

The Lived Experience of Climate Change: Small-Scale Farmers, Vulnerability and Agricultural Adaptation to Climate Change in eThekweni

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Contribution statement

This paper is one of a series which examine a common data set of research materials, interview transcripts, pictures, documents and grey literature produced as part of the European Union-funded Programme to Support Pro-Poor Policy Development (PSPPD) Phase II in partnership with the Presidency of the Republic of South Africa, Department of Planning, Monitoring and Evaluation. The project was led by Professor Sarah Bracking, SARCHi Chair in Applied Poverty Reduction Assessment at the University of KwaZulu-Natal, with Dr Mvuselelo Ngcoya and Ms. Kathleen Diga as Co-Investigators and Dr Andrew Okem as Senior Researcher. The programme of research was also contributed by a number of research assistants: Mr Stephen Olivier (Co-ordinator), Siyabonga Ntombela, Phindile Ngubane, Mandy Lombo, Smanga Mkhwanazi, Ntando Ninela, Nokubonga Shezi, Ayanda Tshabalala and Bahle Mazeka.

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Abstract

In light of the uneven impact of climate change on small-scale farmers, there is now a growing body of work focusing on micro-scale agricultural adaptation to climate change (Arbuckle et al 2014, Ndhleve et al 2014). Because of the dominance of conventional scientific knowledge in climate change debates, there is little research in South Africa on the translatability of climate change (and its complex language and power dimensions) to local socio-economic conditions and whether local farmers' experience of it is taken into account by policymakers and practitioners. Using interviews, document analysis and observation, we sought answers to this key question: How do small-scale farmers adopt (if at all), ignore, resist or remain indifferent to the dominant interventions and discourses around climate change and agriculture in their lived experiences? Because of its world famous climate change adaptation strategies, we use the eThekweni Municipality as a case study. Another important facet of the research was to examine the activities already undertaken by small-scale farmers and to examine how policy adopts, enhances or undermines existing adaptation strategies of the small-scale farmers. Our findings reveal the "more than climate" nature of the struggles of farmers to climate change. There are wide ranging and complex interactions among economic, political, historical, environmental and knowledge factors that contribute to farmer vulnerability to climate change. Simply isolating climate change from structural and quotidian farmer challenges will not do much for farmers' adaptation to changing climatic conditions.

Introduction

There is now a veritable library of academic and policy work on anthropogenic climate change, its impact on agriculture, and how various actors (including the state and farmers) can urgently devise urgent mitigation and adaptation strategies (Isakson 2015, Abbott and Wilson 2014). In particular, there is a growing body of work on micro-scale (farm or household level) adaptation strategies (Murray et al 2016, Arbuckle et al 2014). More often than not, in these studies, agricultural adaptation to climate change is conceptualised in terms of agronomic changes (generally with reference to resilient crop varieties, soil types and how small-scale farmers and households can respond to such variation). Furthermore, climate change scientists, because of their strong capacity to measure and monitor ecological and social variables have dominated and defined the discourses of climate change for several decades now (Head et al 2011, 1090).

Yet there are unresolved paradoxes and enigmas. For example, although there is agreement that African small-scale farmers are extremely vulnerable to climate change factors, yet mere exposure to climate variability is a poor predictor of overall vulnerability of farming communities (Nelson et al. 2005). Secondly, while the subject of climate change is captivating for national planners and researchers, recent research seems to suggest that climate change is perceived quite differently by smallholder farmers themselves (Ndhleve et al 2014). This should not be surprising as there is increasing evidence that there are wide ranging and complex interactions among economic, political, historical, and indeed climatic factors that contribute to vulnerability or otherwise (Nelson et al. 2010; Head et al 2011, 1090). Third, and quite surprisingly, there is little research in South Africa on the translatability of climate change (and its complex language and power dimensions) to local socio-economic conditions and whether local farmers' experience of it is taken into account by policymakers and practitioners. There is an underlying assumption that since climate change is a universal problem, it is understood and experienced in universally common terms. When debates are generalised and universalised it tends to empower the North at the expense of Africa due to the tendencies of colonial knowledge to make claim to universal truth at the expense and exclusion of African farmers and academics.

In light of the eThekweni Municipality's globally recognised leading role in developing climate change adaptation strategies (we say more about this below), the purpose of this research project was to interrogate the lived experience of climate change by smallholder farmers in eThekweni. We wanted to examine the extent to which the Municipality's interventions have been taken up by the groups of targeted farmers. This is important in order to determine the forms of government policy and practice intervention in KwaZulu-Natal and beyond, that can lead to successful pro-poor climate change adaptation activities (Diga et al 2016). Another important facet of the research was to examine the activities already undertaken by small-scale farmers and to examine how policy enhances or undermines existing adaptation strategies of the small-scale farmers in the Municipality. This working paper reports on the key findings of the research we undertook from April to October 2016. Following this introduction, the next section discusses the choice of eThekweni and why this Municipality is an excellent case study for examining the issues of climate change and small-scale agriculture. This is followed by a discussion of the conceptual matter that formed the chassis of our study and the methods employed. The penultimate part discusses the findings and this is followed by a conclusion.

Why eThekweni? Why Small-Scale Farmers?

