduction of contract farming, there was a serious decline in production which heightened from 2000 until 2006. The resurgence in

**Figure 3.3: Tobacco output (1994–2017) (tons)**




Source: Adapted from Moyo and Shonhe (2021)

production from 2007, was not in sync with a general decline in the economy which reached its peak in 2008 and a devastating drought experienced the same year. This resilience, as shown in Table 4.1, indicates that other factors, beyond climate change, may be responsible for some spikes and decline in tobacco production. This notwithstanding, political and economic instability during the period leading to 2008 culminated in negotiations and the formation of a Government of National Unity (GNU), which ushered in a neoliberal economic regime whose major change to the agricultural policy was the introduction of United States Dollars as a currency tobacco trading, as well as the full remittance of the sold value of the commodity to farmers. Thus, a combination of the rise in access to contract farming, currency liberalisation and value retention enabled farmers to earn valuable returns and, in some cases, facilitated the production of tobacco through the reinvestment of their proceeds, from the previous marketing seasons.

While tobacco production is susceptible to climate change, the land reform and broader macroeconomic development thereafter, including monetary and market access provide incentives for production which is seen as crucial in policy decision making by farmers. In particular, access to contract financing, which for A2 and LSCF tend to cover the acquisition of capital equipment and meet labour costs, enable this category of farmers necessary to achieve high yield, allowing the farmers to maintain a consistent increase in production as was the case from 2009 to 2017. To the contrary, A1 farmers and SSCFs experienced a drop in 2017, as the macroeconomic situation experienced another dive, associated with high inflation and shortages in foreign currency.

### *3.3.2 Changing commodity markets*

Within the context of uncertainty arising from a struggling economy, informalised commodity markets supplant formal ones as farmers from different scales of operations compete to maximise returns seasonally. Shonhe (2021) observes the emergence of Makoronyera – aggregate commodity traders who specialise in farmgate commodity purchases for onward trading in formal and informal markets for most agricultural commodities. In the case of maize and tobacco which are highly incorporated into domestic and global markets and operate under stop systems, through state marketing institutions, the emergence of Makoronyera creates new vulnerabilities and opportunities for farmers to secure better value for their agricultural produce. Shonhe (2021) illustrates how the input and output market is dominated by Makoronyera, including the export of tobacco through illicit channels.

Due to the COVID-19 pandemic which came into the fray in March of 2020, smallholder farmers who are unable to participate in the marketing of crops at the auction floors tend to lose out as selling prices and quantities are manipulated (Shonhe, 2021). Similarly, Makoronyera are more active in the small-scale farming area. The small-scale farmers normally face difficulties in meeting operational costs, including the cost of transporting commodities to the market, compared to large-scale farmers, are thus more susceptible to Makoronyera trading where far lower prices are offered.

Even though contract farming predominates tobacco farming, being between 94–99 per cent for communal and resettled farmers, Makoronyera take 52.1 per cent of crop and end up selling this through contract and independent floors or possibly exporting the crop through illicit means (Shonhe, 2021).

# 4 RESULTS, ANALYSIS AND DISCUSSION

## *4.1 Dimensions of communities and individual vulnerabilities, resilience and impact on agricultural production patterns*

Communities and individuals suffer from varied dimensions of vulnerabilities, including differentiated shifts in livelihoods, wellbeing, "self" protection, collective protection and governance across scale, time and space, as illustrated in Table 4.1. For Zimbabwe, farmers' vulnerabilities differ in terms of agro-ecological regions where the impact of climate change requires variegated farming/tenure systems, the role of politics in moderating resource access and the political economy of how different spaces were economically and socially shaped over time. This section analyses how these factors pan out in the three sites where the study was carried out.

### *4.1.1 Chiweshe communal area*

The formation of Chiweshe communal area followed patterns of the colonial history of Zimbabwe in which the indigenous population was moved from the alienated land in Mvurwi and other agriculturally rich areas apportioned to the white settlers from the late 1880s through the 1930s when the Land apportionment Act of 1930 was promulgated. This dispossession of land was confirmed by ECG[2] of the Muzariri clan, now resettled under the A1 scheme:

> I was told this narrative by my grandmother. She said that this area used to belong to Chizaire. My grandmother could actually locate the grave of these people in the mountains. For example, in Marunzi and Mandindindi mountains, there are graves of the Muzariri people. I was born in 1949, they had already been moved and the place had been taken by the whites. My grandmother was born in 1906, she estimated they were removed from their places around 1926/7. The land was being allocated to WW I soldiers. They would be moved from one farm to the other until they reached the TTL where they got settled. I may not know about chiefs. But, our chief in Makope was originally from Mutoko. The chiefs would fight for power and the one who won got to rule certain lands. That is how Chief Chiweshe got to be in charge of the Chiweshe area.

Unlike some TTLs (now communal areas), Chiweshe is situated in natural region II (NRII), which has historically received on average over 800mm of rainfall and is suitable for intensive crop and animal husbandry. In tracking the timeline of changes in the Chiweshe communal area, participants recalled that commercial agriculture commenced around 1946 even though the use of fertilisers was popularised far later in 1958. The introduction of fertilisers was in some way forced on the farmers. As shall be detailed below, cattle sizes were reduced and hence the need to buy fertilisers in place of cattle manure. Barter trading was however being practised well before then. While relying on cow manure for soil fertility, crop production and livestock production were the main source of livelihood for the farmers.

In the post-independence period, virginia tobacco replaced burley tobacco which was the predominant cash crop for communal farmers. The colonial agricultural policy forbade communal farmers from producing the golden virginia tobacco (key informant interview with HKD, January 2020) ensuring that it was confined to settler white farmers. Maize has also been a key cash crop for farmers. The people of Chiweshe are still recovering from years of restrictions associated with the second Chimurenga war, as they were kept in 'keeps' from 1975 to 1979. Their homes and livelihoods were destroyed while their cattle were either taken away and used to feed the Rhodesian soldiers or were simply stolen while they were in the 'keeps'. Households in Chiweshe were also forced to reduce their cattle holdings under the Native Land Husbandry Act of 1951 (with households being limited to two herds of cattle). Household members however believe that this was 'an act of mischief aimed at reducing their wealth', compared to now when they face further threat from grazing land shortages (focus group discussion at Bare, Chweshe, January 2020). More recently, following the imposition of economic

2 All research participants' names have been anonymised in our account, in order to ensure confidentiality.

sanctions from 2002, the markets for their cattle collapsed as evidenced by the disused cattle sales pens at Bare (see Figure 4.1), depriving the farmers of an important source of income, even though local sales through butcheries have continued.

Added to the previous land pressure occasioned by colonial dispossession, vernacular land sales in Chiweshe communal areas benefiting former commercial farm workers of foreign origin and some former urban dwellers, involved in urban to rural migration due to de-industrialisation, have increased pressure for land, resulting in some people settling in mountain tops, as was witnessed during transect walks in Bare. People have also settled from other areas such as Buhera and Guruve districts. The new settlements and the resultant pressure on the land is affecting cattle holdings as grazing lands have depleted and diseases have hiked. The pressure is also observable in the crop programming where riverbank farming and mountain farming has become more common, with obvious threats on the environment, including siltation and soil erosion and also subjecting the crops to threats from baboons, respectively. The struggle for land by landless Chiweshe villagers is real notwithstanding the FTLRP of 2000. Participants agreed during a focus group discussion that:

> In the beginning the land was given to our forefathers by village heads when they came here. Back in the day they used to have big pieces of land. These pieces of land were later subdivided amongst their sons. The problem that we are having now is land shortages due to overpopulation. We have foreigners who came buying land illegally, as well as our own sons and daughters. As a parent you will have to subdivide your land to your children. This situation has been made worse by those returning from urban areas after losing their jobs and now want to farm.

The people of Chiweshe communal area observe that they are getting poorer. Besides cattle diseases such as anthrax and the January disease affecting livestock production, the general economic challenges faced by the country after 1997 and poor economic policies, including those on agriculture, have impacted farmers' accumulation trajectories. Farmers also highlighted the impact of sanctions, low commodity prices, inflationary pressure on farming inputs, foreign exchange policy induced distortions on commodity prices and the precariousness of the informal sector activities they have had to resort to. There is a sense of fear however that dissuades participants from openly discussing issues that they deem are of a political nature, such as these ones. To bypass these challenges, farmers engage in side-marketing of crops through Makoronyera, as will be detailed in sections to follow. Villagers also resort to piece work in the farms as has become more prevalent amongst communal villagers, as they struggle with social reproduction. In response to the shifting climate patterns, farmers in the Chiweshe area have adopted new farming practices for maize and tobacco for instance. New short-season varieties, winter ploughing, early planting and planting

**Figure 4.1: Disused cattle sales pens at Bare, Chiweshe**

Source: Authors' own

at different stages of the season, reducing planted areas and cheat seeding are the common adaptation approaches for maize by farmers in the communal Chiweshe area. Similarly, for the tobacco crop, farmers tend to resort to delayed planting, use of more fertilisers and the use of ridges to control water movement. However, access to fertilisers and improved varieties is not uniform, hence some farmers are able to cope while others regress.

### *4.1.2 Hariana A1 farm*

The farmers at Hariana farm occupied through jambanja (violent and chaotic land occupations) from 2000 and were settled under the A1 scheme. The resettlement programme involved villagers from Chiweshe and many other rural areas in Mashonaland central province. Also involved were urban dwellers from Mvurwi town, Concession town and Harare (Sadomba, 2011). Initially, land occupiers were moving from one farm to another, dispossessing white farmers, often with the help or alternatively opposition from farmworkers (key informant interview, VC, Hariana farm, January 2020). Later on, war veterans, through the village committees of seven and in collaboration with the District Lands Committee, allocated land to occupiers and other settlers (Matondi, 2012). One A1 settled farmer explained that land occupation was never a one-day event:

> There was a sudden change with us blacks demanding our land. I came here on the 3rd of November 2000. We were being led by the war vets as we approached the white farmers and demanded him to leave. We stayed here until 2002 before we could get formally settled as the farmer was challenging the case in the courts, which he lost at the high court in 2002. The AREX people then drew a map and they came up with 77 plots; three were allocated to the Mount Darwin people who were allocated because their district had no farms for resettlement. The majority of the settlers in this area were from the Mvurwi and Chiweshe area as they are the ones who did the jambanja. There was a percentage allocated to women, the Zimbabwe Republic Police, soldiers, prisons officers and war veterans. War vets received 15 plots. I was supposed to go to Donje farm but because I was an interpreter, the Ministry of Lands decided that I should not leave this farm. When they took over this farm, the Ministry of Lands declared that the other side belonged to the Dahwa family where the Mhondoro came from. We performed a ritual to our ancestors (kukanda fodya pasi) and brewed beer. The spirit mediums came from Dande and they spent three days there. Drums were being played. Chief Makope went to the centenary and he gave another beast which was slaughtered for the celebrations.

