GENDER, HOUSEHOLDS AND CLIMATE CHANGE.

ADAPTATION DECISION-MAKING IN

THE MOROGORO REGION OF TANZANIA.

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At the onset of my PhD journey, exactly four years ago, I honestly didn't know what I was getting myself into. If I had any expectations to begin with, the PhD process certainly proved me wrong. Now, at the end of the wobbly trajectory, I feel like living through the PhD taught me number of things. First, I got to know the seemingly endless limits of my own perseverance. I take my finishing this PhD project as sufficient empirical evidence to demonstrate this claim, and rest my case. I also learned that doing a PhD can mean locking yourself in the office for days in a row, doing nothing but writing. I learned this can be very fruitful, at least until your office's invisible and singing neighbour sets in his distracting entertainment. Dear invisible singer, if only you knew how your repetitiveness drove me crazy at times, and amused me at others, making me realise how your repeat function ironically mirrored the circular nature of my own PhD writing. I also learned it can be equally fruitful to leave the office behind and wander the city streets, pondering questions and answers, ending up at Sint-Anneke beach (which turns out to be a pretty good place to do some writing, by the way). Furthermore, although perhaps not as quickly as I should have, I learned to embrace failure as part of the PhD lived experience. I learned to allow myself to be 'unproductive', I tried to be mindful, breath and let go. I am grateful that through this PhD, I got to meet a number of amazing people whom I would never have met otherwise. I love that I got to experience Tanzania from various angles, living on campus, in town and in the village. I am very happy I got the chance to learn Kiswahili and that there were many people around who were patient enough to practice it with me. Finally, this PhD couldn't have come into being without the love and support of my friends, colleagues and family. I would therefore like to take this opportunity to thank everyone who contributed to this dissertation.

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ABSTRACT

Climate change is one of the most pressing issues on the development agenda for the coming decades and it is expected that developing countries, in particular, will bear the brunt of climate change induced risks. Against this background there is a need for effective policies which acknowledge that adaptation to climate change is not only influenced by technological development but also largely shaped by social context, (in)formal institutions and norms that influence human behaviour. In light of this, this doctoral research offers a nuanced gender analysis of climate change adaptation in four rural villages in the Morogoro Region of Tanzania. Employing a combination of quantitative and qualitative research methods, the study investigates how small-scale farmers are adapting to climate change and the role that gender and the household play therein.

Farmers are facing local climate change impacts such as increasing unpredictability and unreliability of rainfall, increased occurrence of destructive rains, lower amounts of rainfall in certain months and rising temperatures. By taking local lived experiences of climate change as a starting point, this PhD argues that farmers perceive adaptation as a game of trial and error. Overall, few adaptation options are available to them and a number of barriers hinder their adaptation endeavours. Access to adaptation is furthermore structured by intersections of gender and marital status, and various types of female-headed and male-headed households therefore follow different adaptation pathways. This intersectional gaze unveils that while some categories of women and men may be disadvantaged in one adaptation area, they can experience easier access to other adaptation fields. The research describes various drivers of this unequal adaptation access, ranging from access to and control over land, capital, education, and dependence on farming as a livelihood strategy.

The study furthermore examines the intrahousehold decision-making process with regard to adaptation. Using an Actor-Partner Interdependence Model, it investigates how spouses influence each other's relative adaptation decision-making power. Distinguishing between different types of adaptation decisions, the analysis uncovers the role played by both wives' and husbands' income-generating activities, independent asset ownership, educational level and life cycle elements. Moreover, the research investigates how wives' participation in decision-making impacts households' adaptation outcomes. By doing so, this PhD offers valuable insights to the literature on climate change in Eastern Africa, as well as to the field of feminist economics.

CHAPTER 1: INTRODUCTION

ON CLIMATE CHANGE, GENDER AND THE HOUSEHOLD

1. RATIONALE: WHY CLIMATE CHANGE, GENDER AND THE HOUSEHOLD?

This PhD study connects to one of the most pressing issues on the development agenda for the coming decades: climate change and the expectation that developing countries in particular will bear the brunt of climate change induced risks. Against this background there is a need for effective climate change adaptation policies which acknowledge that adaptation to climate change is not only influenced by technological development but also largely shaped by social context and local (formal and informal) institutions and norms which influence human behaviour. In this regard this study focuses on the role of one specific type of institution: the household. By definition a gendered institution, the household cannot be understood in isolation from a community's gender relations. This research aims to offer a nuanced gender analysis of climate change adaptation in four study villages in the Morogoro Region of Tanzania. The study gradually narrows down its focus from a more broad gender analysis of climate change adaptation, to adaptation decision-making and intrahousehold relations. In the following section, we introduce the research topic and the study's research aims and pinpoint its relevance from both a policy and academic point of view. Section two offers a brief literature review and describes the various studies and research domains we draw upon. Finally, section three presents a brief overview of the chapters that constitute this PhD thesis.

1.1. CLIMATE CHANGE IN TANZANIA

Like many other Sub-Saharan African countries, Tanzania is facing climate change challenges and has to adapt to a changing climate. Climate change impacts are already manifesting itself and major future effects are likely even in case of the most optimistic scenarios of emission reductions. The impacts of projected climate changes in Tanzania range from growing incidences of natural hazards such as droughts, earthquakes, floods and storms (World Bank, 2014), to rising temperatures, changes in river flow, increasing unpredictability of rains and potential shifts in rainfall patterns (e.g. move from bimodal to unimodal rainfall pattern) (IPCC, 2014; United Republic of Tanzania, 2014). Increasing empirical evidence suggests that climate change heavily impacts the livelihood opportunities of the rural poor across developing countries, and of subsistence farmers in particular (Morton, 2007). In the Morogoro Region, studies suggest that farmers sell on average one third of their produce and use the rest for household consumption (Ellis and Mdoe, 2003; Foeken et al., 2004; Paavola, 2008). Most Tanzanian small-scale farmers furthermore depend on rain-fed agriculture (United Republic of Tanzania, 2014)

which increases their vulnerability to climate shocks, and threatens their livelihood and food security (Arndt et al., 2011; Kakota et al., 2011). Studies have projected that climate change would reduce the country's yields of, among other crops, maize, sorghum and rice (Rowhani et al., 2011).

Climate change scholars have shown that climate change impacts are mainly felt locally (Wilbanks and Kates, 1999; Crabbé et al., 2015) and that consequently, also adaptation strategies are site-specific (Below et al., 2012; Eriksen et al., 2005). These site-specific tendencies of climate change (adaptation) have meant that the majority of adaptation studies have a local focus and offer in-depth case studies. For indeed, understanding the meanings and lived experiences of climate change requires gaining insights into the processes underlying adaptation (Below et al., 2012) and this is intricately connected with the local context in which climate change manifests itself and in which responses are developed. It has therefore been argued that there is a need to understand how farmers have in the past coped with climatic challenges, how they are currently adapting to it, and how they can deal with it in the future. It is therefore useful to gain insights into how farmers are making decisions about adaptation strategies, and we are particularly interested in the role of gender and household relations therein.

1.2. CLIMATE CHANGE AND GENDER

This research contributes to the academic literature on climate change and adaptation which has thus far paid relatively little attention to the issue of gender relations. Climate change discourse has long been the prerogative of natural scientists and it is only since the mid-2000s that international climate change bodies (such as the UN Framework Convention on Climate Change) have explicitly emphasized the importance of equity analysis and more particularly the interplay among gender and climate change. While this has given rise to policy papers discussing the topic, it has thus far not elicited much academic research (we discuss some notable exceptions in section 2.2). This study complements the largely descriptive literature on climate change and gender with more analytical research.

Gender is a social construct that structures relations of power between and among (categories of) men and women. Gender relations vary across culture, community and location, and at the same time intersect with other socio-economic dimensions such as age, class, race, marital

status, and life cycle phase (Crenshaw, 1989). A comprehensive understanding of the relation between climate change and gender requires the realisation that gender structures people's lived experiences of climate change. Research from various fields of study has shown that gender mediates the impacts of climate change and that women are especially susceptible to the impacts of climate change (Goh, 2012; Ngigi et al., 2016; Neumayer and Plu, 2007; Lambrou and Nelson, 2010; Dankelman, 2011; Alston, 2013). For example, research by Lambrou and Nelson (2010) showed that both men and women pointed out an increased workload as a result of climate change. However, the increased workload manifested itself differently for men and women, along the lines of their traditional gender roles and divisions of labour. A typical example from the gender and climate change literature relates to the task of water collection, which is likely to demand more time due to more frequent incidences of drought. Women are likely to bear the brunt of this additional labour burden as water collection is a typically female responsibility (see e.g. Terry, 2009). Next to differential climate change impacts, gender also structures people's vulnerability to these impacts and their ability to respond (i.e. their adaptive capacity). Unequal access to resources such as land, income, assets, livestock and credit drive women and men's respective vulnerabilities, adaptive capacities and decision-making powers.

Other studies have indicated the usefulness of considering the role of climate change in exacerbating existing gender inequalities. This might take the form of increasing workloads of women vis-à-vis men's, or a surge in the number of female-headed household resulting from male outmigration as a coping strategy (Le Masson, 2016; Kyaw and Routray, 2006). Nelson et al. (2002) argue that the impacts of climate change on gender relations have not been studied much to date, and in chapter 4 we therefore provide an illustration of changing domestic water fetching practices in the study area and ask whether this has also meant a structural revaluation of gendered power relations.

In the context of growing pleas for gender mainstreaming in climate change policies and implementation (see e.g. UNDP, 2011), this study is particularly relevant and timely. In many countries gender mainstreaming runs the risk of turning into a technocratic exercise when it boils down to 'adding women' to boards, policies and projects, draws upon stereotypes about men and women, and disregards social relations of power (Arora-Jonsson, 2014). This is a realistic risk in the case of Tanzania, as we discuss in the climate change policy analysis of chapter 3. We therefore warn against an overly narrow interpretation of gender mainstreaming that disregards intersections with other socio-economic dimensions, as this would lead to ineffective policies and possibly drive the (further) marginalization of certain groups of women and men.