The eThekweni Municipality is located in the KwaZulu-Natal province (KZN) the province with the highest number of agricultural households in South Africa (0.72 million out 2.87 million nationally) 95 per cent of whom are black African and 72 per cent of them farm in their backyards (Statistics South Africa 2013). Unlike other major metros such as Johannesburg and Cape Town, eThekweni has a significant rural/peri-urban population that practices agriculture. Areas that would be designated as rural cover a large swath of ground (about 1 500km.sq or about 67 per cent of the municipality's spatial footprint).¹ Although this area is within municipal boundaries, it shares similar patterns with rural areas elsewhere (Mbatha and Mchunu 2016): high levels of socio-economic poverty, traditional land management systems, high environmental vulnerability, and inequitable delivery of social services, and involvement in agriculture (even if it is in matchbox sized plots of land).

Our interest in this geographic and social area also derives from that the farming sector in KZN in particular, scored higher sensitivity due to higher population density coupled with a larger share of small-scale farmers, overreliance on rain-fed agriculture, and acute levels of land degradation (Hitayezu 2016, 6). In particular, changes in climate are projected to have a preponderant negative effect on agriculture and food security in Durban. Projected negative effects of increased temperatures in the municipality include damage to crops, reduction in arable land, food quality, and a greater demand for irrigation (Morgan and O'Donoghue 2014, 6). In turn, this is projected to negatively affect long term food supply chains, place more stress on transport infrastructure, and increase demand for food storage and processing (ibid). Thanks to unpredictable variations in rainfall, food security will be placed in peril due to compromised food production, especially for subsistence farmers (Golder Associates Africa, 2010).

What also attracted us to eThekweni is the incredible biodiversity that defines the ecological landscape of the Municipality. The metropolitan area is located in the Maputo-Pondoland-Albany global biodiversity hotspot, one of only 34 such designated places in the world (Roberts and O'Donoghue 2013, 300). Because of ongoing research in the cultivation of climate resilient indigenous crops, we were interested in examining whether government officials and agricultural advisors and practitioners are advising farmers to adopt the use of the region's high levels of species endemism. More about this later.

Another key reason for focusing on eThekweni is that the Municipality is regarded as a global leader on local adaptation strategies to climate change. The city has developed the Durban Climate Change Strategy (DCCS) which outlines the municipal approach to adapting to climate change and mitigating Durban's contribution to climate change (Morgan and O'Donoghue 2014). To that end it has initiated numerous projects and studies to interrogate the impacts of climate change (including on agriculture). The municipality has done more than most to identify and prioritise climate change concerns for vulnerable communities. Indeed the Durban Climate Change Strategy has a complex food security plan and there exists a current urban agriculture support

¹ eThekweni Municipality, "Rural area-based management." Available at: http://www.durban.gov.za/City_Government/Administration/Area_Based_Management/Rural/Pages/default.aspx; accessed 22 April 2017.

policy, however, the link between the Municipality's local agriculture initiatives and climate change has yet to be well understood or articulated (Ngcoya and Shezi, 2016). In particular, the city's adoption of an agro-ecological approach to its food and agriculture policy makes it stand out as it runs counter to the large-scale commercial agriculture model that dominates the provincial and national agricultural policies.

Finally, in terms of agriculture, eThekweni is an excellent case for investigation because of its overt promotion of "ecological and sustainable farming practices as an overarching approach" (eThekweni Municipality 2014, 7). Like other larger municipalities, eThekweni has taken the issue of food insecurity seriously². However, what distinguishes Durban from other metros is this singular dedication to agro-ecological farming. As such, it promotes ecological and sustainable farming practices as an overarching approach. Part of that strategy involves educating farmers and communities about permacultural farming methods, rejection of genetically modified seeds, heirloom seed saving, a shift away from fossil driven monocultural large-scale agriculture, and the identification of alternative resilient crops (eThekweni Municipality, 2014). To that end, the municipality has established a number of programmes to combat food insecurity; namely over 600 community gardens, aqua-and poultry farming, soya bean projects, mushroom farming and a hydroponics project, One Home One Garden and many others (Spatial Development Framework Review, 2015/16). The Municipality also provides seedlings, compost and expertise to communities to assist them in attaining food security. Another unique feature of the municipality's urban agriculture strategy are the six agricultural hubs (demonstration and support sites) in peripheral areas to help vulnerable farmers with climate smart agricultural support and training. Farmers get assistance with seeds, packaging, marketing, and extension support on climate smart agriculture methods (eThekweni Municipality, 2014). These agricultural hubs include the following: Northdene Agro-ecology Research & Development Centre, Newlands-Mashu Permaculture Centre, Inchanga, Scorpio Place in Mariannridge, Mariannhill and Mbumbulu. All these sites are purposively located in peripheral areas of the municipality where many small-scale farmers produce their food.