Access to land was therefore influenced by participation in jambanja, positioning in the security sector, gender and district allocations in the context of districts where there were no commercial farms for occupation. The resettlement programme also restored land through restoration, targeting those families previously dispossessed and were able to identify their original lands. For example, a Goredema (Figure 4.2) household member who together with other members of his family got resettled in Mvurwi indicated he was happy to be back to the home where they stayed before colonial dispossession:

> My grandfather stayed here and invited the Gasa and Matemba families to join him and his family. There was a school called Goredema. Their boundary was defined by the fireguard. Their children often go to work for the farmers. In 1963, they were forced to leave and settle in Chiweshe in Katema area. Stanley Goredema was born here in 1963. He was accused of supporting the guerrillas during the Chimurenga war.

Resettlement in the Mvurwi area has changed the fortunes for the resettled farmers. Despite differentiated access to financing and markets, farmers in the A1 farming models are highly productive and are accumulating wealth. Mr CG, a war veteran who got settled at Hariana farm indicated during an interview that some crops do well for others but not for everyone:

> Somebody had said it [tobacco] pays and I thought I should try it. I cultivated 1ha of tobacco in 2004. This was my first year doing it. In 2006, I cultivated another hectare and I realized that it was not paying and I stopped. Since then, I have been in command agriculture since the 2016/7 season. I now grow maize, soybeans and vegetables. In the 2019/20 season I harvested 120t of maize which I sold through the GMB under command agriculture. I also get an average of US$12,500 weekly from market gardening. I have now managed to accumulate over 70 cattle, drill two bores and bought a residential stand in Mvurwi town. I plan to sell nine steers and start building a house there. I now struggle to expand my cropping programmes as I only have 6ha and have had to borrow 2ha annually from other farmers. I have also had to transfer 20 of my cattle to my son's A1 farm as grazing land is

> becoming a problem. I hope the government will consider allocating me a bigger farm. Some people have occupied grazing land illegally and this is causing challenges in accessing grazing pastures for our cattle. Here at Hariana we have almost an equal number of illegal settlers compared to those allocated land by the government. Former farm workers are mostly involved in illegal land occupation.

This is, however, not the story for all the A1 farmers at Hariana farm. During a focus group discussion for the elderly farmers, Mrs YJ remarked that:

> Around 1954, we used to farm but never sold our produce because we had no markets in Chiweshe. It is sad that there is a greater hunger now than in the past. The problem we have is that even if we sell; the money has no value. Land was never a problem for us. We used to do shifting cultivation. Now we have less than 1ha as the population has grown. We got allocated about seven acres each by our fathers. Since then, the lands have been subdivided, reducing the land to the current small sizes. The situation has also changed after we got allocated land but access to farming inputs made it difficult to produce. We are struggling to produce in excess to sell to the market.

Some A1 farmers, such Mr CG at Hariana farm are accessing special government mediated contract farming such as command agriculture and as such are able to perform well in maize and soybean production. However, others who are not participating in tobacco contract farming may struggle to produce. As Mrs HD remarked, the production of sweet potatoes which does not require as much financial outlay and has high returns has become more common for Hariana farmers. For those whose farms are mechanised, and own tractors or have access to irrigation for small pieces of land, they are able to engage in irrigated cropping programmes. A key variable by farmers is the pricing structure for the commodities, with farmers preferring cash and foreign currency generating crops such as sweet potatoes and tobacco respectively. However, tobacco is more common among the farmers given

**Figure 4.2: The Goredema family, Mvurwi A1 farm, restored**

Source: Authors' own

its ready market and foreign currency-based payment system. The few farmers who are growing sweet potatoes (Figure 4.3) however confirm that the crop faces less climatic variation risk and also has a ready market through farmgate sales and deliveries to Harare and Mvurwi towns. Mrs DZ narrated how she prefers growing tobacco as a source of foreign currency. However, as she acknowledges, the use foreign and local currency denominated payments for her sweet potatoes is also a source of attraction for the crop, much as 'low harvesting and storage costs as buyers harvest the crop at their own cost (personal interview, 24 February 2020).

However, crop production is also influenced by the shifting rainfall patterns. The impact of climate change is however mitigated through deep ploughing, winter ploughing and the use of improved short season varieties for maize. For tobacco, farmers use more seedbeds of different establishment dates, while planting soybeans during wet days is recommended. The use of chemicals to manage pests and diseases is also promoted by Agricultural Extension officers who advise farmers in the area (personal interview with GB, 23 February 2020).

### *4.1.3 Arrowan A2 farm*

Arrowan farm was redistributed under the A2 farming model. There are 18 households settled from 2004. Unlike the A1 scheme where farmers were settled through jambanja, the A2 farmers were selected through a technocratic process and on merit (Zamchiya, 2012). For example, RC who applied for land and got it at Arrowan farm in 2004 was selected because he was already farming commercially in Centenary. The A2 scheme was created to serve as capitalist farming enterprises in the place of the dispossessed white commercial farmers (Moyo, 2011). However, access to finance remains problematic in the context of three decades of an economic crisis, triggered by, among other factors, sanctions, economic mismanagement, political instability and frequent droughts. For instance, Mr RC, explained that he wanted to access command agriculture but failed. He used to grow tobacco but stopped due to a shortage of firewood. In the absence of bank finance and government support, he uses income from tractor hiring services to secure farming inputs for his cropping programme. He used to irrigate but his irrigation equipment was stolen and his yields

**Figure 4.3: A1 farmers planting sweet potatoes on an A1 farm**

Source: Authors' own

across the crops have decreased. Mr RC complained that the practice of paying 60 per cent for delivered tobacco was unfavourable to the farmers owing to reduced crop earnings, given that farming inputs are mostly sold in United States dollars.

The government generally favours A2 farmers in operational support provision. However, as was observed at Arrowan farm, joint venture (JV) arrangements are also common among A2 farmers. JVs are mostly entered between Chinese, former commercial farmers who are returning to the land, local private sector actors on one hand and the resettled farmers on the other hand. These arrangements bring in financial and productive assets investment which is retained by the resettled farmers at the expiry of the contract. While closing the financing gap which is obvious in the agricultural sector, the nature of the contract remains highly skewed in favour of global capitalism, with the government evidently unwilling to address the anomalies and often siding with global capital. To be sure, JVs are nothing close to what the name suggests as resettled farmers are mostly not involved in the management of the cropping programmes and typically can only receive +/-10 per cent of the gross income at the end of the season. In essence, this constitutes farm rental rather than a JV arrangement. It is a sophisticated way of dispossessing resettled farmers of their means of production thereby depriving them of the opportunity to earn surplus value, as the former white farmers and the new investors tend to benefit from over 90 per cent of gross revenue. Among other crops, sweet potatoes which are commonly among CA and A1 farmers' favourite crops, have also emerged as a climate proof crop capable of reducing the cost of farming and transportation, and providing a source of revenue capable of reducing the negative financial impacts of climate change. In our study, farmers indicated that there has been a shift in rainfall patterns with the start of the season having shifted from around 25 October to late December in the study area. In addition, the rainfall amount received has also decreased annually (PKG, interview 23 February 2020).

Farmers indicated that there has been rampant destruction of property following their settlement at the farm. This resulted in the disappearance of irrigation infrastructure which could have benefitted the new farmers. The destruction of irrigation infrastructure meant that farmers were unable to cope with changing rainfall patterns leading to agricultural productivity declining. Farmers have adopted a variety of ways to reduce the impact of droughts, including seed cheating which involves placing the seed in water in a bucket overnight prior to planting the following day. Alternatively, shorter season varieties for crops such as maize and tobacco have been adopted to deal with the shortened season while drought resistant crops such as sorghum are opted for, even though the number of farmers involved remain low (personal observation, Arrowan farm, February 2021). However, as farmers observed during a focus group discussion, the new varieties are suitable for the shifting rainfall patterns but often lead to reduced yields and poor crop quality.

### *4.1.4 Cross-site sensitivity and vulnerability analysis*

Farmers' sensitivity and vulnerability differed along farming scales and models. The impact of climate change and socioeconomic political dynamics in Mvurwi is differentiated across farming scales and places (see also Annex 3). Newsham et al. (2018) argue that farmers' vulnerability and resilience differ across farming systems, crops, age, gender, ethnicity and class, depending on the extent to which specific farmers are incorporated into the global commodity circuits. In addition, developing countries such as Zimbabwe are more vulnerable given the poor performance of the economy and thus its inability to create contingency and insurance funds to hedge against the drought associated risks often leads to acute shortages of food and a severe downturn in economic productivity (Belle, Sithabile and Ogundeji, 2017; Vogt et al., 2018).

These are explained in detail here and in the sections to follow. Suffice to say, this lack of capacity to create contingent plans for vulnerable populations was observed in Chiweshe where due to drought, households needed welfare support from the state, in 2019. However, not all of them were able to access it. Such vulnerability was observed more prominently among illegally settled farmers in Chiweshe, where former farmworkers ended up establishing homes in the mountains due to land shortages and in the resettled area where illegal settlers are seen as a security threat by formally settled farmers. In both circumstances, illegal settlers are left out of welfare assistance by the government. These groups of farmers are also excluded from programmes such as the presidential input schemes, even though more recently they benefited from the Pfumvudza scheme – a climate adaptation programme launched by the Zimbabwean government in 2020. Thus, with the three sites, those without proper documentation of land ownership are less able to withstand climate change impact on agriculture, due to exclusion. Maguranyanga et al. (2021) also revealed how deforestation has risen due to tobacco production across all the sites. Even though tobacco is not the only threat, the differentiated ability of farmers to access coal, which is mainly accessed by those growing under contract farming, continues to threaten the environment.

## 4.2 Climatic and biophysical hazards and impacts and implications for tobacco commercialisation

The prevalence of droughts partly accounts for the decline in agricultural production after the FTLRP (Moyo and Nyoni, 2013). In our field study in Mvurwi, the timeline exercise revealed that droughts were experienced in 1967, 1972, 1982, 1988, 1992, 1995, 2002, 2005, 2008, 2015 and 2019 (focus group discussion, Harianna, Mvurwi 2020, also see Frischen et al., 2020; ZINGSA, 2020). In other sites such as in Chiweshe communal area and Arrowan A2 farm, however, drought did not feature as a key historical event that may have shaped the community's life trajectories or as harbinger of change, or being central to the history of the community settlement (focus group discussions in Chiweshe and at Arrowan farm, 2020). Maguranyanga et al. (2021) analysed the rainfall patterns in wards 30, 29, 27, 26 and 8 in Mvurwi area for the period between 1980 and 2018, using indices for vegetation monitoring to assess environmental and climate change, commonly called NDVIs[3]. As Frischen et al. (2020, p. 1) argues, 'droughts frequently occur with changing patterns across Zimbabwe', but as Landmann et al. (2019) argues, the occurrence shows differentiated patterns of exposure with some being mild, moderate, severe and extreme.