Although more and more climate scholars are acknowledging the role of gender relations in mediating the diverse impacts of climate change, most studies compare either 'fixed' categories of men and women or male –and female-headed households. In the latter case female-headed households are typically considered as universally disadvantaged. This study contributes to the literature by painting a more nuanced gender picture and moving beyond simple dichotomies and homogenisations. Specifically, in chapter 3, the research provides a policy analysis of Tanzania's climate change documents, while paying attention to the framing of gender and the role of gender mainstreaming therein. Next, chapter 4 aims to enhance our understanding of farmers' lived experiences of climate change and to illustrate its gendered nature on the ground. We use the example of domestic water fetching practices and pay attention to the potential role of climate change in impacting gender relations. In chapter 5 we illustrate that men and women, and male –and female-headed households are no fixed and homogeneous categories. We establish the existence of intersections of gender and marital status in determining farmers' access to a range of adaptation strategies, and hereby acknowledge that different types of female-headed households (and male-headed households) follow various adaptation pathways.

1.3. CLIMATE CHANGE AND THE HOUSEHOLD

In this PhD study, we furthermore narrow our focus to climate change adaptation and household relations (specifically chapter 6, 7 and 8; see also visualisation in figure 1 below). Lambrou and Nelson (2010) established that Indian men and women could not realistically assess how climate change has impacted the lives of the other sex. For example, men's perceptions of how women's lives were affected by climate change were quite different from women's own accounts of how climate change had impacted their lives. This indicates the importance of research not merely relying on accounts of a single 'household head' who is assumed to understand, represent and speak for the whole family. Rather, gender and intrahousehold concerns needs to be carefully considered.

Despite wide support for the representation of women in the drafting of climate change policies and negotiations, little attention has been paid to women's local-level lived experiences of climate change (adaptation) and to the decision-making unit that is closest to their everyday adaptation practices: the household. Rather, efforts of female participation have been centred at the level of the state and formal institutions. The everyday decision-making unit of the household is however typically assumed to be a 'neutral unit' that is irrelevant to adaptation

policies. Nevertheless, Folbre (1986: 6) has argued that: "Significant differences between the economic position of men, women, and children within the patriarchal household mean that it cannot be treated as an undifferentiated unit of analysis". Furthermore, authors such as Alderman et al. (1995) and Agarwal (1997) have illustrated that the households does not (always) operate as a production and consumption unit. Rather, men and women, even within the same household, respond to shocks differently (Rakib and Matz, 2014), and possess different knowledge, insights and preferences. Indeed, "institutions structure climate risk by mediating access to natural and other resources and resolving or managing conflict over resources, thereby facilitating or discouraging particular adaptation pathways" (Smucker et al., 2015: 41). The household is such an institution that serves as an intermediary between policy and individual, and rather than a neutral unit, it mediates policy incentives in a gendered way. If policy makers do not take intrahousehold differences into account and fail to understand how adaptation decisions are constituted within the household, they risk ineffectively targeting (wrong) individuals and not achieving the policy's intended behavioural changes.

This research draws upon insights from intrahousehold bargaining literature, which is a theoretically well-grounded field of research in development studies. To date, cross-reading between the intrahousehold and adaptation literatures has been limited, notwithstanding some laudable exceptions which we address in section 2.3 below. In this study, we regard intrahousehold dynamics with regard to adaptation decision-making from the angle of both intrahousehold cooperation and conflict (Sen, 1990). Indeed, women and men are likely to have both joint and separate interests, as throughout their daily lives, they form domestic units and cooperate in various ways (see e.g. Okali and Naess, 2013). In this PhD study, we approach the issue of climate adaptation and intrahousehold relations from various viewpoints (chapter 6-8). In chapter 6 we aim to understand Tanzanian women and men's bargaining power and the intrahousehold decision-making process. Next, chapter 7 investigates the drivers of wives' and husbands' intrahousehold decision-making power with regard to climate change adaptation. Finally, chapter 8 asks whether and how wives' intrahousehold decision-making participation influences households' adaptation choices.

This study also contributes to the literature by focusing on Tanzania in general and on the Morogoro Region in particular, as to date there has been relatively little work on intrahousehold relations undertaken in Eastern Africa (compared to e.g. West Africa and Asia) (Fafchamps et al., 2009).

2. STATE OF THE ART

In this section, we elaborate on three central concepts of the PhD thesis: climate change adaptation (section 2.1), gender (section 2.2) and the household (section 2.3). We ask how they are interrelated, and wherever possible rely on literature from Tanzania and the Morogoro Region. Finally, in section 2.4, we position the study and its conception of decision-making power within the structure/agency debate.

2.1. CLIMATE CHANGE ADAPTATION

2.1.1. ADAPTATION DEFINITIONS

Climate change scholars have uttered many different definitions of what adaptation does and does not entail. To start, the IPCC defines adaptation as "adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (IPCC, 2007, as referred to in Horstmann, 2008).[1] Even though adaptation is often framed as a 'technical' issue, Smucker et al. (2015) argue that it is in fact inherently political. Rather than merely a technical response to changes in the environment and climate, adaptation choices are made by individuals and collectives and these choices are "embedded within existing institutions and structures of development" (Smucker et al., 2015: 40). Justice issues and the potential reproduction of existing social inequalities are therefore always present in choices of adaptation responses (Paavola and Adger, 2002), whether governments and policy makers acknowledge this or not. In turn, moving beyond the focus on technological fixes and addressing the social equity dimensions of climate change has been termed 'transformational adaptation' (Pelling, 2011; Smucker et al., 2015).

Furthermore, adaptation can be serendipitous (McGray et al., 2007) or indirect (O'Brien et al., 2008), meaning that while actions might actually be aimed at other goals, they also happen to facilitate adaptation to climate change impacts.[2] Indeed, climate change is only one among several socio-economic and ecological stressors that farmers' face in pursuing their agricultural

[1] See also Horstmann (2008) for an analysis of the evolution of the IPCC's adaptation definition across its assessment reports.

[2] This in contrast to 'discrete adaptation' that has as its primary objective the adaptation to climate change (McGray et al., 2007). Note also that adaptation practices need not be 'new' practices. Farmers are used to taking variable weather conditions into account in their decision-making and adaptation is in that sense not new to them (Crabbé, 2011).

livelihoods, and therefore only one of the factors influencing people's adaptation behaviour (Berrang-Ford et al., 2011; Nyantakyi-Frimpong and Bezner-Kerr, 2015). Climate change is not a phenomenon that manifests itself in isolation but rather occurs in a particular socio-economic, environmental and political context. Research in Tanzania has suggested that market risks are perceived as more difficult to control than climatic livelihood risks (Paavola, 2008) and that "adaptation to global market signals (insecure employment markets, fluctuating foreign exchange rates and declining global coffee prices) is perceived as more immediately pressing than adaptation to climate change" (O'Brien et al. 2008: 198). Similarly, in South Africa, Babugura (2010) found that men were able to deal with climate variability, provided that they had the financial means to do so. However, their experience of poverty, HIV/AIDS and long-term unemployment were more problematic. The South African men in Babugura's study found it particularly hard to control the latter livelihood threats as these corroded their sense of self-worth, pride and masculinity.[3]

Consequently, while adaptation can take many different forms, farmers' adaptation strategies are often in line with local development strategies. For example, practices that improve farmers' livelihood security or increase their agricultural productivity are also likely to improve their adaptive capacity in dealing with climate change. Strategies such as livelihood diversification, agricultural intensification or improved agricultural water management are therefore strategies that respond not only to climate change, but also to other environmental, social and economic drivers that are exacerbated and reinforced by the changing climate (Eakin, 2005). Adaptation then focuses on reducing vulnerability and building adaptive capacity[4] to deal with a range of challenges, rather than developing response mechanisms to address specific climate change manifestations (McGray et al., 2007). However, both types of adaptation actions are not mutually exclusive and in practice often difficult to distinguish (McGray et al., 2007).

Vulnerability consists of two elements: one's exposure to risk and one's ability or inability to cope with risky events (Ellis, 2006). McGray et al. argue that a vulnerability approach aims to target "the underlying factors that cause climate change to be harmful" (2007: 8). A vulnerability approach consequently attracts attention to issues of justice and deep-rooted unequal power relations, and looks at the causes of this vulnerability within the social, political and economic

[3] This illustrates that the interrelated livelihood challenges and adaptation options farmers face are also gendered in nature.

[4] Especially within a vulnerability framework, *adaptive capacity* is an important concept. Adaptive capacity is defined by the IPCC as "the potential or ability of a system, region, or community to adapt to the effects or impacts of climate change" (Smit and Pilifosova, 2001: 881, as referred to in Horstmann, 2008).

system (Eakin et al., 2009). McGray et al. (2007) therefore argue that: "Lower levels of capacity necessitate greater investment in addressing underlying sources of vulnerability" (2007: 23). Vulnerability-informed adaptation actions will focus on specific groups that are considered as more at risk of harm in the face of climate change (Paavola and Adger, 2002; Vogel and O'Brien, 2004). One such social category that is often mentioned in the literature are women. Gender inequalities drive and shape the vulnerabilities of individuals, as a result of gender roles, divisions of labour, access to resources etc. (Le Masson, 2016). For example, women are more exposed to violence when they are walking long distances to fetch water and firewood; and men are vulnerable to crises of masculinity as a result of loss of livelihood options and their ability to live up to the traditional provider role (see e.g. Babugura (2010) on South Africa, and Le Masson (2016) on Uganda). In chapter 3 we offer a brief policy analysis of Tanzania's climate change documents and analyse which frames of gender and climate change (adaptation) are dominant.

2.1.2. ADAPTATION STUDIES IN TANZANIA

In this section we present some studies to illustrate which adaptation practices are currently already adopted in Tanzania in general and in the Morogoro Region in particular. Which specific forms does climate change adaptation take in this local context?

First, Kristjanson et al. (2012) find in their research in East Africa[5] that farmers *are* adapting to climate change, but in a non-transformative way. Farmers are making only small, marginal changes to their agricultural and livelihood practices. Kristjanson et al. establish little uptake of existing practices of improved water, soil and land management. Nevertheless, uptake is not unimportant, as the study discovered that households that make only few changes to their farming practices are more food insecure than households who adopt innovations.[6]

Next, Paavola (2008) describes four main adaptation strategies used by farmers in the Morogoro Region. He distinguishes, first, agricultural extensification, that is, extending the agricultural land under production and using it for low-input cultivation. In this way farmers create a portfolio of plots which hold different risks. Second, agricultural intensification or investing more inputs (labour, fertilizers etc.) per unit of land with the aim to increase productivity. Specifically, Paavola (2008) finds that farmers are increasingly switching to fast crops that require few inputs

[5] They interviewed 700 households across Tanzania, Kenya, Uganda and Ethiopia.