There are numerous debates in agrarian studies about the utility of the related concepts of small-scale farmer and subsistence. As Kirsten and Van Zyl (1998) pondered: does 'small' refer to the size of land used for production, or the tonnage of output or some combination of the two? Although numerically, the majority of black households involved in agriculture would be considered small-scale (in terms of both size and output), there are many white commercial farmers (about 25%) who operate farms smaller than 200 hectares that would also be considered small-scale (see Kirsten and Van Zyl 1998, 552). For the purposes of this discussion, we take small-scale farming as a descriptive category of the majority of black farmers in eThekweni who produce small amounts of produce usually on small plots of land. We take it as given that there is great differentiation among these farmers and that they are stratified along numerous markers, including class, types of production, plot size, geographic location, tenure systems, types of agricultural activity, involvement in the market, among many others.

² All major metros have an urban agriculture policy of one sort or another. For example, following an urban agriculture summit in 2002, the City of Cape Town adopted the first Urban Agriculture Policy in the country (Kesselman 2017, 47). Its main goals are to improve food security, reduce poverty and enhance economic development by creating an enabling environment for urban agriculture. It provides support such as inputs, infrastructure, tools and capacity building (City of Cape Town, 2007). Similarly, the City of Johannesburg adopted its Food Resilience Policy, 'A City Where None Go Hungry', in 2012. Its objective is to determine the state of food insecurity in the city, support growers, ensure healthy food is available at affordable prices, and enable and promote healthy eating (Kesselman 2017, 49).

We focus on this group of farmers not because they produce most of the city's food (they do not), but because although their farming practices are marginal to the overall food system, their involvement in agricultural production is meaningful to their own households and the communities in which they operate. These farmers are also among the most vulnerable social groups in the city as they tend to be older and female (our research confirmed this, as we discuss below). Severe climate change impacts will hit the poor and elderly harder than other social groups (Golder Associates Africa, 2010). Although improving the lot of vulnerable farmers is often touted as a justification for initiating climate smart farming methods, there are very few attempts to assess how well farmers adopt or reject such interventions. It is therefore important to examine the lived experiences of climate change among these farmers and to determine whether policy interventions are improving their prospects of adapting to severe climatic changes.

Conceptual framing and methods

As stated in the introduction, the main research question of our study was: How do small-scale farmers adopt (if at all), ignore, resist or remain indifferent to the dominant interventions and discourses around climate change and agriculture in their lived experiences?

There is a lot that is troubling about climate change research in general and its specific implications for agriculture specifically, which form the background to the generation of this core research question. In the literature on small-scale farmers and climate change, there are underlying problematic assumptions. First and foremost, the burden of mitigation and adaptation is often placed firmly on the doorsteps of small-scale farmers. For scholars writing from this angle, public knowledge and understanding of climate change is critical because it increases farmers' willingness to take mitigating action against anticipated climatic changes. Thus, Arbuckle et al (2014, 582) conclude that we should design public education and outreach efforts that "(1) appeal to farmers' problem solving capacity and (2) employ terms such as 'weather variability' instead of more charged terms such as 'climate change' are more likely to be effective with a wider farmer audience." From this perspective, the ethos is to influence decision making through science education and communication, based on the presumption that more relevant or "usable" science will change attitudes and behaviours (Rice et al 2015: 254). The secondary questions of whether the science education is appropriate or relevant, and whether, even if it were, the farmers have the motivation or time to engage with it are questions which remain muted. However, they are critical questions due to the problematic ontology of science knowledge in climate change, as noted in the introduction.

Secondly, farmers are sometimes blamed for not understanding the intricate features of climate change (Ndhleve et al 2015), for attributing normal climatic variability to climate change (Bryan et al 2009), or for making poor adaptation decisions, or for being utterly confused. No wonder then that much of the literature citing farmer confusion cites their incorrect attribution to production (impact of climate change) rather than the climate itself (Gbetibouo, 2009; Muller and Shackleton, 2014). Gbetibouo (2009) reported that a high proportion of farmers in the Limpopo River Basin reportedly noticed a decrease in rainfall, whilst meteorological analysis suggested no significant changes in rainfall over the period of 1960-2003.

Perhaps more worrying is the lack of appreciation of the structural conditions that limit how much new climate change knowledge and learning farmers can in fact apply to their activities. Like the rest of South Africa, eThekweni experiences historical and persistent racially skewed socio-economic inequities. While the city's location places its terrain and population at risk of climate change, treating climate change as exclusively an environmental or ecological problem and not a socio-economic one is likely to yield empty results. Therefore, for a region like eThekweni with a high number of vulnerable farming populations, the crucial question is not whether more usable knowledge can be produced to be taken up by policy makers and farmers to improve their resilience but whether the whole approach takes into account the socio-economic environment in which people produce themselves. Agricultural policies and interventions would be part of this equation, but not the only one. This is why we adopt the lived experience approach to climate change.

Lived experience

The purpose is not to expose the ignorance of small-scale farmers, their poor behaviours, nor to simply record their actions in a research epistemology which would give the researcher the role and power to ascribe normativity to the research subjects. Instead, we used a situated "lived experience" approach because, as Brace and Geoghegan (2011:289) argue, place-based knowledge of climate change "enables us to ask how a variety of publics make sense of climate change, as witnessed and responded to in ordinary, everyday-life scenarios...working on land" (Rice et al 2015: 256). This method also gives back the ascription of normativity to the research subject, while the researcher has the role of accurately purveying the knowledge collected. One of the many advantages of the lived experience approach is that it focuses on micro-scale activities and processes (not because they are intrinsically better) but because this is where global, national, and indeed local decisions are most intimately felt. Instead of examining adaptation decisions at the macro (global or national scales), climate decisions are extended to farmers' everyday practices (what one could call, following Langley 2006, "climate subjects"). Yet, as our research demonstrates, these are not all some supine agreeable subjects. They are 'argumentative' (Barnet et al 2008: 638) and they shape, critique, and challenge hegemonic discourses of climate change by doing their own thing.