As Figure 4.4 shows, the prevalence of drought is differentiated across the wards, both in terms of timing and scale. The 1988 drought highlighted during focus group discussions was seen to have been more pronounced in 8 in Chiweshe area, 26 and 30 where Hariana is located, while there was no drought experienced at Arrowan farm. The 1992 drought also highlighted during focus group discussions was mild even though the overall decline in rainfall patterns was severe. Similarly, 2002 was very devastating across the wards, except for ward 30 (Hariana farm). Overall, however, from 1999, the Mvurwi area experienced a decline in total rainfall received across the studied wards. In this sense farmers' vulnerability varied across places, time and scale. While multidecadal analysis is difficult given the changing nature of drought occurrence, lack of spatial homogeneity and the absence of spatial and temporal consistent records over time (Mutowo and Chikonzi, 2014), the Mvurwi study reveals a pattern in which the rainfall received is generally declining across our three fieldsites. What this decline in rainfall points to is the increasingly essential role of irrigation in the production of commercially viable tobacco and other crops. However, inadequate government capability limits its capacity to develop and, in some cases, maintain existing irrigation infrastructure leading to rainfed cropping programmes (Muzari, Nyamushamba and Soropa, 2016; Landmann et al., 2019). This is particularly the case following the FTLRP and the imposition of sanctions which in turn also limited commodity markets, financial returns for farmers, undermining their productive asset accumulation ability. The production of crops such as maize, which is a staple food crop but highly sensitive to the impact of drought, faces great vulnerability and uncertainty with a huge impact on food security.

Notes: The lines reflect the different changes taking place in wards 30, 27, 29, 26 and 8. Farmers in Mvurwi revealed that the irrigation infrastructure that they inherited from the former white commercial farmers during jambanja (chaotic and violent land dispossessions) was either destroyed during land occupation or is now dilapidated owing to neglect and the resultant poor state of repair. As Shonhe (2019) highlights, some tractor cooperative schemes that were established with the intention to use existing irrigation infrastructure, left behind by the former white commercial farmers, have not been able to do so. A focus group discussion at Hariana farm revealed:

> Even though we have a big dam here and there are underground irrigation pipes in place, we

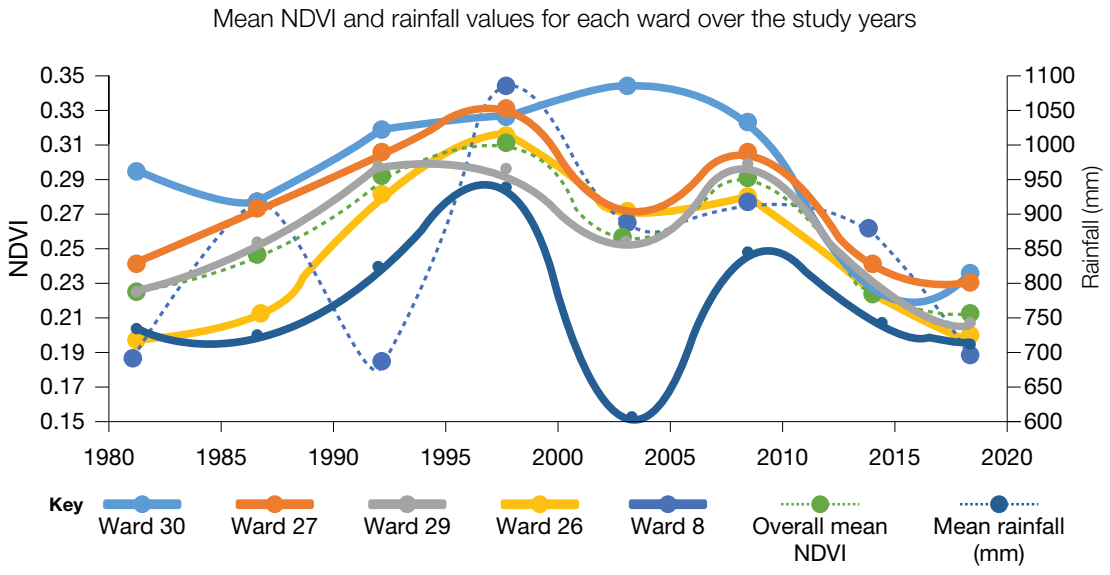
3 Maguranyanga et al. (2021) explain the NDVI and advise that it is calculated as follows: "NDVI= (NIR+R)/ (NIR–R) whereby NIR and R is the surface reflectance in the near–infrared and red bands [AM1] [M2] respectively (see also Rouse et al., 1974). The NDVI values range from -1 to +1. Dense vegetation is represented by high NDVI. values, between 0.1 and 1. Conversely, non-vegetated surfaces such as water bodies yield negative values of NDVI because of the electromagnetic absorption quality of water. Bare soil areas represent NDVI values that are closest to 0 due to high reflectance in both the visible and NIR portions of the electromagnetic spectrum (Lilles and Keifer, 1994)'. Maguranyanga et al. (2021) explain the NDVI and advise that it is calculated as follows: "NDVI= (NIR+R)/ (NIR–R) where by NIR and R is the surface reflectance in the near–infrared and red bands [AM1] [M2] respectively (see also Rouse et al., 1974). The NDVI values range from -1 to +1. Dense vegetation is represented by high NDVI. values, between 0.1 and 1. Conversely, non-vegetated surfaces such as water bodies yield negative values of NDVI because of the electromagnetic absorption quality of water. Bare soil areas represent NDVI values that are closest to 0 due to high reflectance in both the visible and NIR portions of the electromagnetic spectrum (Lilles and Keifer, 1994)'.

have had no access to irrigation facilities as the pump is broken down and electricity supply has been disconnected. The government promised to restore electricity supply, but only after we have settled an outstanding bill which we accumulated collectively upon settlement in 2000. The tractor scheme that was intended to take advantage of the irrigation infrastrusture scheme is also struggling, having received the tractors about six years ago. In the absence of irrigation, some of the crops frequently face severe to moderate droughts which lowers the yields.

Besides the frequent occurrence of droughts, farmers in Mvurwi, also revealed through focus group discussions that they face many other threats during the farming seasons. These include erratic rainfall, cold fronts and pests, hailstorm and strong winds (key informant interview, DG, Arrowan farm 2020). Earlier, Harvey et al. (2014) observed that an attack by pests and diseases potentially leads to lower yield. In Chiweshe, frequent severe droughts pose the biggest threat, compared to erratic rainfall at Hariana farm and pests and diseases at Arrowan farm. The least of the highlighted threats is from hailstorms, cold fronts and erratic rainfall for the Chiweshe, Hariana and Arrowan farmers, respectively. Pests and diseases pose a threat across the sites, even though they come second and third at Hariana and in the Chiweshe area. Across study sites, however, the capacity to cope and adapt to the changing rainfall patterns as well as increasing threats of pests and diseases is thus differentiated. For instance, the threat of erratic rains and frequent severe drought is considered low among the A2 farmers due to the high prevalence of irrigation use across crops. This is not the case for A1 farmers, and much less for the Chiweshe communal farmers. Farmers in Chiweshe revealed that they have not been able to cope with the shifting and shortened rainfall season. While the establishment of an early tobacco crop is one way of reducing risk, the cost of doing so and poor access to the required machinery work against the farmers. For example, each plant requires a minimum of five litres of water during planting, yet, without irrigation or tractors to carry water bowsers, early planting becomes impossible.

Similarly, the crops face differentiated vulnerabilities. For example, in Chiweshe and at Arrowan farm tobacco faces the most significant threat, compared to tomatoes which are the most vulnerable crops at Hariana farm, as shown in Annex 1. Sweet potatoes are the least vulnerable crops for Chiweshe and Arrowan farmers, while they are the second most threatened for Hariana farmers. King onions are least vulnerable for this category of farmers. What this annex demonstrates is that, whether from the perspective of cultivating crops well-suited to respond to the decline in rainfall, or from a commercial perspective, for farmers that lack access to sufficient irrigation, tobacco does not make sense as a crop to focus commercialisation strategies on, relative to other choices of crop. To a significant extent, then, the key question is why tobacco – and also maize – are so central to commercial strategies, relative to other better adapted crops such as sweet potato, sugar beans or rapoko. To what extent would it make sense to switch to alternative crops, and what are the prospects for doing so, both from an adaptation and a commercial perspective? The answers to these questions, whilst central to understanding the

**Figure 4.4: Rainfall changes and vegetation cover, 1980 to 2020 in wards 8, 26, 27, 29 and 30, Mvurwi**




Source: Maguranyanga et al. (2021)

multiple implications of climate change for agricultural commercialisation across our Mvurwi fieldsites, are not straightforward. The biophysical risks faced by farmers have an impact on the production and accumulation patterns of farmers differentially across settlement schemes, but this is not the full story, as we explain in sections to follow.

### *4.3 Dynamic socio-economic and political pressures*

Access to political networks and financial resources mitigate climate change, however this is moderated by the uneven access to these for small-scale farmers in the A1 and CA farming model and A2 farmers in the medium-scale and LSCF models, differentially. Within the farming models, not all farmers have the financial means to secure the productive assets and the farming inputs required. Not all farmers have the capacity to buy pesticides even though pests are the biggest threat to agricultural crop production in the A2 farmers' category, for example. During an in-depth interview, Mrs A Muzanenhamo, an Agricultural Extension Officer noted:

> Maize is an important crop for farming households, as it is a source of food and a source of income. However, growing this crop is very risky as drought can cause the yield of the crop to decline. With irrigation, we rely on rainfed agricultural production which is very risky and results in losses. While some farmers in this area have been able to acquire pumps and are able to irrigate their crops, the majority of us at Hariana farm face difficulties. Besides, some farmers here have no cattle of their own and therefore they are unable to do winter ploughing to reduce the impact of severe drought. Access to fertilisers and pesticides is also influenced by political connections, such that those in the A2 farmers tend to have better access than A1 and CA farmers as the latter are targeted for the command agriculture programme.

In this sense, those farmers endowed with productive assets such as cattle and tractors are able to reduce their sensitivity and vulnerability to climate change and socioeconomic and political downturns. Despite the high level of vulnerability, tobacco and maize are the most commonly grown crops in Mvurwi, while rapoko which has no risk threat is one of the least grown crops. The other crops with low vulnerability are king onions and sweet potatoes, with risk weight factors of one and two, respectively. Indeed, these biophysical factors that are affected by climate change impact on crop production, livelihoods and farmer accumulation. However, the choice of crops grown by farmers often defy these vulnerability assessments due to socioeconomic and political considerations. Upon reflecting on the vulnerability analysis in Annex 1, Hariana farmers realised that they have been growing the wrong crops and wondered if there were other factors beyond these that influences them to continue growing the maize and tobacco crops.