[6] Note that the study could not establish the direction of causality. Nevertheless, Kristjanson et al. (2012) acknowledge that policy implications differ depending on causality. That is, either policy should focus on the reduction of poverty and the provision of safety nets, or on enabling the uptake of innovation. The researchers argue that it is likely that causality runs in both directions and consequently, that both policy approaches are needed to enable change.

and produce 4 to 6 harvest per year (beans, bananas, coconuts, tomatoes and cabbage). Third, livelihood diversification, i.e. combining farming and non-farming livelihoods. Paavola finds this is the most common adaptation strategy in the region. This strategy of livelihood diversification generally values security and lowers risks (to limit vulnerability), rather than achieving greater economic returns (i.e. income-security trade-off) (Chambers, 1989). Fourth, migration, either temporary for farming purposes or on a more permanent basis for employment in urban areas. See also Goldman and Riosmena (2013) on migration as a coping strategy in Tanzania.
Similarly, Below et al. (2012) distinguish between three types of adaptation strategies in the Morogoro Region, and illustrate differential adoption across wards within the region. First, agricultural water management including practices such as irrigation, planting cover crops, deep tillage, mulching, and ridge cultivation. Second, adjustment of farm and crop management such as applying manure and inorganic fertilizers, planting drought resistant-crops, and short-maturing varieties, extending farmland, fallowing, growing vegetables in the off season, keeping livestock, and practicing mixed cropping. In a similar vein, farmers commonly change the timing of planting depending on climatic forecasts (O'Brien et al., 2008). Finally, farmers are diversifying their incomes beyond the farm through involvement in businesses, reliance on natural resources, engagement in salaried employment, and temporary migration.

Note that the risk exists that short term coping strategies jeopardises the community's long-term adaptation options by degrading and depleting the natural resource base. This is especially the case when short term coping relies on the cutting down or burning of trees, e.g. to clear land or produce charcoal. Paavola (2008) emphasises that this is especially problematic in peri-urban areas where people have access to forest resources as well as to urban markets for selling the forest products. Monela et al. (2000) report that households in the Morogoro Region may obtain up to 68% of their total income from forest resources. This natural resource base is a safety net for local communities and helps to meet their subsistence needs (through looking for wild fruits, charcoal production, production of building materials etc.), especially if people's access to other means of earning an income are limited (no access to land, employment or public services). Indeed, Eriksen et al. (2005) find that households who depended most on natural resources based coping activities, were more likely to lack access to a salary or remittances. Other coping strategies in the region include the stress-selling of assets and livestock to be able to purchase food, and applying for government food assistance.

2.1.3. THIS STUDY'S UNDERSTANDING OF ADAPTATION

In this PhD thesis, we define adaptation with the help of Smit et al.'s (2000) three key questions on what adaptation is. In the context of our study villages, we understand adaptation as follows. First, adaptation to *what?* In chapter 2, we analyse and describe how climate change is manifesting itself locally in the Morogoro Region. Farmers particularly face challenges of rainfall variability and unpredictability, extreme climatic events such as drought, dry spells, floods and destructive rains. However, we acknowledge that farmers respond to different vulnerabilities and livelihood threats, and not just to an isolated climate change challenge (see in particular chapter 2 and 4). Drawing upon qualitative methods, we aim to start from farmers' own understanding of climate change and their daily, lived experiences thereof (see chapter 4). Second, adaptation by *whom?* This study focuses on adaptation by small-scale farmers in the Morogoro Region of Tanzania.[7] Rather than relying on a view of farmers as one homogeneous category, a key contribution of this research is our recurrent differentiation by gender and attention to intersectionality (see chapter 5). Women and men adapt to climate change from their positions as farmers, household heads, mothers and fathers, and wives and husbands. This study aims to improve our understanding of gender and intrahousehold relations in climate change adaptation. For example, in chapter 7 we investigate who within the household is involved in adaptation decisions; and in chapter 8 we ask which impact wives' decision-making participation has on their households' adaptation choices. And, third, *how* does adaptation occur? This study considers a range of adaptation practices, and these can be more reactive or anticipatory in nature. More reactive actions are typically considered as coping strategies, while more proactive actions can be considered as 'more pure' adaptation strategies. Coping strategies typically alleviate current vulnerabilities but do not proactively adapt to the changing climate in an effort to prevent negative impacts or improving one's adaptive capacity. In this sense, coping is more curative (see also chapter 8). Furthermore, adaptation can be either spontaneous or planned (Smit et al., 2000). In this study we particularly aim to understand the process of adaptation by investigating factors facilitating and constraining people's access to

[7] We use the term 'small-scale farming' to refer to farming that is family based, where output and input are relatively low and the scale of operation is too small to attract the services that would be needed to increase productivity significantly. In the Morogoro Region, this for example means that small-scale farmers rarely own tractors and use a considerable portion of their harvest for family consumption (see Kirsten & van Zyl, 1998). Furthermore, the research kept the concept 'farmer' relatively open, e.g. to allow villagers to identify as farmers when they are growing crops in a small garden. However, actually farming a plot of land (or garden) at the time of the research was a prerequisite to be considered a farmer. That is, merely identifying as a farmer, without undertaking farming activities, was not sufficient to be included in the study. Participants were therefore at the beginning of each interview asked about the location of their farm plot and the crops they were growing that season.

adaptation strategies (e.g. chapter 5 and 8) and the decision-making process that shapes adaptation outcomes (e.g. chapter 6 and 7). Throughout the study, we start from the current knowledge base of climate change adaptation in Tanzania and the Morogoro Region (as discussed in section 2.1.2 above).

2.2. GENDER AND ADAPTATION

In this research, we understand gender as being both discursively produced (Butler, 1990; Francis, 2008) and manifested in people's concrete actions (Nayak and Kehily, 2006). Men and women discursively produce and reproduce their gender subjectivities through everyday practices, and at the same time negotiate these subjectivities through subversive acts and speech (Foucault, 1978). This research furthermore starts from a Gender and Development (GAD) approach which wishes to addresses systems and mechanisms of gender inequality by drawing attention to power relations and the social status of both sexes (Kabeer, 1994) and paying attention to intersectionality (Crenshaw, 1989).

While the academic gender and climate change literature remains relatively limited, this research also draws upon earlier literature from related and established fields. These include gender and natural disasters (e.g. Blaikie et al., 1994; Enarson and Morrow, 1998; Fordham, 1998; Enarson and Chakrabarti, 2010; Neumayer and Plu, 2007), gender and agriculture (e.g. Beuchelt and Badstue, 2013 on access to climate smart agriculture; Peterman et al., 2014 on gendered access to agricultural inputs, technologies and services; and Mbagaya and Anjichi, 2007 on access to agricultural extension services), gender and technology adoption (FAO, 2011; Doss and Morris, 2001), and gender and natural resources management (Doss and Meinzen-Dick, 2015). Research from these related fields has shown that environmental and climatic impacts differ depending on a person's position in society, which is in turn determined by gender, race, class, ethnicity, religion, age, marital status etc. Furthermore, these studies have illustrated how the adaptation trade-off can be different for women and men. For example, Hellin et al. (2010) found that women in Mexico prefer longer-maturing maize varieties because they take less long to cook and therefore require less firewood collection and female labour. Similarly, fertilizer use might require more time spend weeding and thus increase (women's) labour burden (Doss, 2001).

Gradually, more climate change research has addressed gender in a nuanced way, recognizing differences between male- and female-headed households, as well as between women in male-

headed and in female-headed households. For example, Guloba (2014) compared male- and female-headed households' adaptation behaviour in Uganda. She found that the households' adaptation choices are similar in female-headed and male-headed households, whereas the factors influencing these choices were not gender neutral. Furthermore, Guloba established that female-headed households were more likely to reduce consumption and increase their labour supply following a shock, while male-headed households were more likely to rely on savings. Other studies (e.g. Huynh and Resurrección,2014) established that, in attempting to support their families, female household heads were more likely than women in male-headed households to diversify their livelihoods through wage labour. Huynh and Resurrección found that class, age, education, credit and household headship were dimensions that broadened or narrowed women's attempts to diversify their livelihoods. For example, well-off women were more likely to enter self-employment, while those who were poor were more likely to engage in less lucrative and irregular waged labour activities.

2.3. ADAPTATION AND THE HOUSEHOLD

2.3.1. HOUSEHOLD DEFINITIONS

In this section we ask what is a useful way to define the household (in Tanzania) and whether the household is a useful unit of analysis in the study of adaptation decision-making. The household definitions in surveys and quantitative research varies greatly and often the definition used is not made explicit (Randall et al., 2011) as the household is assumed to be an unproblematic concept. Many studies make the implicit assumption "that a household as a statistical unit accurately represents the household as a social unit" (Randall et al., 2011: 225). The United Nations defines the household as those "people living together under one roof, eating out of one kitchen and sharing one common budget" (UN, 1986). Almost all household definitions have in common that they are concerned with living and eating together, and some with the pooling of resources, while most definitions do not require the presence of all three components at the same time (Deaton, 1997). Tanzanian government surveys use various definitions of the household in practice, although the National Bureau of Statistics put forward one single definition in its 2005 survey manual (quoted in Randall et al., 2011: 224). The survey manual defines the household as: "a socio-economic unit that consists of one or more persons with common living and catering arrangements. Such persons are usually, but not always related to each other by blood or marriage... A husband with more than one wife and who spends his

time in more than one household is counted as a household member if he spends at least half of his time in that household".