The lived experience also flattens knowledges about climate change. Challenging such hierarchies of knowledge and power does not valorise local knowledge at the expense of scientific knowledge (as if these are always distinct). It simply requires that we "be attuned to the ways that scientific and nonscientific ways of knowing develop political significance through their interactions" (Rice et al 2015, 256). Instead of laughing off our farmers' attribution of climate change to "God", we simply need to hear this and try to understand what invisible forces they are referring to when they cite preternatural causes of climate change, and what strategic purpose such an explanation gives to them in their life worlds.

Methods

Our methods were qualitative and involved interviews, site visits (observation), and document analysis. To that end, we visited four of the six agricultural hubs of the eThekweni Municipality. We interviewed members of the seven organisations (farmers and support groups) that were supported by the four agricultural hubs that formed part of our study. We also interviewed representatives of the four agricultural hubs, including their managers and the extension officers seconded to the farmer groups. Quite importantly, we also interviewed representatives of Food

for Thought (FT),³ a third party (contractor) organisation tasked with providing support to farmers. Engaging FT was important because they were given a list of 32 organisations that were presumably ready to graduate to commercial farming. Three out of the seven organisations we visited were part of this list of “champion projects”. FT were appointed in 2015 to provide support to organic farmers using land and infrastructure development, educating and mentoring assistance and the distribution of knowledge about local, super and global markets. Their strategy is based on a three to five year business model of a ‘core farm’ that assists core food producers and numerous ‘outgrowers’, who finally run their own ventures as independent enterprises. Three of the farmer organisations we visited were part of this group of “champion farmers” identified by the municipality.

Table 1, below presents a list of the farmer organisations we interviewed. As can be seen from this list, small-scale farming is highly gendered and there is hardly any land for the farmers to make a living and they grow a limited range of common commercial crops.

Table 1: List of farmer organisations involved in the study

| Project | Location | Land size | Members | Crops cultivated |
|---|-------------------------|-----------|-------------------------------------|--|
| Sinethemba Project | Thafeni (eZingonyameni) | < 3 ha | 6 members | Carrots, onions, spinach, beetroot, potatoes, tomatoes and cabbage |
| Intandokazi Garden | Hammersdale | 2.5 ha | 17 members | Spinach, carrot, cabbage, onion, beetroot, butternut |
| Isiphikeleli Farmers Cooperative | Hammersdale | 3 ha | 5 members 1 female 4 males | Maize, butternut, cabbage and potatoes |
| Phansi Kwentaba Cooperative | Waterloo | < 3 ha | 7 members 1 male 6 female | Tomato, onions, spinach, carrot, potatoes, amadumbe |
| Zamafuthi Project | Mkhizwane (Inchanga) | < 3 ha | 26 members 2 males & 24 females | Spinach, carrots, cabbages, beetroots, potatoes. |
| Intuthuko Yomphakathi Project | Klaarwater | 1.8 ha | 8 members 4 females and 4 males. | Cabbage, spinach, tomatoes, beetroot, carrots, green beans, amaDumbe, potatoes, butternut, chillies and pumpkin. |
| Igijima Garden | Klaarwater | 3 ha | 7 members 2 male 5 females | Carrots, beetroot, spinach, cabbage, onions, maize, |

Findings: The Lived Experience of Climate Change

The more-than-climate nature of agriculture

Our key finding is that agriculture questions are not divisible according to the newer discourse of climate change. When we asked farmers about climate change, the questions yielded answers that pertain to both structural and prosaic farming challenges faced by small-scale farmers throughout

³ All names of organisations and individuals used in this paper are pseudonyms.

South Africa: lack of land, persistent water shortages, inexistent or poor market access, and insufficient technical and knowledge support where it existed. We therefore conclude that the big question of climate change and farmer responses to it pertains to more than just climate. The more-than-climate nature of the lived experience of farmers suggests that government interventions cannot isolate climate change issues from the normal struggles that small-scale farmers in eThekweni face. Increasing their resilience demands offering robust support in terms of key inputs such as land, water, diverse seeds and seedlings, and intangible services such as technical support and increasing access to markets. On the issue of land, for example, all seven groups used land that was three hectares or less per group. In fact, the biggest cooperative, Intandokazi Garden from Hammersdale, had 17 members sharing 2.5 ha (see table 1, above).

Furthermore, such interventions cannot simply reside in the agricultural sector. Because eThekweni is faced with acute socio-economic challenges, these also have to be addressed if the most vulnerable among the city's population are to be effectively targeted. A multisectoral approach has to take into account not just the agricultural vulnerabilities of the farming communities but also structural socio-economic conditions and environmental factors. Simply advising farmers to use organic manure when they have no land, lack housing, experience poor health and have poor quality road infrastructures, misses the intrinsic linkages between climate change and structurally produced vulnerability.