A separate process was used to assess these potential factors. Table 4.1 shows how agricultural production is influenced by socioeconomic and political considerations often in conflict with the efforts towards reducing crop vulnerability and farmers' resilience. A focus group discussion held at Hariana farm, with A1 farmers revealed that farmers consider food sovereignty, access to labour and the related costs, availability of storage facilities, access to the market, road networks and transport availability, the role of politics and state policy, access to foreign currency, access to cash income and availability of agricultural financing. Farmers at Hariana farm considered access to agricultural finance as the most significant consideration for farmers, with a weight of 21.1 per cent, followed by access to labour and the ability to meet employment costs (14.1 per cent). At 4.2 per cent of the total score, food sovereignty is given the least consideration by farmers along with availability of produce storage facilities at 5.5 per cent.

Zimbabwe's macroeconomic situation has been in sustained decline post-GNU characterised by shortages in cash and foreign currency. However, this study showed that in terms of priorities for farmers, access to cash and foreign currency are not the top priorities. At 12.7 per cent of the total score, access to cash ranks on par with the need to secure transport services and have accessible roads. Securing foreign currency is only considered after political pressure to produce certain crops or after some deliberation of available state support facilities such as the presidential input scheme or command agriculture, common for food crops, with score percentages of 11.3 per cent and 9.9 per cent of the total score, respectively. Similarly, and quite surprisingly, most farmers grow maize and tobacco crops for food and marketing purposes, yet the two crops attract the highest levels of economic vulnerabilities with a total score of 24 and 16, respectively. To explain this anomaly, Mr G Fambirai, an A2 farmer in Mvurwi observed;

> I grow tobacco and maize, mostly because I have access to contract farming and command agriculture financing. As such, the two crops have a ready market as Mashonaland Tobacco Company buy my tobacco and the GMB accepts my maize crop without any problems. Of course, we are unhappy that part of our

foreign currency earnings from the government is retained by the Reserve Bank of Zimbabwe which reduces our net income from the tobacco crop, but the advantage we have is that our input costs are met by the merchant companies anyway.

The GMB may delay our payments, as was the case some years back, however, the current pricing structure is competitive even though we are paid in the local currency. I also grow maize because I get to keep part of the produce which I use to pay labour during the following season. I combine these two crops with livestock breeding, mainly cattle as these complement each other. During difficult seasons, either due to experiencing severe drought or getting prices in the markets, cattle become a secure fall-back position through reinvestment in agricultural production through cattle sales.

Indeed, the A2 farmers have better access to financing and patronage networks, unlike the A1 and CA farmers. Among smallholders, limited access to financing in the context of an economy in crisis means that different sets of choices have to be made by small-holder farmers. For example, faced with these difficulties, crops with a low-risk score, such as sugar beans, sweet potatoes, rapoko, kingonions, groundnuts and soya beans are selected for production. Coincidentally these are the same crops that attract low vulnerability from biophysical threats identified above. However, during focus group discussions, one CA farmer in Chiweshe explained, regarding the production of Rapoko;

There are mistakes that farmers in this area make. A perception that these traditional crops have no market or that the returns are low is both misleading and unhelpful. I grow rapoko annually and sell it at good prices. The market is there locally and in Harare. The GMB also buys rapoko at very reasonable prices. I also grow sweet potatoes and get handsome returns annually. Buyers come from as far as Bulawayo to buy sweet potatoes from my farm and hire their own labour to harvest the crop. They pay me in cash, either in US dollars or in the local currency. It all works for me because I meet my costs in either of the currencies. Again, with sweet potatoes, another advantage for me and my family is that we are assured of an alternative for bread for the next six or so months.

There is therefore arguably a level in which many farmers lack commodity market information, which results in a disconnect between supply and demand leading to pricing uncertainty and distortions for

**Table 4.1: Costs and risks factors of crops commonly grown in Mvurwi**

| Crop | Food sovereignty | Labour access and costs | Availability of storage | Market access | Transport access | Political pressure and state policy | Source of forex | Source of cash | Finance access | Score/ weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Sugar beans | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Irish potatoes | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 4 |
| Sweet potatoes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Maize | 0 | 2 | 0 | 0 | 3 | 3 | 3 | 2 | 3 | 16 |
| Groundnuts | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 5 |
| Tobacco | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 1 | 24 |
| Tomatoes | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 0 | 2 | 8 |
| King onions | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 4 |
| Soya beans | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 5 |
| Rapoko | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 3 |
| Total score | 3 | 10 | 4 | 6 | 9 | 8 | 7 | 9 | 15 | 71 |
| Percentage of total score | 4.2 | 14.1 | 5.5 | 8.5 | 12.7 | 11.3 | 9.9 | 12.7 | 21.1 | |

Source: Authors' own, APRA climate study

*Key: 0=No impact; 1=Small impact; 2=Medium impact; 3=Disastrous impact*

some agricultural commodities, which in turn mis/inform farmers' making decisions. Where the demand for some commodities is unknown and prices are uncertain, commercial agricultural production becomes unsustainable, especially for medium to large scale producers in the A1 and A2 models. Poor farmers in the A1 and CA models become the main producers for such commodities, as they are less able to participate in the production of commodities that require greater financial outlay in the purchase of inputs, land preparation and labour hiring. Climate change and socioeconomic factors disproportionately affect smallholder farmers which impacts on crop choices and 'make(s) their livelihoods even more precarious', making food insecure (Harvey et al., p. 2014, p. 1). As Table 4.1 shows, maize and tobacco have high political and economic weight (the desire to secure foreign currency, cash sales and access to agricultural finance – command and contract financing) due to their role as staple foods and as sources of foreign currency. Yet, for the farmers, biophysical factors impact on crop viability, vulnerability and farmers' resilience.

Moreover, the Zimbabwean economy is highly informalised such that the marketisation of agricultural commodities through the informal sector, often associated with illicit exports now predominates. In some cases, as in the case of soya beans, the government has introduced restrictions and regulated the marketing through the GMB, but this also has implications on the net value accruable to farmers, given that this route applies a local currency pricing structure which reduces farmers' income. Across the farming scale, this increases farmers' vulnerability. The Tobacco Industry and Marketing Board (TIMB) and the GMB are also assigned the role of administering stop orders for tobacco and maize respectively. However, *Makoronyera* now co-exist alongside the formal markets, offering both opportunities and challenges (Shonhe, 2021) that generate new crop vulnerabilities and often undermine farmers' capital accumulation. Along the emerging variegated value chains, crop income changes often reduce farming viability and thus negatively reduce the capacity of farmers to cope with climate change adoption demands. In particular, *Makoronyera* offer far lower prices to farmers, leading to reduced ability to mitigate the impacts of climate change. Thus, the informalisation of the economy distorts the pricing matrix for most crops (key informant interview, DF, Arrowan, 2020). In the context of an economy in distress, Zimbabwe has unique crop choice decision-making considerations. For example, across crops, in the post-FTLRP period, sanction-instigated capital flight (Moyo and Nyoni, 2013) and de-industrialisation has accompanied the collapse of traditional domestic and global commodity markets especially the closure of the European markets, securing new markets has remained problematic. Hence, smallholder farmers highlighted the importance of fair and accessible markets for tobacco, tomatoes and rapoko, compared to the existing commodity circuits or the absence of information on the same (Table 4.1. People are migrating from one class to another because they are engaging themselves in *Makoronyera* business which makes them rich, and some face disasters of erratic rains as well as dry spells which affect their yields and reduce their incomes. The proliferation of *Makoronyera* reflects collapsing governance systems where state regulations are not uniformly applied in the agricultural commodity markets. A tobacco contract leaf officer revealed that the increase in side-marketing of the contracted tobacco crop is partly due to the failure by responsible authorities to enforce the stop-order system (interview with RJM, Mvurwi, 2020). While tobacco merchants have intensified the monitoring of farmers, low penalty fees for those caught on the wrong side of the law result in some farmers participating in this illicit trade, either due to the attraction of the US dollars offered or the intention to avoid deduction in line with contractual obligations. Overall, the failure of the state to fully implement the law and growing corruption across the economy accounts for increased socioeconomic vulnerability for farmers (see Shonhe, 2021).

In addition to collapsing governance infrastructure, aided by corruption, farmers also lack a collective voice to challenge the market conditions and combat the impact of Makoronyera. During focus group discussions, farmers revealed their reduced roles and participation in farmers networks and associations. Compared to the historical role of associations in white-led commercial agriculture from 1908, especially after 1923 when farmers voted for an independent government and became members of parliament and ministers in government, current farmers are highly fragmented (Selby, 2006; Shonhe, 2021) and lack the ability to exercise collective action. Without a collective voice, farmers' livelihoods and cropping programmes are extremely vulnerable and their resilience eroded.

## *4.4 Community, individual vulnerabilities and social differentiation*

How then do climate change and power distribution, differences in access across farming models and differentiated farming patterns impact vulnerability and social differentiation? Even though climate change and variability have dissimilar incidence across agro-ecological regions and affect farmers in a similar fashion across scale, impacts on farmers are more

intense among smallholders who have limited access to productive assets such as irrigation infrastructure. Through focus group discussions the study revealed that farmers understood their wellbeing differently and therefore their understanding of their social status varied across farming models (see Table 4.2, and Annex 2 for more detail).

This is reflected in the attributes or requirements that farmers mostly associated with wellbeing and the distribution across people in their area of access to wellbeing. The naming and description of classes is informed by how participants captured this uneven distribution of wellbeing (see Annex 2 for more detail). Importantly, the factors deemed significant for assessing wellbeing also differed. In the CA,

**Table 4.2: Selected descriptive quotes on wellbeing by farming model**

| Farming model and classes | Participant initials | Selected descriptions and quotations from focus group discussions |
|---|---|---|
| **Communal area** | | |
| Rich | AM | Those who are rich have houses with asbestos or zinc roofing, in some cases they have solar or electricity as a source of energy, they also have toilets in their houses. |
| Middle | B | I belong to the middle class because I'm an employed civil servant. Also, people who are into commercial farming can be middle class too. |
| Lower | TS | I belong to the lower class; the reason being that I'm not married, I also do not have cattle, and I have no ploughs. |
| Poor | JM | Those who are poor who don't have education and who own small pieces of land. |
| Very poor | AM | The very poor people are people without cattle; they are labourers in other people's lands. Those people who are in the very poor category are those with inadequate housing; they have a thatch house. |
| **A1 farmers** | | |
| Very rich | TM | I have a borehole, land for which I have the title deeds and cattle. I have access to implements including a tractor disc and diesel. I also have three workers and access to cash. I also have 50 chickens. |
| Rich | LW | I'm rich. I have a well and a borehole though I haven't started to use it yet. I have cattle. I also have land and I work as an electrician. I'm an employer with three permanent staff at my house and I have several casual workers. I have a house in Harare, here and a stand in Mvurwi. I also have security. I am now applying for my title deeds for my house. In a few months I will be in the very rich class. |
| Middle | FK | I'm in the middle class. I used to have 15 cattle but due to unforeseen circumstances I'm left with 10. I have 8ha of land. I farm all of it. I have two cars. I have a stand in Mvurwi. I have my own plough. I don't have permanent workers. I rely on hired labour. |
| Poor | EC | I'm a widow, I don't have a car and I have no cattle. In terms of workers, I rely on hired labour, I have a plough stand with title deeds and I have access to loans, and I have land. I'm not into contract farming. |
| Very poor | TS | They rely on selling labour and have no land of their own. They do not grow enough for their own household consumption. |
| **A2 farmers** | | |
| Best | RC | The rich can employ 50 or more people. They own 300–400 cattle. They also have access to government loans. They use the latest technology when irrigating. |
| Better | PC | These people can access medical aid as well as private healthcare. However, they do not pay their workers consistently. They also have access to accumulation of assets as well as government loans. The majority in this class have so many contacts – for example, contracts with tobacco contacting companies as well as command agriculture. |
| Good | NM | I classify myself as good. I have minimum access to the outside markets. I have an irrigation system which is sufficient for me to farm. I have enough money, but I don't go to the private doctors. I make use of the public healthcare system. |
| Average | NM | These people are struggling. They do not have much, they do piece [rate pay] jobs most of the cases. They also get their inputs from contract farming. However, the inputs from contract farming are not reliable. As we speak, we haven't received the fertilisers for this season. |
| Vulnerable | NM | These are people who sell groundnuts on the roadside. They do not have workers and rely on family labour. These people die in their houses and sometimes get access to illegal drugs since they cannot afford to pay in the pharmacies. Sometimes they rely on prophets and traditional healers. |