The 1995 comprehensive collection of anthropological essays "Gender, Family and Household in Tanzania" (edited by Creighton and Omari) shows the wide variety of household structures, compositions and conceptions in Tanzania. Individuals in the country may frequently change households, resource flows may often be intended for persons beyond the household, and household members may (temporarily) migrate. It is thus important to be wary of projecting on Tanzania nuclear family models such as these exist in Europe and North America. Campbell (1995) furthermore emphasises the dynamic nature of the household, and argues that it is a "set of relationships whose content is continuously re-negotiated by co-resident members", thereby contrasting it with a "bounded, homogeneous or harmonious social unit" (1995: 179). Omari (1995) moreover illustrates that the household can consist of more than one homestead, and include (un)married children and their partners or children. It is estimated that about 80% of Tanzania's population is patrilineal (Rwebangira, 1996; Englert, 2008). In many matrilineal communities a shift towards the inclusion of more patrilineal practices has been observed. This has also been the case in the Uluguru Mountains (Morogoro Region): Englert (2008) finds that traditional matrilocal practices are under negotiation, and practices such as matrilocal residence are today primarily seen as a choice of the couple. The patrilineal-matrilineal divide is thus more of a continuum in practice and such cultural practices are not static or fixed. One element is the influence of outside factors in changing social systems. For example, the Kwaya, a traditionally matrilineal community, gradually incorporated patrilineal practices when the local Catholic church encouraged them to pay bridewealth upon marriage, in an attempt to lower the number of divorces in the community (Forster, 1995; Bryceson, 1995; Englert, 2008). It is clearly difficult to generalize household behaviour across Tanzania (Campbell, 1995) and we should therefore be clear about the external validity of our findings. Findings from intrahousehold data are likely to hold for the Morogoro Region and other areas where similar socio-economic and gender relations hold (primarily in the central and eastern part of the country).

Another strand of literature dealing with household relations is the feminist economics literature on intrahousehold bargaining, which has become particularly popular since the 1990s when policy failures in various areas (children's education, health, microfinance) were traced back to the ignorance of household decision-making. More specifically, it was increasingly acknowledged that the household does not necessarily function as a harmonious neutral intermediary among policy-makers and individuals and that solid knowledge about what was

happening inside the black box of the household was necessary for interventions to be effective. It has given impetus to the emergence of a strand of household models which conceptualise household behaviour differently. We elaborate on this strand of the literature in chapter 6.

2.3.2. THIS STUDY'S UNDERSTANDING OF THE HOUSEHOLD

For the household definition throughout this thesis we draw upon Bryceson (1995), who defines the household in a way that leaves space for a broad range of cultural variations and phenomena, yet does not lose its value for empirical (quantitative) analysis. She sees the household as "the collective identity of a group of individuals unified by commonly held factor endowments and one or more of the following: a common budget arising from greater or lesser degree of income pooling, common cooking quarters, and/or a common residence" (Bryceson, 1995: 39). Bryceson defines factor endowments as consisting of "land, labour and/or capital derived from the pooling of 'entitlements' as legal and social rights held by the individual" (1995: 39). An individual's entitlements are furthermore determined by the cultural values and norms of the wider community, e.g. rights associated with an individual's gender, marital status and age. An individual does not need to contribute all his or her entitlements to the household, rather Bryceson argues that commonly accepted cultural gender norms and values or gender ideologies determine the culturally endorsed degrees of factor pooling in marriage. She conceptualises this as 'marriage/cohabitation contracts'. More income pooling ensures the formation of stronger and more stable households.

Moreover, individual's decision-making power over the collectively pooled entitlements depends on a number of elements, and we elaborate on these in chapter 6 and 7 where we draw upon intrahousehold bargaining theory in particular.

We could furthermore ask if the household is a significant unit of analysis in climate change decision-making. Or do we risk reifying a household unit without specific social meaning? Creighton and Omari (1995) argue that research on rural Tanzania suggests that the household is indeed of substantial importance in many decision-making processes (Booth et al., 1994). Similarly, climate change studies have also confirmed that the household is an important decision-making unit for small-scale farmers' adaptation decisions. For example, Below et al. (2012) states that in Tanzania, rural households "operates as the ultimate decision-making unit in farming and livelihood processes" (2012: 225). Nevertheless, such climate change studies (e.g. Below et al., 2012; Eriksen et al. 2005) typically only take the gender of the household head into account in their analyses, and do not convincingly unravel the intrahousehold dynamics at play.

2.3.3. STUDIES ON ADAPTATION AND INTRAHOUSEHOLD RELATIONS

While explicit cross-readings of the climate change literature and intrahousehold literature have largely remained limited to working papers, much academic research on the importance of intrahousehold decision-making has been performed in related fields. For example, some of the studies that have inspired us deal with intrahousehold bargaining and natural resources management (Doss and Meinzen-Dick, 2015), the uptake of agricultural innovations (Mutenje et al., 2016; Singh, Squire and Strauss, 1986) and irrigation (Lecoutere and Jassogne, 2016).

Nevertheless there are also some studies that specifically address intrahousehold relations and climate change adaptation. For example, Ngigi et al. (2016) examine how intrahousehold factors play out in adaptation behaviour in rural Kenya. Using a random sample of 156 households, they describe how wives and husbands within the same household perceive climate change risks and coping strategies, and investigate the interplay of adaptation with spouses' roles and responsibilities, social norms, gendered risk perceptions and access to resources. Ngigi et al. establish that spouses share similar worries about the nature of climate change challenges, although wives consider climate change as more risky in terms of limiting agricultural productivity and fodder availability, and are more concerned about the impact on food security. This is due to their responsibility as wife and mother in ensuring food availability in the household. On the other hand, the study finds that husbands seem to experience the risk of water availability more pressing than women. Ngigi et al. furthermore find that wives are more likely to adopt crop-related strategies, while husbands are more likely to rely on livestock- and agroforestry-related strategies. For example, wives were found to engage more often in soil conservation and management compared to husbands (including practices such as crop rotation, soil amendment by using manure, and the use of cover crops[8]). Men, on the other hand, more frequent used agroforestry strategies, which is according to the researchers related to their more secure and long-term land tenure and women's lower levels of decision-making power with regard to land use. Moreover, the study finds that group-based income-generation (mixed-gender and women-only) is likely to improve women's bargaining power and fallback position by helping women build up assets and promoting livelihood diversification. While women mainly benefited from group-based approaches through livelihood diversification and risk management, men used groups primarily as a way of sharing climate change information and available or useful adaptation options.

[8] E.g. sweet potatoes and pumpkin.

Furthermore, Twyman et al. (2014) investigated intrahousehold dynamics in Uganda, Kenya and Senegal, interviewing both spouses in each household, and comparing data from husbands and wives. The most frequently applied adaptation practices are simple crop adjustments such as switching crop varieties and changing planting dates, while households also relied heavily on soil and water conservation, and the planting of trees on farms. Twyman et al. find that adopted adaptation practices are relatively similar across gender. Furthermore, the study finds that women are less likely to be aware of climate smart agriculture (CSA). Nevertheless, when women are aware of such practices, they are just as likely (or even slightly more likely) to adopt them as men.

Finally, Eriksen et al. (2005) investigated adaptation behaviour in Tanzania and found that many households are dealing with climatic risks by income diversification at household level. They describe how household level diversification went hand in hand with increased specialisation at the individual level. That is, individual household members were specialising in specific livelihood activities, within an overall strategy of diversification of activities at the household level. Eriksen et al. argue that whether households successfully undertook a diversification/specialization strategy was dependent on the degree of intrahousehold solidarity and a strong sense of commitment between household members. The authors found that relations of diversification and specialisation within the household were mediated by social relations of gender. For example, preferred non-agricultural activities people engaged with in times of drought were businesses or shops, skilled work (such as carpentry) and reliance on remittances. Businesses and skilled work were more likely to be performed by men, as individuals need to have enough labour available to invest in these activities for them to pay off. As women's time was more constrained by child care tasks, and water and fuel wood fetching, they found it harder to engage in these activities. On the other hand, traditionally female activities such as petty trade, handicrafts, and the harvesting of indigenous fruits did not yield as much profit as men's activities and remained small-scale. Eriksen et al. furthermore found that custom prohibited women from engaging in certain lucrative activities such as honey collection and carpentry.

In the next section, we position this doctoral study and its conception of decision-making power within the structure/agency debate.

2.4. POWER, AGENCY AND DECISION-MAKING

In the political ecology and sociological literature, structure and agency are typically considered as two manifestations of power that are closely intertwined. On the one hand, structures shape the agency that individuals can exercise. Social structures thus influence who can exercise agency to what extent, and in which form. In other words, structures limit the scope of agency available to individuals or groups (see also Folbre, 1994). At the same time, this agency, exercised at the individual level, shapes structures. That is, individuals' actions can reproduce structures, but can also transform them. Giddens (1987), in this theory of structuration, argues that social structures are ultimately dependant on a degree of individual agency, and writes that:

> "In following the routines of my day-to-day life I help reproduce social institutions that I played no part in bringing into being. They are more than merely the environment of my action since ... they enter constitutively into what it is I do as agent. Similarly, my actions constitute and reconstitute the institutional conditions of actions of others, just as their actions do mine... When I pursue the activities of my daily life, I draw chronically upon established convention – in a manner which is both largely tacit and at the same time extraordinarily complex – in order to do so. But this very process of drawing upon convention reconstitutes it, in some part as a binding influence upon the behaviour of others as well as that of myself. My activities are thus embedded within, and are constitutive elements of, structured properties of institutions stretching well beyond myself in time and space." (Giddens, 1987: 11)

Moreover, a key feature of agency is that individuals' actions are contingent. Giddens describes this as follows:

> "It is intrinsic to human action that, in any given situation, the agent... could have acted otherwise. However oppressively the burden of particular circumstances may weigh upon us, we feel ourselves to be free in the sense that we decide upon our actions in the light of what we know of ourselves, the context of our activities, and the likely outcomes. ... the actor in some sense 'could have done otherwise' – or could have refrained from whatever course of action was followed." (Giddens, 1987: 3)

Put differently, individuals always have some room for manoeuvre in the daily stream of decisions and choices they have to make. At the same time, social structures are in constant

need of reproducing themselves, and this happens through individuals' daily decisions and the (collective) repetition of acts. That is, through their agency, individuals can reproduce and strengthen, or challenge and transform the structure within which their agency is formed. Butler (1988, 1990), in her performativity theory, writes the following on gender as a structure and performance:

> "The act that one does, the act that one performs, in a sense, is an act that has been going on before one arrived on the scene. Hence, gender is an act which has been rehearsed, much as a script survives the particular actors who make use of it, but which requires individual actors in order to be actualized and reproduced as reality once again." (Butler, 1988: 526)

> "...what is called gender identity is a performative accomplishment compelled by social sanction and taboo. In its very character as performative resides the possibility of contesting its reified status." (Butler, 1988: 520)

It is thus exactly (individual and collective) agency that makes the contestation of structures and constraints possible. In this sense, agents have a positive power to act, to decide, to develop strategies, to negotiate social norms, and ultimately to (re)produce social structures and subjectivities (for example, the conceptions of what a good husband and wife should act, feel and think like). This is in line with Lukes' (1974) three-dimensional understanding of power, and in particular the second dimension of power: the power to exercise control over decision-making, and equally to exercise power through non-decision-making. It can be argued that this dimension of power takes the form of power-*to* (Rowlands, 1997), as distinct from power *over*, power *with* and power *from within*. Furthermore, it can be related to Foucault's notion of power as the production of subjects and social structures (see Allen, 1999).