Knowledge about climate change

Awareness of climate change, its causes, climatic trends and adaptation issues vary across social groups in eThekweni. As highlighted above, other research shows that small-scale farmers in socio-economically poor environments are also the most vulnerable to climate change (Thomas et al., 2007). There are various sources of knowledge about climate change and its relationship to farming among the farmers we interviewed. Some have received formal training from the Municipality about organic farming, some cited the radio and TV, but they also intercrop this knowledge with traditional knowledge. Consider this exchange on water quality for example:

Ntando: Does water quality have an impact on your crops (stream, rain, or tap water for example?)

Farmer: Yes, there is a difference. Rain water and water from the stream are similar but different from tap water. Tap water is standing alone because they use chemicals to clean it. If you use rain water and water from the stream our crops are fine and we fail tap water, we don't give it a pass. Even crops that are growing from home are not same as the ones that are here on this garden because at home I'm using tap water whereas here we use water from the stream. Basically, this is a wet point which sometimes is affected by the drainage system, but something rare. Do you know how to see living water?

Ntando: No.

Farmer: There will be a tadpole. I grew up in a eShowe with these things. Living water has living creatures, fish and tadpoles, if those are not living there, then that water is not right, it has been spoiled and food won't grow from that water because food is also a living thing.

However, one of our key questions was to determine whether farmers' own experiences and views of climatic changes percolate up to the authorities and experts? Consider this conversation:

Smanga: The people who train you, are they open to take your suggestions?

Farmer: We don't stand up for that, we only just listen to them. But you can see that they won't listen to you because they have formal education and they don't want the informal education that we grew up with. They will say it is old fashioned knowledge.

It is highly problematic that there are these transmission barriers that only allow knowledge and information to flow only in one direction. We would then agree with Rice et al (2015:259) that "when mainstream, expert-driven politics suppresses everyday climate knowledge in this way, it becomes oppressive, diminishing people's power to make decisions and pursue their own actions." However, we were quite surprised by the same farmer's response to another question:

Smanga: But as farmers, are there times when your methods of farming conflict with theirs? For example, you work with the NGO, the trainer from the municipality, and the agricultural extension officer from the Department of Agriculture, but you also have your own methods that you say you learned as you were growing-up...

Farmer: Yes, there is a conflict of ideas, but we do agree with them because there is something that they are bringing to us. But they are telling us some things that we have been doing for years some in a different manner. We don't disagree with them, rather when they are gone we continue with our own ways, they will come back and say we didn't teach this but when they leave we continue with our ways of farming. Because they won't do plots for us. We had about seven plots or more whereby we hired people to help us make those plots, when the tractor came, it destroyed all those plots and they promised that they would make new plots which they never did.

Although national, provincial and municipal policies and practices are designed to create caring "climate subjects" among all citizens, including our groups of farmers, what we observe in this quotation is that such discourses are sometimes met with ambivalence ("we don't disagree with them"). Or worse, they are opposed so that they decrease rather than increase a sense of urgency about climate change ("but when they leave we continue with our ways"). As "argumentative subjects" (Dowling 2010) some of the farmers use their distinct intuitions to ignore, question, or challenge the designs and desires of the powerful. To some experts though, this argumentative subject simply demonstrates lack of understanding.

Based on our findings then, we would argue that what many experts see as opaqueness, or lack of understanding of climate change by small-scale farmers, can be re-read as the farmers' simple yet profound understanding of climatic variations as occurring in an already complex and multi-sectoral environment. In other words, it is "more than climate". They operate in a world of highly unequal social and agrarian relations (as we have shown above, all organisations farm on small size plots of land for example) and therefore it is highly impossible to discuss causal relationships with them. For example, we prodded one representative to share with us her understanding of what causes climate change. Her answer: God! God? We asked again. And she nodded, nonchalantly. We interpreted this not to mean a fatalistic or millennial misgiving about climate change, but as a suggestion that the causes of climate change, for her, have historical embeddedness in spheres far beyond her control.

The changing climate is oppressive to us farmers. Sometimes you want to cover your crops as we experience harsh weather conditions but as farmers we can't do anything because it's something that is natural.....it's created by God. I remember a time when it would rain but our cabbages would still die (Representative, Isiphikeleli Garden, Hammersdale, 11 July 2016).

Crop diversification

There is growing recognition that the cultivation of indigenous crops is an important component of climate smart agriculture. The genetic resources of these crops is important both for biodiversity and because they are key resources for building resilience in an agro-ecosystem as they provide suitable varieties needed to adapt production to changing climatic conditions (FAO, 2013; Nyong et al 2007). Indeed, research commissioned by the eThekweni Municipality recommends that in order to ensure food security in the municipality, it is important to identify alternative climate resilient crops (Golder Associates, 2011).