Source: Authors' own

households named food security, shelter, water and education as the key requirements for wellbeing. In the A1 farms, the main requirements were access to land, health, cattle, security of tenure, money, shelter, food, water and access to labour. In the A2 models, the main requirements were seen as access to land, health, cattle, money, marketing and access to labour. The wellbeing of the farmers is thus linked to access to land, productive assets and financing opportunities. Shonhe and Scoones (submitted) observes how, due to differences in access to financing farmers accumulate differently, across scale, as identified in our field sites. At least 35.9 per cent of the A2 farmers accessed tobacco contract financing, compared to 17.5 per cent among the A1 farmers and 13.1 per cent in the communal areas. Similarly, 47.5 per cent got support through the maize oriented Command Agriculture scheme, compared to 16.1 per cent for the A1 farmers and 2.9 per cent for communal farmers in Mvurwi in 2019. Consequently, while 1.4 per cent of A2 farmers had water pumps, only 0.1 per cent and 0.3 per cent of A1 and communal farmers had them. On average A2 farmers had 25.6 herds of cattle compared to A1 farmers who had nine and communal farmers who had six. Shonhe (2019) also revealed that 24.5 per cent, 4 per cent and 0.2 per cent of A2, A1 and communal farmers own tractors, while 28.3 per cent, 29 per cent and 3.9 per cent hire in tractors, respectively. Water pumps support irrigated cropping programmes while tractors and cattle provide draught power which enables timely land preparation and planting and therefore greater scope to cope with climate change.

While there is debate on whether participants can openly identify their classes (Vogt et al., 2018), Table 4.2 shows that individual farmers are able to do so using the categories in Table 4.2. Perceptions of individuals in different classes however differ per farming model.

## *4.4 Politics, access, climate change resilience and smart cropping*

In the post land reform period, A2 farmers and the remaining large-scale farmers benefit from favourable state policy where they have better access to tobacco contract farming and Command Agriculture which support the production of maize and other food crops (Shonhe et al., 2020). Moreover, through state policy, A2 farmers have also benefited from the agricultural mechanisation programme (Shonhe, 2019; Gono, 2020; Magaisa, 2020) as well as JVs involving former (now returning) white commercial farmers, some Chinese national and some black businessmen now venturing into commercial agriculture (Matondi, 2019; Shonhe, 2018; Mkodzongi and Lawrence, 2019). Based on the financial support in productive asset acquisition and the agricultural input support secured through the public and private sector mediated contract farming as well as through government programmes, A2 farmers are seen as more resilient to climate and socioeconomic and political vulnerabilities. This is in large part due to these favourable access dynamics. However, A2 farmers are also heterogeneous, as some also face challenges in accessing credit facilities and produce far less than others (Shonhe, 2021). As they are less favoured by government policy, accessing only the presidential input scheme which supports the production of maize, and more recently as availed through the Pfumvudza programme, smallholders in the A1 and CA models are less endowed with productive assets and tend to rely on personal savings, remittances and the reinvestment of proceeds from the sale of agricultural produce (Shonhe and Mtapuri, 2020; Mazwi, 2021). The reliance on precarious sources of funding by smallholder farmers and the production of crops that are less common on the commodity markets increases their vulnerability and reduces the scope for their resilience.

Where some food crops continue to be produced, their resilience to climate change is often low. In the case of Zimbabwe, some climate smart indigenous crops, such as rapoko, sweet potatoes and sorghum, have decreased in importance over the years. Farmers who are eager to earn returns in foreign currency have shifted to tobacco and maize crops. However, as this research reveals, these two crops are vulnerable to climate change and the financial returns are not entirely in foreign currency or in cash, as anticipated by farmers. The choice to produce tobacco is also influenced by available funding options. There is limited accumulation across study sites, reflecting adverse incorporation into the value chains, currently being worsened by the hike in Makoronyera activities (see also Binswanger-Mkhize and Moyo, 2012; Shonhe, 2021). Besides the cost of farming and fluctuating foreign exchange rates, government policies have undermined farmers' accumulation prospects as farmers have failed to adopt appropriate farming systems to increase their climate change resilience (key informant interview, DF, Arrowan farm, 2020). The need to commercialise often leads to the introduction of crop varieties that may be less ideal for the local climate (Eakin & Luers, 2006; Leichenko & O'Brien, 2008; Newsham et al., 2018a a). In doing so, indigenous crops such as sorghum, rapoko and sweet potatoes are avoided, negatively affecting farmers' resilience to climate change. The choice of a cropping programme is therefore influenced by a variety of factors, including the extent of incorporation in the global commodity circuits and the changing pricing matrix. Smallholder tobacco farmers sit at the bottom of the value chain

where they produce the crop but have no influence over its pricing in the market. They receive a small price for the crop that gains value exponentially at the point of export and at consumer product levels. Unlike in the past, when commercial farmers had a collective voice through farmers' associations and had shares in the tobacco auction floors, the new tobacco producers are fragmented and lose control of the crop as soon as they deliver to the auction floors (Shonhe, 2021). This is far more the case for the contracted farmers who are often converted into disguised workers for global capital on their farms (Shonhe, 2019).

Farmers in Mvurwi have not been able to develop more resilience mechanisms to deal with globalisation and climate change exposure. In the communal areas, the cropping system often includes more reliable crop varieties and an array of drought resistant crops, such as rapoko and sweet potatoes, due to the prevalence of poverty in these areas. In the more commercialised sector, A1 and A2 farms (Chitapi and Shonhe, 2020), farmers are mostly motivated by profit rather than food security and as such, they may ignore climate risk considerations.

# 5 CONCLUSION

This conclusion has two core objectives. First, we present headline conclusions based on our research. Second, we present the adaptation options most relevant to a smarter approach to commercial agriculture in the context of a changing climate. We contextualise these options through a consideration of the dynamic pressures and root causes that impinge upon the prospects for the introduction of these adaptation options.

## *5.1 Headline findings*

**Climate change and variability are already causing problems for tobacco production.**

First, as the ZINGSA (2020) report makes clear, there has been a marked shift, in average terms, to a drier climate regime since the 1980s and a shorter rainy season. Our data point squarely to key difficulties that have resulted from these changes across our communal area, A1 and A2 field sites. Crucially, tobacco has become harder to farm under rainfed production systems. Transferring tobacco plants into the ground from seedbeds later in the season due to the rains not yet arriving, risks insufficient time for the crop to reach maturity. Similarly, the more erratic character of the rainfall reported across our fieldsites – intense bursts in short time periods, followed by prolonged stretches of days with little or no rainfall – has in some cases led to the abandonment of tobacco crops at worst, or at best a reduction in the quality of the crop. Where farmers without formal irrigation infrastructure do have access to sizable quantities of labour, a scotch cart and large receptacles for water transport, they can, at least in theory, make up for low or no rainfall as they transfer the crop from the seedbed. However, this is a labour-intensive and costly workaround, requiring 5L of irrigation per plant, for 1200–1500 plants per ha. In addition, the poorer farmers who might have the most to gain from being able to sell a cash crop are the least likely to have access even to these resources. In short, the sorts of changes to the rainy season that have been experienced in recent decades seem to be raising the question of whether, and for whom, it is worthwhile to grow tobacco under rainfed conditions, even in a part of Zimbabwe which is agro-ecologically favoured.

**Tobacco production appears to be implicated in higher levels of deforestation in Mvurwi.**

The conversations we had with farmers often brought up comments on and concerns about the levels of tree cutting, locally, that were required in order to cure harvested tobacco. Availability of wood, by some reports, had reduced so much that it was becoming difficult to source, to the extent that some were questioning whether they could even continue to grow tobacco. These findings are consistent with APRA remote sensing data collected in 2018, which indicates patterns of increases and decreases of land cover influenced by the politics, broader macroeconomic conditions that affected the area under crop production and the cropping programmes, which shifted overtime (Maguranyanga et al., 2021). To be sure, tobacco curing is by no means the only factor driving tree cutting, especially after 2009 when contract farming-driven tobacco production attracted a broad mass of farmers from communal and A1 farms. In the Chiweshe communal area, the arrival of farmworkers who had been evicted from farms under the FTLRP had put extra pressure on land. The need for pasture for livestock displaced by incoming farmworkers – even with reduced herd sizes – was also mentioned in relation to tree cutting. Clearly, this reduces options for the use of non-timber forest products for medicinal and nutrition purposes, but in the context of an already-warming picture, reducing forest cover risks contributing to even higher levels of local warming.

**Farmers are already adapting, but even with these adaptations tobacco and maize are riskier crops to grow than traditional grains.**

Echoing other studies in Zimbabwe (Phiri et al., 2019; Asare-Nuamah, Mandaza and Amungwa, 2021) our findings show that farmers are keenly aware of important variations in temperature and precipitation patterns, as well as their implications for the growing season. Some of them are adapting to these variations, for instance with the introduction of short season varieties of both tobacco and maize. Given that to some extent to farm is by definition to adapt, and given everything that has been written in Zimbabwe, Southern Africa and much further afield about the wealth of agro-

ecological knowledge farmers possess (Richards, 1985; Scoones and Thompson, 2009; Newsham and Thomas 2011), this is wholly unsurprising. Starting with what farmers already know and do will, as ever, be the starting point for more effective and legitimate adaptation. And yet it remains the case that when we conducted a risk analysis of crops commonly grown in communal, A1 and A2 areas, the results did not lead to the recommendation that those without access to a good irrigation infrastructure, significant labour power and inputs should produce tobacco as a commercial crop. Larger scale producers of tobacco in the area – such as the Foresters farm, which grows up to 700ha of tobacco yearly – which do have this infrastructure are already better adapted to climate change than those without it. The results also suggest that whether for subsistence or commercial purposes, crops other than maize would be less susceptible to drought and other risk factors, climate-related or otherwise. Given how risky tobacco in particular is as a commercial crop for many of the smallholder farmers that have chosen to grow it and given also that there are alternative crops that could be grown – sweet potato and the familiar suite of 'ancient grains' amongst them – the question arises as to why tobacco is chosen. Indeed, when we were conducting the exercise in which climate and economic risks were identified and impaired across crops with A1 farmers, they themselves questioned their focus on tobacco production, in particular when they saw the results of the exercise. This might indicate that farmers are not adequately equipped with the right information to make informed decisions on climate and economic risk-free cropping programmes.