In this light, (intrahousehold) decision-making power and voice should be understood as shaped within social structures that are perceived as given by individual agents.[9] While some social structures are more rigid, others are more flexible and thus more viable to change. Examples of such structures shaping (adaptation) decision-making power are the agricultural system in place,

[9] Voice is one's "ability to articulate practical needs and strategic interest, individually and collectively, in the private domain and in the public" (Gammage, Kabeer and van der Meulen Rodgers, 2016: 6). In this dissertation, we consider voice to reflect one's ability to participate in decision-making, "to be heard, listened to, and acted on" (Gammage, Kabeer and van der Meulen Rodgers, 2016: 6).

the labour market (and whether or not work opportunities are available for women), legal provisions (such as marriage and divorce regulations), the institutions of the household and marriage, and more broadly, gender norms and gendered relations of power. For indeed, gender norms are "very real structures and constraints that are embedded in organizational bodies and practices... and institutions" (Gammage, Kabeer and van der Meulen Rodgers, 2016: 5-6; see also Beneria, Berik and Floro, 2015; Elson, 1999). These institutions on the one hand limit and structure agents' actions, while on the other hand actors remain free – within these structures and institutions – to follow their own goals and preferences. For example, when two partners are cohabiting, a society's expectation and normative claim might be for them to engage in marriage. Within the institution of marriage certain expectations will hold of the division of labour between spouses, their respective responsibilities and the nature of the household decision-making process. Nevertheless, within each marriage there also is room for manoeuvre for individuals to pursue their own strategies and preferences, and to negotiate their own terms of conjugal life. Negotiation and bargaining should, in keeping with the economic bargaining literature, therefore be understood as key manifestations of agency within the household (Gammage, Kabeer and van der Meulen Rodgers, 2016), and structures are, in this sense, always viable to change.

In this study, we acknowledge that people possess agency and have the ability to make decisions and choices that are not entirely determined by structures and could thus 'go either way' (i.e. contingent decision-making). The research's position within the agency/structure debate is twofold, and differs between the more quantitative and qualitative chapters.

First, in the chapters of this PhD that are more *quantitative* in nature – in particular chapters 5, 7 and 8 – the emphasis lies on which factors determine the decisions people make. That is, how people use their agency or, *how agency is structured*. We investigate which patterns can be found in people's exercise of agency, that is patterns that transcend the individual level. In chapter 5, for instance, we analyse which variables influence who can adopt which adaptations strategies, and we focus in particular on the role of gender and marital status in structuring agents' adaptation choices. In chapter 7, in turn, we look at the variables that influence wives' and husbands' degree of decision-making power over adaptation. Put differently, we ask which factors explain who has more decision-making power within the household with regard to the topic of adaptation, and in keeping with authors such as Sen (1987, 1990, 1999) we draw attention to the importance of the external environment in determining and reinforcing the distribution of power between spouses (e.g. legal provisions influencing bargaining power are discussed in chapter 6). Finally, in chapter 8, we examine the factors that structure wives'

adoption of adaptation strategies, including their own degree of decision-making participation, education, land ownership and household welfare.

Second, in the *qualitative* chapters of this PhD thesis, it could be argued that the emphasis lies on *how structure is agencied*. We examine individuals' experiences of the decision-making process and their (perceived) choices in adaptation behaviour, and ask how agency plays a role in this. For example, in chapter 4, we explore the changing gender division of labour in the context of water fetching practices. We argue that men are actively redefining their water fetching tasks – and thus exercising agency – and in this way allowing for the changed division of labour – or structure – to become more persistent. In chapter 6, the study focuses on respondents' various discourses of intrahousehold decision-making and how these (partly) maintain the norms and ideals of household harmony and men's important role in household decision-making.

To understand this divide between two approaches, I argue that it should be understood that they form part of the same central idea: performativity and how it mediates between the agency of subjects, and the structures that subject them (Butler, 1990). This means that no structure can exist without performative, contingent decision-making by individuals, or that social structures are always dependent upon individuals' exercise of agency.

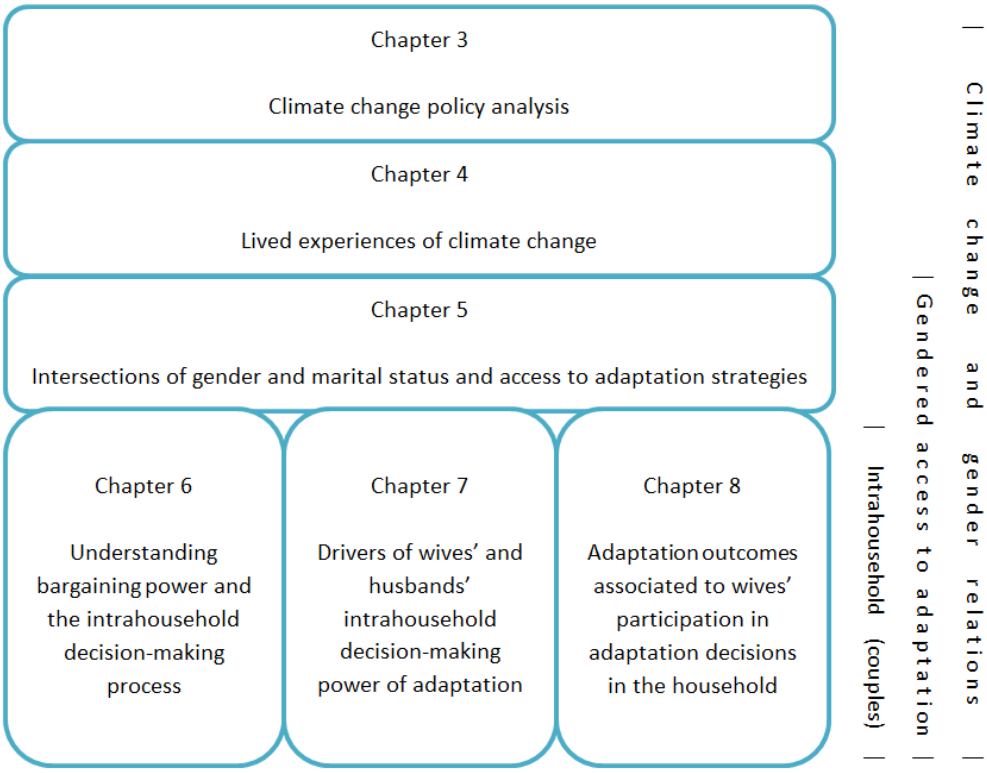
3. THESIS CHAPTERS

In this section we provide an overview of the various subjects that the chapters in this PhD thesis address. Table 1 presents an overview of the main and specific research questions in each chapter (main research questions are in bold) and figure 1 visualises the study's building blocks and its narrowing focus throughout the chapters. That is, the study gradually 'zooms in' from a more general focus on gender and climate change, to a focus on gendered access to adaptation, and finally to adaptation and intrahousehold relations.

Throughout the research we rely on a variety of qualitative and quantitative research methods and data collection tools. In chapter 2, we first introduce the study's mixed methods approach, before moving onto the description of each of the data collection tools that were used throughout the research process. Next, we present an overview of the analysis methods used in each of the subsequent chapters. Furthermore, all chapters are applied to Tanzania in general and our four study villages in the Morogoro Region in particular. In the remainder of chapter 2 we therefore present background information on the study villages by illustrating both socio-economic conditions and the local manifestations of climate change that farmers face. We furthermore contextualize the existence of other livelihood threats in the villages, which exist next to and are often interrelated with climate change threats. In the final section of chapter 2, we address the researcher's positionality and the study's limitations.

In chapter 3 we focus on Tanzania's climate change policy documents. We offer an overview of Tanzania's climate change policy documents and ask a number of questions about how climate change is framed in these documents. For example, we ask how the documents conceive of vulnerability and who they consider as such. Furthermore, we devote attention to how gender has been addressed in the documents and link back to literature on gender and development, and gender and the environment. Next, we take a brief look at institutional arrangements for the mainstreaming of climate change and gender, and drawing on group discussions in the study villages, complement this information with farmers' views of climate change responsibility. One finding relates to the homogenising of women and men in climate change policies, and we consequently aim to sketch a more nuanced gender picture in subsequent chapters.

Figure 1: visualisation of the study's building blocks



Chapter 4 addresses farmers' lived experiences of climate change and illustrate how these lived experiences mediate farmers' conceptualisation and prioritisation of climate change, as well as how they act upon climate impacts. Drawing on group discussions and qualitative interviews, we ask how respondents understand climate change through their everyday lives and how they prioritize climate change-related challenges vis-à-vis other livelihood threats. Through the example of traditional rainmaking rituals, we aim to understand why some farmers attribute low priority to climate change challenges. Next, we investigate changes in the gendered division of labour in the context of climate change. In particular, men are increasingly involved in domestic water fetching activities and we aim to understand whether this shift in division of labour also leads to a restructuring of gendered power relations.

Chapter 5 moves beyond simple dichotomies of women and men as homogeneous categories and investigates how adaptation strategies are structured by intersections of farmers' gender and marital status. Drawing on group discussions and using logistic regression to analyse questionnaire data, we compare adaptation strategies across categories of married, widowed, divorced and never-married women and men. In this chapter we thus distinguish between different types of male-headed and female-headed households. We specifically focus on two

different adaptation strategies: livelihood diversification and agricultural water management; and investigate whether (categories of) women and men who are disadvantaged in one area of adaptation, can at the same time experience easier access to other types of adaptation. We visualise findings in a typology and draw upon qualitative interviews and academic literature to fully comprehend the reasons behind marital categories' access to adaptation strategies or their adopted adaptation pathways.