All the farmers we interviewed expressed great enthusiasm to this idea and to agro-ecological farming altogether. However, this enthusiasm about *ukutshala ngemvelo* (as they put it, or agro-ecological farming) did not derive from its link to climate change or from training by the experts. They liked it because it is *indlela yokhokho* (ancestral way) and if felt right to them. However, market imperatives were not far removed from *indlela yokhokho*, as a farmer put it:

We are employing the old ways of doing things, and that is noticing seasonal changes as it is about to break through into summer, we till the soil and then do compost then put it in the soil. By doing so we get the soil ready for planting for the season. However now we are more driven by the market and money we have to be consistently growing even in winter because we need the money for our families (Representative, Isiphikeleli Garden, Hammersdale, 11 July 2016).

| | SP | IG | IFC | PKC | ZP | IYP | GG |
|-------------|----|----|-----|-----|----|-----|----|
| carrot | y | y | | y | y | y | y |
| onion | y | y | | y | | | y |
| spinach | y | y | | y | y | y | y |
| cabbage | y | y | y | | y | y | y |
| beetroot | y | y | | | y | y | y |
| maize | | | y | | | | y |
| tomato | y | | | y | | y | |
| amadumbe | | | | y | | y | |
| butternut | | y | y | | | y | |
| green beans | | | | | | y | |
| chillies | | | | | | y | |
| pumpkin | | | | | | y | |
| potato | y | | y | y | y | y | |

Table 2: Popular crops cultivated by farmers in the four study sites

Most of the farmers we interviewed cited lack of water as one of the major constraints. Understandably, as we conducted our research during one of the worst droughts to hit the province during the winter months of 2016. So harsh is the environment for some that they have discontinued cultivation of certain crops. We spoke to a representative of a farmer group and asked what types of crops they grow:

What we usually grow now is maize, butternut and potatoes because of water shortage. We focus on these because they do not require a lot of water unlike crops such as spinach that require water daily; then we would have a problem. They end up not being irrigated. We have seedlings (points to the seed bed) those seedlings are over a million. We made the beds with the hope that we will receive a bigger water tank. We do not use the entire space because we are not able to irrigate the whole garden (Representative, Isiphikeleli Garden, Hammersdale, 11 July 2016).

Indigenous knowledge, methods and crops

As stated in the introductory section, eThekwin's impressive ecological biodiversity made the city an important case to study. Its location in the Maputo-Pondoland-Albany global biodiversity hotspot (Roberts and O'Donoghue 2013, 300) offers opportunities to experiment with numerous crops. In light of this advantage, we wanted to find out if farmers, policy makers and agricultural experts are integrating the region's high levels of species endemism in their strategies and practices.

Although we conclude that the farmers' understanding of climate change is not scientific (at least in the conventional definition of science), they were generally well-versed about agro-ecological methods of farming. Although they lamented infrequent visits by Municipal representatives and inadequate support, knowledge uptake has been high in terms of methods: composting, intercropping, planting calendar, mulching, and so forth. They were simply drawn to these methods because they resonated with them culturally. However, while a significant number of them cited *indlela yokhokho* in response to questions about use of indigenous knowledge, we were surprised by the lack of indigenous innovations among the majority of farmers.

There is a host of indigenous systems, methods, tools and practices that have been touted as potential anchors for indigenous communities the world over in their struggles to buffer themselves against the negative impacts of climate change. For example, in northern KwaZulu-Natal where we have conducted research on indigenous plants, farmers have resuscitated indigenous seed banking systems in order to preserve local seed varieties and increase their seed choices (Kumarakulasingham and Ngcoya 2016). In a widely cited paper, Nyong et al (2012, 796) report that in the Sahel, farmers have employed various intricate indigenous tools to predict weather changes and that these tools often exceed some conventional scientific models. They conclude that the use of these indigenous tools of gathering, forecasting and interpreting information have helped farmers' decision-making about crop choice, planting date, and cropping patterns to manage vulnerability. Understandably, then, one of our questions to the farmers in eThekwin pertained to the existence and use of such indigenous innovations. We wanted to know if farmers have identified under-utilised indigenous crops as substitutes for commercial varieties, whether they have revived any forgotten indigenous systems, networks, and practices. Unlike the Nyong et al study, such innovations were hard to come by.

This lack of variation in terms of climate-smart/friendly crops and systems was attributed to, first and foremost, market conditions and then secondarily whether a crop required a lot of inputs (such as labour, water, fertiliser) or not. Unsurprisingly, spinach, cabbage, and carrots were the most popular crops among the farmers. As can be seen in table 2 below, only amadumbe would be recognised as an indigenous crop among the 13 crops cultivated by all the seven organisations we interviewed. This crop was cultivated by only two of the seven groups. We interrogated this lack of indigenous innovation and poor cultivation of presumably more climate friendly indigenous crops in eThekweni.

We asked one of the experts, the head of one of the agricultural hubs whether he promotes the cultivation of any indigenous crops. His response: such as?

Mvu: Well, we could start with the most popular ones among rural people all over KZN, such as *imbuya*.

Him: I have never heard of that one.

Me: Surely, *amadumbe* you've heard of.

Him: Oh yes, but people don't need help with those as they already know them.