**Contract farming and the Makoronyera (black-market) appear to be key 'push factors' in choices around tobacco production.**

A key driving factor is related to the presence of contract farming and the Makoronyera. These offer access to inputs and markets, and to farmers for whom access to either is often precarious or non-existent. They thereby hold out for the prospect of producing a crop which is often paid for in US dollars, resolving the conundrum of inflation eating into earnings in the local currency. Especially for poorer farmers and in particular in communal areas, the absence (perceived or actual) of better vehicles for commercialisation seems in recent years to have pushed them towards choosing tobacco, either without a full appreciation of the risks entailed, or even when there is awareness of them. Exacerbating this tendency is the reduction in support from agricultural extension (and veterinary) services owing to a lack of funding. Agricultural extension officers we spoke to and worked with expressed scepticism around tobacco commercialisation under rainfed conditions and had done their best to communicate this locally. However, reduced access to farmers meant that this scepticism had not been as widely communicated as it might otherwise require, and it had been less possible to provide extension support around looking into other options.

**There are broad differentiations in vulnerability and resilience across and within communal area, A1 and A2 farmers.**

In broad brush terms, A1 and A2 farmers tend to be better-equipped to deal with climate impacts, especially to the extent that they are better resourced. This is because they grow a wider scale of crops or have established irrigation infrastructure, albeit on a small-scale, to be able to guarantee viable production at the end of every season. At the other end of the scale, at the time the research was taking place, most communal area farmers in Chiweshe were receiving food aid, according to one agricultural extension officer. This is an acute demonstration of how difficult even subsistence, let alone commercial farming, is against a backdrop of decades of economic decline, recurring bouts of inflation and the longer-run effects of dispossession and structural disadvantage/marginalisation started in the colonial era and not yet fully left behind. There is significant variation within this picture, with access to irrigation, for instance, not just being a difficulty in communal areas but also for considerable numbers of A1 and A2 farmers. Within this mixed picture, there are key groups with which to engage, from a climate vulnerability perspective. More broadly, our results suggest the need for a greater focus on and level of support for those living in communal areas. But it is also important to consider those whose access to land and productive resources/inputs is often precarious. This includes farmworkers who have moved back into communal areas, but also groups who have illegally settled in A1 and A2 areas. These groups, and perhaps especially those who are settled illegally, are less likely to have access to the government input support schemes and to what agricultural extension support is available.

**Tobacco farming can credibly be considered a land reform 'success story', but for whom?**

To come back to where we started this report, the hope and excitement around tobacco as a cash crop in the post-FLTRP era is, to a significant extent, vindicated by the staggering increase in its production amongst smallholder farmers. Tens of thousands of A1 farmers have made good on its commercial potential, even under initial conditions that many would have considered to be prohibitive. It is a powerful counterpoint to the narrative that land reform of the

kind that Zimbabwe has embarked upon has led only to disaster, and indeed to the (often racist) assumptions that black Zimbabwean farmers would not be able to make anything substantial of the opportunities afforded to them by access to land. There are studies which have found that on average, tobacco-producing households in Zimbabwe are more food-secure than those who do not produce it (e.g. Mapfumo, 2015). This picture provides support for commentators like Saul Ngarava (2020), who argue that tobacco does have a huge role to play in reducing hunger and poverty. And it makes it understandable that, given more farmers each year want to take it up, he would focus on recommending assistance for them to become better tobacco farmers.

We do not want to undermine the sense of achievement that A1 farmers or Zimbabweans more broadly might take from what Ngarava characterises as a revolution in Zimbabwe tobacco production. Our position is closer to scholars who have, in our view, shown that the outcomes of the land reform programme demonstrate that it needs to be taken seriously as a policy model, not just dismissed as economic ineptitude and elite cronyism on a national scale. And yet climate change does increase the level of risk to which farmers are exposed in ways which raise questions about implicitly endorsing its production and suggesting a policy focus on how to farm it better, especially for those without access to sufficient irrigation and labour. Moreover, the prospects for gaining these benefits look very different in the communal area context, even in one in the middle of a zone with prime agro-ecological conditions for tobacco production, precisely because of their varied levels of access to favourable production conditions. These in turn are the result of diminished possibilities and support linked to 30 years of a broader picture of economic stagnation and inflation crises which have been felt hardest in the communal areas and which, in Chiweshe, had left people hungry, resigned and without a sense of hope. For all the importance of understanding the rapidly unfolding commercialisation story of the A1 areas, a focus on climate change impacts on tobacco production, in the context of an analysis of access to what we might call the means of adaptation, shifts the focus back to the far larger quantities of people in the communal areas. These constitute a demographic that, by and large, have experienced much less in the way of benefits than those who received redistributed land, and who are still more sharply subject to the repercussions of Zimbabwe's history as a settler colony. And that is before considering former large-scale farmworkers that have in so many cases had to return to the communal areas due to having nowhere else to go. Seen through the eyes of a communal area farmer, the tantalising prospect of agricultural commercialisation via tobacco as a route out of poverty and hunger often continues to look slim.

## 5.2 Adaptation measures

These questions of highly differentiated access to the productive resources which can contribute so much to adaptive capacity are foregrounded when we set tobacco production in the context of local DoV, the dynamic pressures and the root causes operating on them. A consideration of these dynamics is woven into the account of adaptation measures suggested below, the better to assess their feasibility.

**Irrigation access support**

First, increasing access to irrigation infrastructure is the most obvious adaptation to a climate that has become drier, and in the context of increasingly erratic rainfall – even judging by the standards of a country which is long used to unpredictable rainfall patterns. This measure would, of course, be of assistance not just for tobacco, but for crop production more broadly, and for this reason, it is a common and now fairly long-standing recommended adaptation measure in much research into climate change, agriculture and adaptation in Zimbabwe (e.g. Nhemachena and Mano, 2007). At the same time, the costs of acquiring, installing and maintaining such infrastructure render it a prohibitive option for many (though not all) CA farmers, A1 and even A2 farmers. Given the decades of economic stagnation and crisis in Zimbabwe, leading to anaemic state revenues, constraints upon government funding and assistance for the provision of irrigation infrastructure to those who do not have access are currently prohibitive. The economic situation is also implicated in the shortage-prone and expensive electricity infrastructure upon which irrigation is often dependent. Moreover, the greater incidence of drought, linked to lower levels of rainfall since the 1980s, is reducing the amount of water available for irrigation, both in Mazowe (Tsiko, 2021) and nationally (Serpell, 2020). Even with these caveats, in areas such as Mazowe, with relatively plentiful water supply, irrigation could and arguably should be a priority for national and international funding aimed at climate change adaptation support.

In thinking through what form the support for irrigation might take, it will be important to explore not just large-scale engineered irrigation schemes commonly called for in Zimbabwe in the context of increasing irrigation capacity. It is also worth paying attention to the different forms of farmer-led irrigation that are emerging on A1 land in Masvingo district (Scoones, Murimbarimba and Mahenehene, 2019). Scoones et al. identified three loose categories of irrigators: homestead, aspiring

and commercial. They find these to be more flexible, resilient and in some cases more effective than the formal irrigation or group gardens also in operation in the same area. They do, however, across these three groups, highlight the unevenly distributed and differentiated opportunities for accumulating the level of capital required even to invest in irrigation infrastructure. Given accumulation opportunities are often even lower in communal areas, the implications for equity of access of supporting farmer-led irrigation would require careful thought.

**Switch from tobacco to better-adapted crops and support their commercialisation for those for whom tobacco production has become routinely risky**

In the case of farmers on the margins of tobacco production as a commercially viable prospect (particularly in communal areas), a potential adaptation could be to switch to other crops better adapted to current and projected growing conditions than tobacco, and which could potentially have viable commercial prospects. In the context of our research, crops such as sweet potato, sugar beans and rapoko may all be worth considering in this regard. For instance, there appears to be demand in nearby Harare for sweet potato as an inexpensive staple. There also appears to be a farm-gate market opportunity that only a small number of farmers in the area are currently exploiting. It is important to set this recommendation against an understanding of the reasons why farmers do not currently decide to grow more of these crops. To some extent it may be owing to a lack of market information for these crops. It is also bound up in the underlying questions of differentiated access – to markets, extension support, inputs etc. – which produce such different outcomes for tobacco production, particularly for those farmers who do and do not have access to irrigation infrastructure, and sufficient labour to produce and harvest the crop. In any case, strengthening both the commercial viability of better adapted crops and supporting farmers to connect with existing but under-exploited commercial opportunities are priorities which appear to us to be of particular relevance to poor and struggling farmers in communal areas and to a lesser extent in A1 and A2 areas. Farm-gate sales of climate smart crops through *Makoronyera* reduce marketing costs for farmers but may well cut off the growers from the value chains far too early in ways that reduces their returns. Linking farmers to the agrifoods value systems involving supermarkets and millers for sweet potatoes and rapoko, for example, would result in farmers earning higher returns. Sweet potatoes may also gain greater value if milled and consumed as porridge among other ways, earning higher returns to the farmers.

**Grants and credit for investment in switching to and commercialising better-adapted crops.**

Third, offering support grants or credit to farmers to be able to purchase inputs and invest in gaining better access to markets could help reduce dependence on:

a. Contract farming, which does supply inputs, but at high prices and provide a ready market forthe produce, but purchases tobacco at prices so far below market prices that commercial viability is difficult to achieve; even when climate impacts such as erratic rainfall do not induce crop failure

*b.* *Makoronyera* traders, who while at least offer the advantage of one type of market access, pay prices so low for produce, and sell on at such a premium that they bring to mind the 'relational vulnerability' that Marcus Taylor's work so powerfully captures in the context of Andhra Pradesh, India (Taylor, 2013; 2014).

A more difficult question to answer is who would be in a position to offer such support? International donors and NGOs may certainly want to consider this form of assistance. However, providing support for sufficiently long periods of time for a critical mass of smallholder farmers to establish themselves in cultivating and selling such crops is likely to go beyond what it is possible within the context of the project cycle. Moreover, as alluded to earlier, tobacco is not a crop or a cause that international donors might find easy or desirable to support. Appeals for funding might therefore need to be framed in terms of support for other, wider objectives, such as irrigation expansion. The Zimbabwean government is another potential candidate to provide financial support but has at best a mixed record in distributing support a) at times, only relevant to the electoral cycle and b) to farmers along political affiliation and/or connections to the political elite (Shonhe, 2018).