In the three final chapters (6, 7 and 8) we zoom in to the intrahousehold level by investigating households that comprise a married or cohabiting couple. This is visualised in figure 1 by the three parallel building blocks at the bottom of the figure. In each chapter we investigate a different aspect of (married/cohabiting) households' adaptation decision-making.
Chapter 6 is a bridging chapter that introduces the topic of intrahousehold bargaining and decision-making. The first section of the chapter provides an overview of the intrahousehold bargaining literature and its different models or theories, before connecting these to the Tanzanian context. We ask which factors influence women's (and men's) bargaining power in Tanzania and, drawing upon intrahousehold bargaining literature, investigate the country's legislation with regard to family law (i.e. marriage, divorce, custody regulations), land and inheritance law, and employment. Despite differences in implementation and enforcement across the country, these element are virtually the same for all Tanzanian women: it are extra-household or context factors that determine spouses' bargaining and decision-making position across the country. (Compare to chapter 7 and 8 where we investigate socio-economic factors that differ at the household or individual level, e.g. educational level, control of assets). In the second part of chapter 6, we rely on the study's qualitative interview data from the Morogoro Region to unpack discourses surrounding the intrahousehold decision-making process. We consider respondents' tendency to emphasise household cooperation and family harmony, and aim to understand the different forms that 'joint decision-making' takes.

In chapter 7, we focus on the drivers of wives' and husbands' intrahousehold decision-making power, specifically their decision-making power over climate change adaptation decisions. We use questionnaire data to investigate which factors are crucial in determining this decision-making power and attach specific attention to spouses' work outside of the home, and how this influences perceptions of contribution and actual fallback positions. We develop an Actor-Partner Interdependence Model (APIM) which contributes both theoretical and empirical insights to the intrahousehold bargaining literature. The APIM allows to estimate both actor and partner effects simultaneously, and thus to take into account the effects of spouses' situation

(e.g. employment, education, asset ownership) on each other's outcomes (i.e. their adaptation decision-making power). We furthermore distinguish between different domains of adaptation decision-making and investigate whether the drivers and effects differ across these decision-making domains.

In chapter 8, we ask whether wives' degree of intrahousehold adaptation decision-making power has an influence on their households' adaptation behaviour. That is, while decision-making power served as an outcome variable in the previous chapter, chapter 8 considers it as an independent or predictor variable. Drawing on questionnaire data of 343 married (or cohabiting) women, we ask if household adaptation choices differ with wives' participation in adaptation decision-making. We use logistic regression to estimate the factors influencing the adoption of eighteen household and individual-level adaptation practices. These adaptation practices range from agricultural to coping and livelihood diversification strategies. Understanding the association between wives' decision-making participation and household adaptation outcomes requires insights into spouses' bargaining set, the nature of coping strategies and household farm output as quasi-public household goods.

Finally, the concluding chapter offers a summary of the research findings as well as contributions to the literature, and furthermore suggest some policy recommendations and avenues for further research.

Table 1: Overview of the main and specific research questions per chapter.

C3	**How do Tanzanian climate change policy documents frame issues of adaptation and gender relations?** - Which policy documents are guiding Tanzania's climate change actions? - How is climate change (adaptation) framed in these documents? - Is gender framed in these documents, and in which way? - Which institutional arrangements are in place for the governance of mainstreaming of (gender in) climate change?
C4	**How can we understand farmers' lived experiences of climate change and its gendered nature?** - What does farmers' prioritization of livelihood stressors reveal about their conceptualisation of climate change? - How is farmers' conceptualisation and prioritization of climate change influenced by their dependency on farming, and their collective histories and cosmologies (e.g. traditional rainmaking rituals)? - How are lived experiences of climate change gendered, especially in relation to (domestic) water fetching practices? - Can climate change, in tandem with adaptation behaviour and other socio-economic changes in society, induce transformations in gender division of labour and gendered power relations?
C5	**How do intersections of gender and marital status structure farmers' access to adaptation strategies?** - To what extent does a person's gender and marital status determine his/her adoption of adaptation strategies, in the fields of agricultural water management and livelihood diversification? - Given that marital status has a bearing on a person's vulnerability and ability to adopt to climate change, what constraints and opportunities work towards determining the differential paths to adaptation of the various marital categories?
C6	**How can we understand intrahousehold bargaining power and the adaptation decision-making process in married couples?** - Following the intrahousehold bargaining literature, which Tanzanian legislation affects women's (and men's) intrahousehold bargaining power, and in which way? - Are Tanzanian women participating in household decision-making, and in which way? - How do respondents speak about intrahousehold relations and decision-making? - Which different forms does 'joint' decision-making take, and how do husbands and wives deal with disagreement?
C7	**What are the drivers of women and men's decision-making power of climate change adaptation among married couples?** - Using an Actor-Partner Interdependence Model (APIM) and thus considering both actor and partner effects, which spouse's educational level and employment situation drives wives' and husbands' intrahousehold adaptation decision-making power? - Does wives' asset ownership, age, and the number of children in the household affect wives' and husbands' intrahousehold adaptation decision-making power? - Do the drivers of wives' and husbands' adaptation decision-making power vary across diverse domains of adaptation decision-making (in particular the traditionally male, female, joint, individual and cash-related domains)?
C8	**In married couples, what is the relation between women's intrahousehold decision-making participation and households' adaptation behaviour?** - What is the dominant mechanism of adaptation decision-making in farm households (joint, male, female, etc.)? - Is wives' intrahousehold adaptation decision-making correlated to households' adaptation strategies, and in which way? - Across 18 adaptation practices, is wives' higher voice related to the adoption of different adaptation practices at the household level? - How can we understand (the absence of) these correlations, through the lens of narrow bargaining sets, the nature of coping strategies and farms as quasi-public household goods?

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CHAPTER 2

METHODOLOGY OF THE STUDY

In this methodological chapter, we first discuss the study's mixed methods research design and its epistemological underpinnings. Second, we provide a detailed description of the different (primary and secondary) data collection methods. Third, we briefly describe the analysis methods that were used to answer a range of research questions. Fourth, we situate the four study villages and contextualise their socio-economic and climatic characteristics. In the final section, we discuss a number of challenges and opportunities that we faced in undertaking the research, and discuss the researcher's positionality and its impact on the study.

1. RESEARCH DESIGN: MIXED METHODS APPROACH

In this study we have used a multiphase mixed methods design with both sequential and concurrent elements (see Creswell and Clark, 2011). As visualized in figure 2 below, an exploratory field research phase fed into a phase of qualitative data collection, which in turn fed into the final phase of quantitative data collection, which was supplemented with additional qualitative data collection (concurrently). We distinguish the two main data collection phases as a first phase of qualitative, and a second phase of quantitative, and concurrent qualitative research.[10] On the one hand, the sequential use of qualitative and quantitative methods allowed us to optimize instrument development in the second research phase. Specifically, the questionnaire was developed to fit local circumstances by e.g. incorporating already existing adaptation practices. Moreover, qualitative research informed our choices of concepts and the formulation of questions in the second research phase. For example, we found that 'climate change' is too abstract a term for many people to grasp. The term bears little meaning to local farmers and, if anything, is confused with seasonal changes in weather patterns. In the second data collection phase, we therefore specified local manifestations of climate change that were identified earlier on (i.e. prolonged drought, periodic floods, increased climate unpredictability, highly concentrated rainfall, and temperature rises or 'strong sun').

On the other hand, the mixed methods served the purpose of enabling us to generate a deeper and enhanced understanding of the inherently complex social phenomenon under study. As Greene (2007: 20) puts it: "a better understanding of the multifaceted character of... social phenomena can be obtained from the use of multiple approaches and ways of knowing". Scholars have indeed recognized

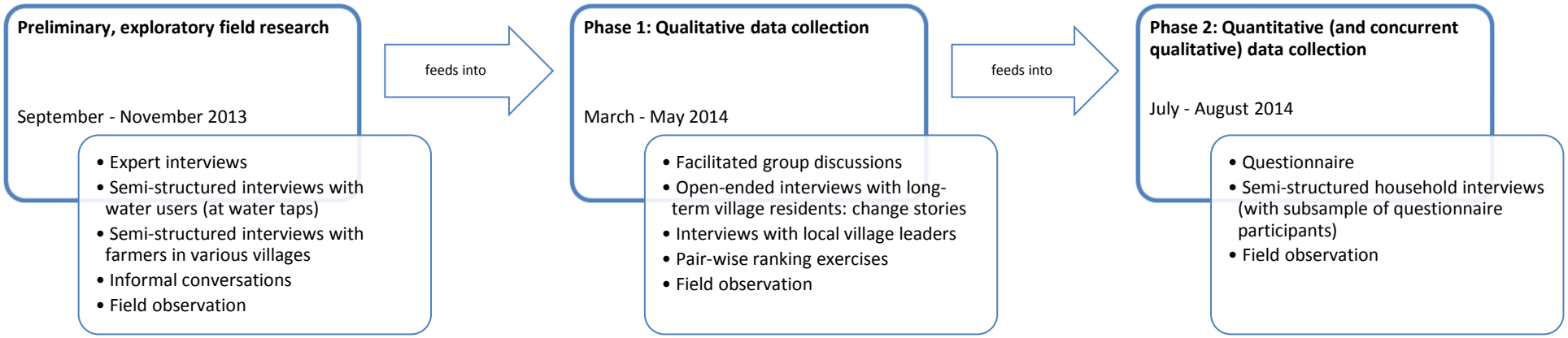
[10] Note that we do not name the exploratory field research as a main data collection phase. The aim of the exploratory research was to gain contextual understanding, explore local circumstances, and select relevant study villages. However, data collection during this exploratory field research was conducted in various villages, and was not specific to, nor including all four villages that constitute the location of the rest of the study (compared to phase 1 and 2).