His attitude to indigenous plants was also well-encapsulated in a casual comment he made about some of the indigenous medicinal plants that grew at his site. We asked why he was growing indigenous medicinal plants but not edible ones. "Oh, they look good. The place has to look good. But then I've seen one of my workers take some of the bark home. I've told her it's OK occasionally but I don't want this place swarming with *sangomas* (diviners/traditional healers) here." And he laughed. All the advisors and experts we interviewed revealed a lack of knowledge about the possible edible crops that could act as substitutes for the popular commercial crops that are not as resilient to climate variations.

Although one agricultural hub manager was sympathetic to the older farmers and their knowledge, when we asked her what she has done to absorb and integrate farmers' indigenous knowledge, she said: "Those who can write we encourage them to document that information, so we can include it in our pamphlets." In other words, even though many are illiterate and older, their knowledge will only be incorporated if *they* take the initiative and codify it in writing. When we asked for copies of these pamphlets there were none. Another hub manager put it more bluntly:

Ntando: You said the age group of people participating in the project are between the ages 50-80, what wealth of knowledge are they bringing into the projects or feeding back to your training approaches and manuals?

Manager: The problem we have is that those guys are skilled but they are still yearning for knowledge they still want to learn more. However, they don't show that they know what we teach.

Conflict between Provincial and Municipal Strategies

The final important revelation from our study is that there is great confusion among various spheres of government. This partly derives from the fact that climate change is a multi-level governance issue incorporating different government spheres and departments. It also cuts across different sectors and this can lead to incoherence and conflict. As stated in section two above, the

eThekweni Municipality has adopted an agri-ecological approach to farmer support. This method rejects fossil fuel dependent large scale commercial agriculture in favour of sustainable permacultural methods. This approach however, is in direct contrast to the provincial approach of the Department of Agriculture and Rural Development which makes no distinction between agri-ecological and commercial agriculture. Although the vision of the provincial department is stated as the promotion of “a united, sustainable and vibrant agricultural sector with thriving rural communities in balance with nature”,⁴ it is clear that it favours large-scale commercial farming for “stimulating economic growth.”

These conflicting approaches present challenges to farmers within the farmgate. Witness the words of one of our interviewees:

On Monday, you have Municipality coming to us to teach us about composting and intercropping, yes? Then on Tuesday the Department of Agriculture [province] delivers fertiliser we did not order, yes? Next Monday, sisi Nonhle from Municipality sees this mountain of fertiliser outside our garden and asks why we bought it. We tell her Agriculture brought it. Next day Agriculture come and they see the fertiliser lying there and they say we are ungrateful. But who asked us what we wanted to begin with?

Another farmer expressed his frustration with the province, thus:

The people from the Province (Department of Agriculture) used to visit. Those guys only come when they felt like it. The problem with those guys is that the knowledge that they share with us is stuff we already know. So next thing, they visit just to stand around the garden then get in their cars and go. We then started asking about the resources (water, tractor) because they didn't have the answers they stopped coming (Representative, Isiphikeleli Garden, Hammersdale, 11 July 2016).

It was not only the farmers who expressed frustration. A number of the agricultural hub managers conveyed dismay about their relationship with the provincial Department of Agriculture and Rural Development. When we asked one of the managers about what kind of assistance they receive from the Department, she said:

Just forget about those ones [the province], they even took their tractors we even find it hard to farm; they took entire tractor around Durban and gave it to people of Msinga who have huge gardens of 20 hectares. But they said it their new policy, they said they have been some changes they can't help small farmers.

However this conflict was not only between the Municipality and the Province. Municipal workers we interviewed expressed frustration about the lack of coordination among the various departments responsible for agriculture. One extension officer decried the “vulnerable orphan” that their unit had been turned into over the years. The Environmental Planning and Climate Protection Department (EPCPD) has been responsible for coordinating municipal departments that work on climate change issues. However, over the years, our interviewee reported that the unit running agricultural hubs has been housed in various departments and has had to go begging for resources from various budget controllers. This has sometimes been the Department of Parks and

⁴ KZN Department of Agriculture and Rural Development, “Office of the MEC: Vision, Mission and Strategic Objectives.” Available at <http://www.kzndard.gov.za/about-us/office-of-the-mec/42-about-us>; accessed 25 May 2017.

at other times the Department of Economic Development. This insecurity of the status led to her referring to her unit as a “vulnerable orphan” meaning they could only offer meagre support to their farmers:

The upper levels say that we should work together as different departments, but to be honest it not something that is being encouraged. There is nothing that is there to encourage us to work together because if I need a water tank from department of water, my department has to pay for that service. We have to rent that water tank from another Municipal Department; we can only use that water tank if it comes from the Department of Parks which is my department. So working together can be seen on interdepartmental where one section works with other sections, not from different department, you have to pay for other departments if you need their services; money works.

This lack of coordination among Municipal Departments has hindered the ability of the hub managers and their staff to offer sustained and effective extension support to the farmers under their care.