**Support to existing agricultural extension services.**

As mentioned in Section 2, access to research participants in our field sites was facilitated by the AREX arm of the Ministry of Agriculture. This work is frequently constrained by the absence of resources. In addition, AREX had a clear vision for commercialising agriculture in ways that would benefit small scale farmers. The commitment of the AREX officers to the research, their detailed knowledge of the people and places in which they

work and the obvious esteem in which they were often held, locally, is all suggestive of how much more they could do, if better resourced.

Of course, the reasons for the decline in the level of service that AREX is able to provide can seem intractable. Zimbabwe's economy is long-stalled, crisis-prone and now subject to the restrictions put in place in response to the global COVID-19 pandemic. The government is already overstretched, and not currently in a position to fund a significant increase in the funding that AREX has to work with. Other extension services working with CA farmers, such as those provided by NGOs offering support to farmers to learn conservation agriculture methods, have, within the life of the funded projects they are part of, produced some worthwhile results, in the view of AREX officers. Yet when the funding ends and the support is withdrawn, the vast majority of farmers who received the support appear unable to continue to use conservation agriculture methods. Again, then, the likelihood of procuring such funding seems remote. It remains the case, nonetheless, that other worthwhile measures here, around pivoting towards better-adapted crops and strengthening existing or potential commercial options around them, especially for poorer farmers in communal lands and precarious groups across communal, A1 and A2 land, seems unlikely to happen in the absence of revived agricultural and veterinary extension services.

**Form and connect cooperatives to strengthen national collective bargaining capacity.**

As mentioned in Section 4, one key difference between the pre- and post FTLRP eras is the diminished level of collective organisation and capacity to lobby the government that tobacco farmers used to more commonly exercise. Our research did uncover instances of farmer cooperatives that did offer the familiar benefits of pooling resources, but there remains much less in the way of national level organising and liaising with the government on behalf of smallholder growers. Given the contribution of smallholder agriculture to national tobacco production, there is scope to create a greater shared identity between growers, and to build more powerful mechanisms for collective action, for instance in negotiations around prices and currencies offered to farmers by the TIMB or the GMB. Again, expectations for the prospects of such a measure may need to be tempered against considerations of the extent to which farmers given A1 and A2 land lease titles are beholden to the government. Arguably, one of the benefits of land reform for the government is the extent to which a significant proportion of the electorate could be considered to be 'captive' (Mkodzongi, 2013). There may be fear of the consequences of taking a more assertive line and of making stronger demands. Yet strengthening capacity for collective organisation is worth considering all the same.

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# 7 ANNEXES

**Annex 1: Crop hazard exposure and vulnerability analysis**

| Chiweshe communal area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Climatic risks | | Pests and diseases | Drought | Erratic rainfall | Strong winds | Hailstorm | Strong winds | Total |
| Crop | Assessment variables | | | | | | | |
| Risk ranking | | #3 | #1 | #2 | #4 | #5 | | |
| Maize | Level of shock | 2 | 3 | 2 | 1 | 1 | 0 | 9 |
| | Impact | Poor yield | Poor yield | Low yield siltation | Poor yield | Low yield | | |
| | Coping mechanism | Spraying chemicals | Drought resistant crops Irrigation | Early or late planting | Do nothing | Do nothing | | |
| Tobacco | Level of shock | 3 | 2 | 2 | 2 | 2 | 0 | 11 |
| | Impact | Reduced yield | Low yield | Low yield | Low yield | | | |
| | Coping mechanism | Spraying of chemicals | Drought resistant varieties Irrigation | Early planting | | | | |
| Sugar Beans | Level of shock | 3 | 3 | 3 | 2 | 0 | 0 | 11 |
| | Impact | Low yield Poor quality | Poor germination Low yield | Poor quality | Poor quality | No impact | | |
| | Coping mechanism | Spraying chemicals | Winter ploughing | Do ridges | Do nothing | Do nothing | | |
| Sweet potato | Level of shock | 1 | 2 | 0 | 0 | 0 | 0 | 3 |
| | Impact | Poor quality Low yield | Poor germination | No impact | No impact | No impact | | |
| | Coping mechanism | Spraying of chemicals | Irrigation | Do nothing | Do nothing | Do nothing | | |
| Rapoko | Level of shock | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Impact | No impact | No impact | No impact | No impact | No impact | | |
| | Coping mechanism | Do nothing | Do nothing | Do nothing | Do nothing | Do nothing | | |
| Groundnuts | Level of shock | 1 | 2 | 2 | 0 | 0 | 0 | 5 |
| | Impact | Poor quality | Poor germination | Poor yield Poor germination | No impact | No impact | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Coping mechanism | Spraying | Early planting Winter ploughing | Do ridges | Do nothing | Do nothing | | |
| Cow peas | Level of shock | 3 | 2 | 2 | 0 | 0 | 0 | 7 |
| | Impact | Poor quality Low yield | Poor yield | Low yield | No impact | No impact | | |
| | Coping mechanism | Spraying of chemicals | Irrigation | Do nothing | Do nothing | Do nothing | | |
| Total score per weight | | 13 | 14 | 11 | 5 | 3 | 0 | 46 |
| Percentage of total weight | | 28.3 | 30.4 | 23.9 | 10.9 | 6.5 | 0 | 100 |
| **Hariana A1 farmers** | | | | | | | | |
| **Crop** | **Assessment variables** | **Severe drought** | **Erratic rain (mild drought and flooding)** | **Cold fronts** | **Pests and diseases** | **Hailstorm** | **Strong winds** | **Total** |
| **Risk ranking** | | **#3** | **#1** | **#6** | **#2** | **#5** | **#4** | |
| Maize | Level of shock | 1 | 3 | 0 | 2 | 1 | 1 | 8 |
| | Impact | Poor germination | Difficulty managing fertiliser use and weeding Poor germination | No impact | Reduce yield | Poor crop and yield | Poor yields | |
| | Coping mechanism | Deep ploughing Winter ploughing Use of drought resistant varieties | Use of herbicides Ridges Irrigation application of fertilisers | Do nothing | Pruning of affected leaves Use of chemicals | No control | No control | |
| Tobacco | Level of shock | 2 | 2 | 0 | 2 | 2 | 1 | 9 |
| | Impact | Poor crop quality Poor yield Sponge | Stunted growth Poor yield | No impact | Reduce yield Poor quality | Poor quality | Poor yield | |
| | Coping mechanism | Wetting the barns Reducing heat | Irrigation Change planting dates Use more than one seedbed | Do nothing | Making use of chemicals | Recover the leaves that look better -Insurance | No control | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Soya beans | Level of shock | 2 | 2 | 0 | 1 | 0 | 2 | 7 |
| | Impact | Poor germination Poor crop quality and yield | Poor germination and yield Poor crop quality and yield | No impact | Poor crop yield | No impact | Reduce yield | |
| | Coping mechanism | Plant when there are adequate rains | Timing of planting | Do nothing | Spraying chemicals | Do nothing | Do nothing | |
| Sugar beans | Level of shock | 0 | 1 | 0 | 2 | 0 | 2 | 5 |
| | Impact | No impact | Poor yield | No impact | Poor quality Poor yields | No impact | Reduce yield | |
| | Coping mechanism | Do nothing | Do nothing | Do nothing | Spray chemicals | Do nothing | Do nothing | |
| Ground nuts | Level of shock | 2 | 2 | 0 | 2 | 0 | 0 | 6 |
| | Impact | Poor germination Poor crop quality and yield | Poor germination and yield Poor crop quality and yield | No impact | Poor crop yield | No impact | No impact | |
| | Coping mechanism | Plant when there are adequate rains | Timing of planting | Do nothing | Spraying chemicals | Do nothing | Do nothing | |
| Sweet potatoes | Level of shock | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| | Impact | No impact | Poor crop yield | No impact | Poor quality | No impact | No impact | |
| | Coping mechanism | Do nothing | Irrigation | Do nothing | Apply chemicals | Do nothing | Do nothing | |
| King onions | Level of shock | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Impact | Poor yields | No impact | No impact | No impact | No impact | No impact | |
| | Coping mechanism | Irrigation | Do nothing | Do nothing | Do nothing | Do nothing | Do nothing | |
| Rapoko | Level of shock | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Impact | No impact | No impact | No impact | No impact | No impact | No impact | |
| | Coping mechanism | Do nothing | Do nothing | Do nothing | Do nothing | Do nothing | Do nothing | |
| Tomatoes | Level of shock | 3 | 2 | 3 | 2 | 1 | 3 | 13 |
| | Impact | Poor quality Low yields | Poor quality | Studded growth Poor quality and yields | Poor quality Poor yield | Reduce crop yield | Reduce crop yield | |
| | Coping mechanism | Irrigation | Do nothing | Avoid winter ploughing Use of greenhouses | Spraying | Do nothing Cover provide cover | Do nothing Provide cover | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total score per weight | | 11 | 13 | 3 | 12 | 4 | 9 | 52 |
| Percentage of total weight | | 21.2 | 25.0 | 5.7 | 23.1 | 7.7 | 17.3 | 100 |
| Arowan A2 farmers | | | | | | | | |
| Crop | Assessment variables | Hailstorm | Long dry season | Pests and diseases | Erratic rainfall | | | |
| Risk ranking | | #2 | #3 | #1 | #4 | | | |
| Maize | Level of shock | 3 | 2 | 3 | 2 | 0 | 0 | 10 |
| | Impact | Low yield | Poor germination | Poor yield | Reduce yield | | | |
| | | | | Poor quality | Poor yield | | | |
| | Coping mechanism | Insurance | Seed cheating Gap filling | Use of pesticides | Pruning of affected leaves. Use of herbicides | | | |
| Tobacco | Level of shock | 3 | 3 | 3 | 2 | 0 | 0 | 11 |
| | Impact | Poor quality Poor yield Low income | Stranded growth Poor yield | Poor quality | Reduce yield Poor quality | | | |
| | Coping mechanism | Wetting the barns Reducing heat | Irrigation Early or late planting | Use of chemicals | Making use of chemicals | | | |
| Soya beans | Level of shock | 3 | 3 | 3 | 1 | 0 | 0 | 10 |
| | Impact | Poor germination Poor quality | stunted growth Poor yield Poor quality | Poor quality Poor yield | Poor yields | | | |
| | Coping mechanism | Plant when there are adequate rains | Irrigation | Spraying chemicals | Spraying chemicals | | | |
| Sugar beans | Level of shock | 3 | 0 | 3 | 2 | 0 | 0 | 8 |
| | Impact | Stranded growth | No impact | Poor quality | Poor quality Poor yields | | | |
| | Coping mechanism | Replanting | Do nothing | Do nothing | Spray chemicals | | | |
| Sweet potato | Level of shock | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | Impact | No impact | No impact | Poor quality | No impact | | | |
| | Coping mechanism | Do nothing | Do nothing | Make use of Chemicals | Do nothing | | | |
| Potatoes | Level of shock | 0 | 2 | 3 | 1 | 0 | 0 | 6 |
| | Impact | No impact | Poor yields | Poor quality | Germination | | | |
| | Coping mechanism | Do nothing | Irrigation | Spraying of chemicals | Early harvesting | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cabbages | Level of shock | 3 | 3 | 3 | 0 | 0 | 0 | 9 |
| | Impact | Poor quality | Poor germination | Stranded growth Poor quality Poor yields | No impacts | | | |
| | Coping mechanism | Insurance | Irrigation | Spraying chemicals | Do nothing | | | |
| Total score per weight | | 15 | 13 | 19 | 8 | 0 | 0 | 55 |
| Percentage of total weight | | 27.4 | 23.6 | 34.5 | 14.5 | 0 | 0 | 100 |