that climate change is a highly complex or 'wicked' problem (Lazarus, 2009; Levin et al., 2012), and the social and gender relations associated to climate change are no doubt among its complex facets. Gender is a social construct that structures relations of power between and among (categories of) men and women. Gender relations vary not only across culture, community and location, but also intersect with other socio-economic dimensions and structures such as age, class, race, marital status, and life cycle phase (Crenshaw, 1989). These complex social power relations, which are discursively (re)produced through everyday practices (Butler, 1990) and at the same time continuously negotiated through subjects' subversive acts and speech (Foucault, 1978), shape people's experiences of climate change, as well as their vulnerabilities and adaptive capacities in the face of the changing climate. This begs for proper contextualisation of climate change debates by taking into account local social and gender relations of power (Arora-Jonsson, 2011). Qualitative data collection is better suited for grasping the subtleties and multiple facets or intersections of gender relations and intrahousehold bargaining and decision-making. Through utilizing various methods, we aim to get a more comprehensive understanding and insight into this complex social problem of gender and climate change. Related to this, both quantitative and qualitative methods are in fact addressing a different facet of the research question. As Creswell and Clark (2011: 63) describe, combining both approaches allows for "uncovering relationships between variables through quantitative research while also revealing meanings among research participants through qualitative research." Through quantitative methods, we establish correlations in outcomes, while the qualitative methods allow us to focus on the *process* of the social phenomenon under study, and the meaning respondents attach to it. We could argue that in research phases 1 and 2 different epistemological underpinnings come to the fore, which consequently go hand in hand with different data collection tools and methods. While the first phase of data collection relies on a more constructivist epistemology, the second is more post-positivist. That is, in the first phase the study's focus lied on gaining contextual understanding of the social phenomenon and the local context (*verstehen*). In this phase, we relied on more open-ended questions and interviewing methods, specifically change stories, group discussions and PRA-inspired methods such as pair-wise ranking (more details in section 2). We asked broad questions and respondents were allowed to talk openly about the topic at hand. This allowed us to investigate which aspects of the research topic are relevant to local farmers, which factors are significant within the local context, and which elements we should not neglect later on in the research. For example, during group discussions and change stories we wanted to get an understanding of whether climate change was considered as a problem locally, and how climatic challenges manifest themselves locally. What are (female and male) farmers' lived experiences of climate change? Which other social, economic and political changes are present in the community and how are these affecting people's livelihoods (in tandem with climate change)?

Subsequently, the second phase of quantitative, and qualitative, data collection involved less open-ended questions. The aim of the quantitative questionnaire was to make (externally valid) generalisations about the population and establish correlations between variables, and thereby focussed on addressing *outcomes*. Questionnaire data were used to test hypotheses with regard to intrahousehold bargaining power and decision-making. Furthermore, through semi-structured qualitative interviews with household heads and their partners, we also aimed to understand the *processes* of decision-making within the household. These qualitative methods help us to understand how spouses bargaining about household adaptation decisions and improve our insight into the direction of causal relationships. Both methods thus address different facets of the research question, and in this way deepen our understanding of the social problem of climate change and gender relations.

Other reasons for combining methods in this study were the triangulation of data and research findings, as well as the fact that results from different methods can reinforce each other. For example, throughout chapter 5, 7 and 8 statistical results are supported by qualitative quotes. Both methods are thus complementarity and can illustrate the same findings or contribute nuances to findings from the other method.

Figure 2. The research's data collection phases



2. THE DATA COLLECTION METHODS

Various data collection tools were applied throughout the research phases (see visualisation in figure 2). All qualitative and quantitative data collection tools are described in detail below. Note that throughout the data collection stages, the researcher also used *field observation* as methodological input (Gupta and Ferguson, 1997; Bernard and Gravlee, 2014). That is, during field work I gathered information based on experiences in the field, being in the field, observing and engaging with respondents. For example, in terms of respondents' living and livelihood arrangements, observations were made with regard to who is fetching water and when, and at what kind of boreholes or wells, as well as who is doing what kind of work in the farms, in the market place, in local governments, etc. Whenever possible, attention was paid during observations to intersecting categories of gender, class, age, religion and marital status.

2.1. PRELIMINARY DATA COLLECTION (SEPTEMBER – NOVEMBER 2013)

During the exploratory, preliminary research phase, data collection started with expert interviews, including university experts from Sokoine University of Agriculture (SUA), Mzumbe University (our institutional partner), as well as practitioners such as programme directors of iWash, UNWomen and agricultural organizations in Morogoro Town. Finally, some government officials were also interviewed at this stage (Wami-Ruvu River Basin, Morogoro Regional Office, Ward Office, etc.). These interviews and consultations served to ensure construct validity of the research findings (see Shadish, Cook and Campbell, 2002) and to elicit input for the design of later data collection tools.

Secondly, water user interviews were undertaken at (public and private) taps in Changarawe and Vikenge village. These took the form of rather informal talks and brief semi-structured interviews. I attended the water taps at various timings (morning, noon, evening) with a translator, and we spoke to 25 men and 3 women in total.[11] Respondents were asked about their

[11] At the specific water taps we visited and at the time of the interviews, substantially more men than women were fetching water. Consequently, more men than women were interviewed. These figures are *not* representative, neither across villages nor for all times of the day or year. Indeed, our (representative) questionnaire data indicate that women are the main water fetchers in the household: 68% of husbands and 72% of wives agreed on this (see also chapter 4). The researcher's field observations are also consistent with this. It is likely that the timing of the water tap interviews was not in line with women's water fetching schedules. Note that this poses a limitation to the study: I was not able to return to the research site to extensively interview women on their perceptions of water fetching and femininity/masculinity, the changing division of labour in water fetching, and their preferences with regard to using bicycles. Further exploration of this topic and women's viewpoints would provide interesting avenues for further research.

practices with regard to water fetching and water vending. Questions included how often they fetched water, how much and for what use. We also established which means of transport they used and whether they contributed water fees to the village (for maintenance and service use). Furthermore, if respondents indicated to sell water, we asked about prices and customers. Finally, we asked about their perceptions and appreciation of the task of fetching water.

Thirdly, together with a translator, I undertook a range of semi-structured interviews with farmers across various villages. These interviews dealt with a variety of topics, including household formation and relations, land inheritance, agricultural and livelihood practices, water availability in the village etc. The villages in which these preliminary interviews were undertaken include Changarawe, Vikenge and Kiwege (3 out of 4 villages that constitute the study site of the main part of the study), Mindu Dam (along Mzumbe-Morogoro road), Tangeni, Mgeta and Nyandira (Uluguru Mountains), Morogoro Town, Dakawa (along Morogoro-Iringa road) and Mkata Station (Kilosa District). The aim of the preliminary data collection was twofold. First, improve our understanding of the local context and potentially relevant research questions; and second, select the villages that were to be the location for the remainder of the study.

2.2. FIRST PHASE OF QUALITATIVE DATA COLLECITON (MARCH – MAY 2014)

For each data collection tool, we describe the procedures that were followed and the selection of research participants. Note that all interviews were conducted in Kiswahili. Thanks to the researcher's basic understanding of the language, it was possible to monitor translators during qualitative interviews by picking out key words in respondents' answers and discussions. Most translators were recent university graduates and had not been involved in this type of work before.

2.2.1. GROUP DISCUSSIONS

A total of 41 facilitated group discussions were conducted, in which we included PRA (Participatory Rural Appraisal) tools such as Venn Diagramming, problem ranking and scoring (Chambers, 2008). Each group consisted of either women or men, but was mixed in terms of age, marital status and class. In total 25 group discussions were organized with women and 16 with men (see table 2 below).

Table 2. Group discussions per gender and per village

Village	*Vikenge*	*Changarawe*	*Kiwege*	*Sinyaulime*	*Total*
Female groups	4	5	9	7	25
Male groups	3	3	7	3	16
Total number of group discussions	7	8	16	10	41

All participants were at least partially engaged in farming. We aimed to ensure spatial representation of the participants, and therefore organized group discussions in each of the administrative subvillages. In each subvillage, a local chairperson assisted us in bringing (male respectively female) participants together, and received a small compensation for this task. It should be acknowledged that local leaders thus influenced who we did and did not speak to. Groups were composed of between three to seven participants and were facilitated in Swahili by four trained university graduates (two men and two women, graduated from either Mzumbe University or SUA). Facilitators worked in pairs: one person functioned as the main facilitator and the second person made extensive notes. In certain subvillages, two group discussions were conducted concurrently by the two teams.

In each group discussion, participants were asked to discuss the different livelihood challenges they are facing, as well as to rank these livelihood challenges vis-à-vis each other. Participants then proceeded to distinguish potential and actual strategies to react to the threats, and attached scores to each strategy to indicate how successful or effective they considered the strategy. Specifically, participants were given small papers to write down – after group discussion – the different livelihood threats or challenges that they face in the village. The threats were written down concisely in a few words or, when participants were illiterate, were represented by a simple drawing. Writing and drawing was usually done by one of the group facilitators although participants were encouraged to write or draw when they felt comfortable with this. When a new livelihood challenge came up in the discussion, a new piece of paper was used to write down the new threat. The identified threats were placed in front of the participants (on the ground) in random order.[12] Next, participants were asked to rank the

[12] Note that prior to the advancement of the group discussion, participants were not told about the research's specific interest in climate change and weather related threats (and its relation to gender and intrahousehold bargaining). This was done so as to avoid desirable answering since in this phase of the research we wanted to establish if climate change threats came up in farmers' list of livelihood challenges.

different livelihood challenges vis-à-vis each other. More specifically a circle was drawn in the sand or created with bricks or stones lying around. The centre of the circle represented the 'centre of the village', where the most urgent or important threats were placed by the participants. Occasionally, participants also ordered threats outside the Diagram, that is outside the 'village', indicating that these threats were relatively unimportant ones to them. Sometimes one 'chairperson' was appointed among the participants to place the papers in order as decided during the discussion, but other persons could also intervene and change the ranking order. For each of the threats, participants were asked to discuss who they thought of as responsible to protect farmers or villagers against this threat. Participants then proceeded to distinguish potential and/or actual strategies to react to the threats, which were written down on papers (in a different colour and shape). Each threat was put on the floor with its solutions placed around it. Finally, participants allocated scores to indicate how successful (or effective) they considered each strategy. To visualise the scores, we used local materials such as beans, or stones that were found lying around. Between 0 and 10 points were allocated to each strategy and placed on the corresponding piece of paper to visualise its valuation. Each participant was given some beans or stones so everyone could be involved in allocating them. Rather than the 'outcome' itself (i.e. the allocated scores, identified strategies, etc.), the participants' discussion and how they reached the 'outcomes' was of interest to us. Furthermore, the group discussions provided us with initial insights into which socio-economic and cultural characteristics might be of importance in influencing climate change adaptation, and these factors were later on included in the quantitative regression analyses as control variables.