Farmer extension services

As stated above, in our assessment, eThekwini has the most environmentally friendly agricultural policy of all the large metro municipalities in South Africa. Most of them are committed to reducing food insecurity by any means; eThekwini on the other hand, favours. As discussed in the previous section, eThekwini’s approach also contradicts the provincial strategy that is ideologically centred on large-scale commercial agriculture. However, the problem with the eThekwini’s agro-ecological approach is that although its goals and methods are laudable and resonate with the farmers we interviewed, in the context of Durban, agro-ecological farming is inherently difficult to carry out. This is due to large numbers of households involved in agriculture in the Municipality, historical neglect of the farming communities now under city management, and the historical subjugation of indigenous knowledges that would form the fulcrum of the Municipality’s agro-ecological approach. Therefore, its policy needs careful, adequate, patient and deliberate husbandry in order for its laudable programmes to take root.

The agro-ecological approach combines both indigenous knowledge and technical expertise to impart ecological skills. The Municipality simply does not have the quantity nor quality of agricultural extension officers who are well-versed in both spheres of knowledge. They are woefully overextended so that they would not be able to offer assistance to farmers even if they followed conventional systems and methods, let alone agro-ecological ones. Here is how one agricultural hub manager described her challenges:

The area I’m responsible for covers 250 projects and I only have a single tractor to assist the farmers. Also, you have four seasons in a year and each season you have to use different techniques. For each season you have to break the dry land to cultivate. The land needs to be well and the soil ready for the micro-nutrients involved. The problem is, we have old equipment, equipment purchased 20 years ago but we just manage to work with what we have. If you look at the equipment it is not equipment that should be used by the people we work with. We normally work with old frail people, people at the age of 50 and above up to 80 years old. So these people require machinery that can break the

compacted soil, as much as they are driven by passion they need machinery to assist because at the end of the day they are trying to secure food for the city.

As can be gleaned from this interview, the city focuses on projects, generally defined as cooperatives. This is what “seeing like a state” (Scott 1998) looks like in eThekweni’s agricultural programmes. According to Scott, the desire to manage and control requires a tunneling of vision and the great benefit of narrowing the lens is that it only brings into sharp focus desirable aspects of an otherwise complicated and unruly reality. Scott went on to argue that state bureaucracies use simplification, legibility, and manipulation to effect urban planning, land administration, and agriculture. In our case study, we see this desire to make legible that which is complex by compelling farmers into organised groups, no matter how inchoate they are. In order to get the state bureaucracy’s attention, a farmer has to cease to be a mere farmer, but convert herself into a cooperative member first and a farmer second. “We don’t assist individuals!” a hub manager informed us. When we asked why, he said “the Municipality believes that we should benefit lot of people with the available limited budget, not individuals because as an individual you will only eat with your family.” He went on to state that, “however, we help them to be organised so that they will have an organised group that will have a committee consisting of chairperson and finance officer and so forth, so we can be able to meet with all of them.” A finance officer?

Yet further on in the interview, the same manager expressed frustration with this requirement:

In most project farmers don’t become successful because some members or chairperson treat their fellow farmers as their children or subordinates because he started the cooperative. In other instances, some farmers come at the garden at 11am while others would have started around 6am, while others don’t even come or come once a week, yet they want to have equal share when they harvest. Sometimes the interference of the municipality leads to shutting down of the projects because people assume that the chairperson is getting a share alone from the municipality, because whenever we come, we visit his/her place to ask about the garden.

Conclusion

Although the few cases we examined yielded intriguing results, we are aware that these are a small number of cases in light of the numerous climate change and agriculture projects supported by the Municipality, including over 600 community gardens. Yet our findings deserve attention because we examined projects that had received sustained care from the Municipality and its contractor. If the farmers we interviewed can be labelled as lacking “climate literacy”, the accusing finger ought to extend to all the relevant stakeholders who provide support to these farmers. There needs to be better coordination of strategies and activities among the various spheres and departments of government.

Although there have been valiant attempts to educate farmers about climate change, experts do not reciprocate by trying to understand the language and experiences of climate change from the farmers’ perspective. Is this due to poor epistemological and linguistic translatability of climate change language? In part yes, because of the inability of formal science to incorporate the contextual and the cultural into its framings of change. But it is also the case that institutional knowledge about climate change has not incorporated the already existing vulnerabilities of these farmers; it simply does not see them. Therefore, the acknowledgement of farmer knowledge is

needed and a participatory space for farmers to express their knowledge could legitimise their intricate and deep and pragmatic knowledge.

In light of the regions biodiversity, the paucity of edible indigenous crops and fruit among the farmers we interviewed is a glaring missed opportunity. Knowledge about endemic and environmentally friendly crops and fruit among the experts was non-existent. As indicated above, the Municipality commissioned a study about the potential impact of climate change to popular crops and part of that study suggested substitutes such as sorghum to replace commercial varieties. However, more collaborative work needs to be done to identify more endemic species of food crops and fruits which could translate to practical climate smart agriculture steps.

Myriad structural factors limit the ability of the farmers we interviewed to adapt to climate change: lack of land, a poor selection of crops, poor access to financial and other resources, gendered nature of small-scale farming, and poor institutional support. As for attempts to identify and assist 'champion farmers' to graduate to commercial levels, it was clear from our findings indicate that they still need further intense support and targeted programmes. Perhaps even the criteria for their selection needs reconsideration. Above all, the socio-economic conditions of these farmers seemed to trump all other factors. What they do have in their favour, however, is the ability to strategically absorb competing knowledges which are presented to them.

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