Source: Authors' own, compiled from APRA climate change study, 2020

*Key: 0=No impact; 1=Small impact; 2=Medium impact; 3=Disastrous impact*

## Annex 2: Class and wellbeing matrix from Chiweshe, Hariana A1 farm and Arrowan A2 farm

| Chiweshe Communal farmers | | | | | |
|---|---|---|---|---|---|
| Variable | Rich | Middle class | Lower class | Poor | Very Poor |
| % | 0.5 | 9.5 | 20 | 25 | 45 |
| Food security | Assured food security Large-scale commercial farming | Medium access to food Small-scale farming | Low to medium food security Stay in communal lands | Poor food security Communal land farmers Hand to mouth | Very poor security Labourers in other people's fields |
| Shelter | Own big houses More than one house House made from asbestos or zinc | Medium houses Houses made from asbestos or Zinc | Good houses but not adequate for the family | Partially built houses | Poor housing |
| Water | Access to tapped water | Access to safe water from well | Access to public wells | Access public wells | Access to water from the river |
| Education | Majority not educated | Educated, mostly civil servants | Educated but lack opportunities | Aspire to be educated but resources do not permit them to go beyond primary school | Not educated |
| A1 farmers | | | | | |
| Emerging classes | Very Rich | Rich | Middle | Poor | Very Poor |
| % | 1 | 10 | 53 | 10 | 26 |
| Access to land | Employers who own productive farms | These are top government officials or company directors. They are large commercial farmers. | They have access to land and jobs. They are SSCFs. Mostly civil servants and A1 farmers. | They have full government support. They sell inputs. They rent their land and are involved in deforestation. They have access to government resources. | Own no cattle or land. |
| Health | They have access to clean water and have medical aid facilities. | Have very good access to health. | They have access to private hospitals. | Limited access to health care. | Poor access health care facilities. |
| Cattle | 400+ | 300+ | 100 | 5 | 0-2 |

| | | | | | |
|---|---|---|---|---|---|
| Security of tenure | They are protected. They have access to security systems | They are protected. They have access to security systems. | Peace is low | Not secure | Not secure |
| Money | Get money from savings since they are business owners. | They have money from their salary. They have access to government support. Access to loans. | Low salary. Have access to government support. They have access to contact farming and commercial agriculture. | Have access to government support. Lower salaries. Contact farming. Involved in informal trading. | No salaries. No access to loans Government welfare input support. |
| Shelter | They have mansions. They have many houses. | They have houses. | They have a three bedroom which is furnished by zinc or asbestos. | They look after farmhouses. Those who own houses usually have 2 bedrooms furnished with zinc and asbestos. | They live in compounds. |
| Food and water | Healthy eating lifestyle and access to clean water. | Good food and access to clean water. | High food security. Common wells. | They can afford two meals a day at most. | They eat junk food. Inadequate and poor-quality food. |
| Number of farm workers | 100-200+ including temporary workers. | 100+/- including temporary workers. | 1-20 including temporary workers. | They hire 2-5, but do not pay well. | These are the people who are hired. |
| A2 farms | | | | | |
| Emerging classes | Best | Better | Good | Average | Vulnerable |
| % | 2 | 10 | 38 | 20 | 30 |
| Access to land | These are top civil servants. They own farms. They have mansions Have access to lucrative markets. | Small-scale farming. They are SSCFs. | They have access to land and jobs. They are SSCFs. Most are civil servants. | Till small pieces of land. | Unable to till their land. |
| Health | Have access to clean water and access to international health care. | They can access healthcare facilities that are public and private. They have access to medical aid. Have very good access to health. | They can afford to see a private doctor. | Access to local medical services. | No access to health care facilities. Rely heavily on prophets. They drink unprescribed pills. They suffer a risk of dying in their houses. |
| Cattles | 300+ | 50+ | 20 | 5 | 0 |
| Money | Get money from savings since they are business owners. Can afford to go for holidays outside the country. | They have money from their salary. They do not pay workers on time and consistently. Have access to loans. | Low salary. Minimal accumulation of assets. | Have access to government support. Lower salaries. | They live from hand to mouth. |

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| Marketing | Sell maize to GMB. Produce 100 t each season. Make use of centre pivot irrigation systems. Benefit from government schemes. | They are involved in too many contracts. They are into irrigation. | No access to command agriculture. Small engines. Little access to markets. | In most cases they sell on the roadsides and local markets. They are involved in small-scale farming. | They are into gardening. Sell vegetables and fresh produce in the local markets. |
| Labour | 50+ | 10+/, mostly casual workers | 1–20 including temporary workers. | They hire but do not pay 2–5. | These are the people who are hired. |

Source: Authors' own

**Annex 3: Dimensions of vulnerability, a summary from transect walk, village mapping; observations and participatory learning.**

| Dimension of vulnerability | Headline findings | Relevant climate impacts? | Relevant socioeconomic and political issues? |
|---|---|---|---|
| **Livelihoods** | At all three sites, crop production and livestock rearing are important enterprises. However, informal trading was also highlighted as a key source of livelihoods by women. Due to de-industrialisation, many former urban workers have returned to the rural homes and are now involved in farming. Due to the informalisation of the economy, migration and resorting to piece work for social reproduction is increasing in significance. Some former farmworkers have bought rural homes in Chiweshe, thereby creating land pressures as some build houses in the mountains. Ravaging livestock diseases and depreciation of livestock rearing and marketing infrastructure as well as a drop in regulatory and oversight institutions are undermining agricultural productivity. A2 has a more diverse cropping programme of 11 crops; with cucumbers and cabbages being added to A1 farms commodities, where tomatoes and sorghum are also unique out of 1o crops. A1 farmers are also involved in poultry, crafting, builders, transporters, milling, and dairy farming. In the CA, farmers grow eight crops: maize, groundnuts, sugar beans, tobacco, rapoko, cowpeas and sweet potatoes. They also keep livestock such as cattle, goats, turkeys, pigs, rabbits and guinea fowl. | Increasing land pressure is a hazard to the environment and cattle grazing. The shift to tobacco production which relies on firewood mostly for curing is responsible for ongoing deforestation in the Mvurwi area. | Having recovered from years of colonial segregation and war instigated confinement in 'keeps', from 1980, there has been a sustained crisis in access to farming inputs and markets which impact on net income. However, farmers are not always eager to highlight these challenges, on political grounds. A negative turn was experienced from 2000 when post-independence gains began to be eroded. The GNU economic fortunes also dissipated from 2017. Uncertainty emanating from macro-economic instability impacts farmers' vulnerability. |

| | | | |
|---|---|---|---|
| **Wellbeing and class formation** | Across the settlement models, the variables identified as relevant to their 0 differed. In Chiweshe, access to food, shelter, water and education were identified as crucial for household wellbeing. In the A1 model, access to health facilities, cattle, security of tenure, money, shelter, food and water and labour was observed as important. Comparatively, in the A2 model, access to health facilities, cattle, money, marketing and labour access were also identified as important. To achieve better wellbeing A1 farmers indicated they would also need land (farming), jobs, government support, inputs and loans. | The identification of food and water in the CA and A1 models as well as cattle and money in the A1 and A2 models illustrates the importance of agriculture across the sites. Climate change issues therefore influence farmers' wellbeing. | Farmers in the A1 model however, also identified security of tenure, CA noted the importance of education while the A2 observed the importance of marketing access as critical for the improvement of their wellbeing. Labour access was equally important for the A1 and A2 models. Equally, shelter was considered valuable in the CA and A1 models. Even though these socio-economic variables figure differentially across models, their impact on vulnerability and its sensitivity is obvious. |
| **"Self" protection and individual capacities** | Crop and livestock farming choices are individually based and depend on farmers' differentiated access to land, finance, irrigations, inputs, markets and labour. | Inadequate response to changes in climate risks exposes farmers to yield reductions. Access to irrigation is a key success factor. | Differentiates access to finance, markets and labour impact on farmer vulnerabilities. |
| **Collective protection** | Farmers' vulnerability increases with collapsing productive infrastructure that would normally aid farmers' resilience. These include irrigation, electricity, road networks, dip-tanks, cattle auctioning, holding pens, dams, rivers and crop post-harvest processing and storage facilities. The input and output market access and commodity value chains moderate farmer accumulation differentially across farming models, but collective action is required to secure a voice along the chain. For example, Makoronyera buys outputs at cheap prices and resells, making a huge margin, impacting farmers' vulnerability. The macro-economic performance of the economy which impacts on the farmers' vulnerability sensitivity may also require collective action to deal with input price hikes and how this is worsened by foreign exchange price distortions. Access to inputs and markets is highly politicised and requires collective action. The role of farmers' associations and networks in the history of agricultural development in Zimbabwe is crucial. | Inadequate infrastructure impact on farming viability. Irrigation facilities access is not uniform across and within farming models. Some farmers are therefore able to irrigate and access markets more than others and are thus more resilient. There are however weak associations and thus farmers lack a voice. | Without viable farmers associations, farmers lack a voice. Communities may be organised as wards, villages and around schools, dip tanks via committees with political links through contesting parties at a local level. However, these committees lack a voice on agricultural issues beyond the distribution of the presidential input scheme support. One challenge identified relates to distorted commodity prices due to interchangeable use of the local Zimbabwean dollar and the United States dollar, as well as the retention of 40% of foreign currency earnings for tobacco farmers. Also, due to poor organisation, networks are poorly utilised for commodity marketing. |
| **Governance** | The prevalence of Makoronyera, poor infrastructure state of repair, lack of marketing information, deteriorating government services in the AREX department, inadequate planning in command agriculture and inadequate monitoring of tree cutting, as well as low replenishment through afforestation point to diminishing governance in Zimbabwe. | Deforestation will increase the impact of climate change, while farmers' resilience will remain precarious due to inadequate AREX advice. | Poor policy implementation and corruption increases farmers' vulnerability and reduces prospects for accumulation. |

Source: Authors' own

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