Note that participants received a small amount of money for participation in the group discussion. This was framed as a compensation for travel costs, as some respondents had to travel by e.g. motorcycle to reach the location where the group discussion was held. Furthermore, (soda) drinks were provided during group discussions.

2.2.2. CHANGE STORIES

A second type of interviews conducted in the first data collection phase were change stories. A total of 24 interviews or 'stories of change' were conducted between March and April 2014. These took the form of semi-structured interviews conducted by the researcher and a translator. In the interviews, villagers discussed changes they had perceived in the community, ranging from social, political and economic changes to environmental changes. A selection criterion for change story respondents was that they had been living in the village for at least thirty years. In

total, we interviewed 11 women, 11 men, one married couple (both husband and wife participated actively in the interview and were interviewed together), and a group of four elderly men (*wazee*, who were also interviewed together).

2.2.3. INTERVIEWS WITH LOCAL LEADERS

A range of interviews with local leaders (chairpersons or *mwenyekiti*, Village Executive Officers (VEO) and other local leaders) were also conducted during this phase of the research (8 in total). These were often conducted concurrently with group discussions, and helped to prevent the chairpersons' intrusion in group discussions. Interviews covered a range of topics, including access to local services and water points, village composition, as well as their personal views on changes in the village over time and the villagers' livelihood challenges.

2.2.4. PAIR-WISE RANKING EXERCISES

A limited number of participatory pair-wise ranking exercises (Narayanasamy, 2009) were undertaken in Changarawe and Vikenge villages by the researcher and a translator. Specifically, six pair-wise ranking exercises were carried out in total, three of which took place in Changarawe and three in Vikenge. Three male and three female respondents were randomly addressed in the street and asked if they wanted to participate in the exercise. The pair-wise ranking exercises in this study each involved only one participant, although the data collection tool can also be conducted in the form of participatory group exercises. Consequently, we could not rely on observation of the discussion between participants and this meant that the interviewer and translator extensively probed the participant about his or her answers and stimulated the participant to elaborate on the choices (s)he made.

Table 3. Pair-wise ranking exercises per gender and village

Village	*Changarawe*	*Vikenge*	*Total*
Women	2	1	3
Men	1	2	3
Total	3	3	6

An example of a pair-wise matrix that was produced during one of the interviews in Vikenge is provided in table 4. In the ranking exercises, participants were asked to choose between two adaptation strategies at a time. I.e. they had to choose the adaptation strategy they would prefer to use, not necessarily the one they were using at the time. The 7 practices that participants were asked to choose between came forth from the group discussions.[13] To contextualise the exercise, we asked participants about weather-related challenges in the village and whether they thought these affected their agricultural practices. At the start of the exercise, one set of cards depicting the 7 practices were arranged from top to bottom (vertical), and another set of cards was arranged from left to right (horizontal). We described all practices and explained to the participant that these practices are ways in which people in the village might choose to deal with these weather-related challenges. We asked whether they agreed with this and checked if they understood the meaning of the practices. Next, the concept of the exercise was explained to participants by referring to a football game: only one of the teams can win the league, either *Yanga* or *Simba* (two popular teams across the country). This metaphor helped to clarify to participant that each time, they had to choose the 'winner' between two practices. We then picked up the first vertical card, and asked the participant to choose between this card ('small-scale irrigation') and, one by one, each horizontal card. So, the first choice would have been whether the participant would prefer to use small-scale irrigation in his/her farm, or whether he/she would prefer to use a farm located in the valley. The second question would have been "between small-scale irrigation and early farm preparation, which do you prefer to use in your farm?"; and so forth. Preferences were recorded in the matrix as visible in table 4. When the matrix had been completed, we counted how many times each practice had been chosen to establish the 'winners' and 'losers', and asked the participant to discuss the outcome.

[13] I.e. in the group discussions these 7 practices were often mentioned as ways to deal with drought, floods, and unreliable or unpredictable rainfall.

Table 4. Example of a pair-wise ranking exercise (female participant, Vikenge)

	Small-scale irrigation	*Farming in valley*	*Pre-seasonal (early) farm preparation*	*Fast-maturing seeds*	*Drought-resistant crops*	*Resowing seeds continuously*	*Non-farm activities*
Small-scale irrigation	x	Valley	Irrigation	Fast seeds	Drought-resistant	Irrigation	Non-farm
Farming in valley	x	x	Valley	Fast seeds	Valley	Valley	Valley
Pre-seasonal (early) farm preparation	x	x	x	Fast seeds	Drought-resistant	Early preparation	Non-farm
Fast-maturing seeds	x	x	x	x	Drought-resistant	Fast seeds	Non-farm
Drought-resistant crops	x	x	x	x	x	Drought-resistant	Drought-resistant
Resowing seeds continuously	x	x	x	x	x	x	Non-farm
Non-farm activities	x	x	x	x	x	x	x

Source: pair-wise ranking exercise. Note: the cards during the exercise itself were written in Swahili (all six participants were literate)

The aim of the ranking exercise was threefold. First, by asking questions about farmers' agricultural preferences, we gained insights into which criteria they use to make choices about the adaptation strategies they adopt. Rather than the 'outcome' itself (i.e. the matrix as represented in table 4), it was the process that was important. That is, which arguments did farmers use to explain their preference for certain adaptation practices, and their non-preference of others? Second, the exercise provided insights into the reality of adaptation trade-offs farmers might have to make. While some of the choices participants were asked to make were not realistic (i.e. farmers can at the same time plant drought-resistant crops and choose to keep resowing seeds until they germinate; this is not usually an either-or-story), others were

(for example, one woman preferred non-farm activities and indeed invested little in her agricultural plot). The exercise furthermore illuminated that these adaptation trade-offs differed depending on famers' circumstances and socio-economic status. For example, factors of influence were respondents' livelihood strategies at the time of the study, the size of their farm plots, their household composition and marital status, access to resources such as cash, etc. Third, how farmers referred to practices and which criteria they used to decide on their (non-)adoption were elements that fed into the questionnaire (phase 2). For example, some of the criteria that came to the fore were that the practice was too time-consuming, costly, uncertain in its effectiveness or had not been successful in other peoples' farms. These criteria were later on included in the questionnaire.

2.3. SECOND PHASE: QUANTITATIVE QUESTIONNAIRE AND QUALITATIVE INTERVIEWS (JULY – AUGUST 2014)

2.3.1. HOUSEHOLD QUESTIONNAIRE

The survey. Findings from group discussions, expert interviews, pair-wise ranking exercises and change stories contributed to the optimization of the survey design, which improved construct and internal validity of the questionnaire instrument (see Shadish, Cook and Campbell, 2002). The survey covered a range of topics, including demographic data (age, gender, marital status, educational level, number of household members, etc.), socio-economic data (ownership of means of transport, toilet facilities, type of roof, ownership of land, ownership of assets, main occupation, etc.), adaptation practices (adoption of practices, person who made the decision to (not) adopt each practice and reasons for (non-)adoption), and questions about the water sector. Table 5 presents a description of the adaptation practices that were covered in the questionnaire.

The procedure. Three female and three male enumerators – who were all staff at Mzumbe University – received a five-day training by the researcher and undertook the questionnaire interviews in Swahili. A brief field test (one-day) was organized in a village neighbouring Changarawe that was not part of the four study villages. The researcher was present in the field during questionnaire interviews, attended interviews of different enumerators, intervened to avoid misinterpretation of questions and survey practices, and was available for questions at all times. At the end of each day of field work, there was a debriefing with all enumerators and the researcher checked all surveys for missing data and inconsistencies. Questionnaire interviews took between 1,5 hours and 45 minutes, and as a sign of appreciation respondents received a

small compensation for the time they spent participating in the research. This compensation took the form of a small payment of 5,000 TSH per household, which is equivalent to about 2.3 USD. This is in line with research practices in the area as other universities and NGOs have developed the habit of paying respondents for research participation. This has become an expectation of respondents and an issue chairpersons explicitly bargained about with the researcher to establish the sum respondents would receive.

The sample. A total of 844 respondents were included in the questionnaire, of whom 686 were married (i.e. 340 couples)[14], while 159 comprised single-headed households (114 females and 45 males). As has been discussed in the introduction (section 2.3.2), we define the household as "the collective identity of a group of individuals unified by commonly held factor endowments and one or more of the following: a common budget arising from greater or lesser degree of income pooling, common cooking quarters, and/or a common residence" (Bryceson, 1995: 39). Table 6 shows the total number of male and female respondents in each village.

[14] As there were 6 respondents who were married or cohabiting, but for whom we failed to interview the spouse.

Table 5. Description of adaptation practices covered in the survey

Adaptation strategy	*Description*
Drought-resistant crops	Planting crops that are able to cope with drought conditions, e.g. cassava, millet, sorghum, groundnut and sunflower.
Participate in farmer field schools	On-farm field trials. Participation in farmer field schools (locally known as shambadarasa) to learn to apply new agricultural techniques.
Vegetable cultivation	Cultivating vegetables in gardens during the dry season.
Mixed cropping	Growing two or more crops simultaneously on the same farm plot.
Mulching	Placing a layer of organic – or other – material on the soil to conserve moisture, improve soil fertility and/or reduce weed growth.
Cover crops	Planting crops that improve soil moisture and fertility and/or control weeds and pests.
Fallowing	Ploughing the farm land and leaving it unseeded during at least one growing season.
Work as casual farm labourer	Work as a casual labourer on someone else's farm land, usually in return for cash but occasionally for food or a share in crop yields.
Non-farm income activities	Engaging in income-earning activities outside the household and farm, such as brick making, charcoal production, own business, wage labour (not including income-earning activities on other people's farms, see working as a casual labourer).
Food support	Asking for or receiving food support from the government, relatives or friends.
Look for wild vegetables	Searching for wild vegetables or wild fruits balance the diet. These can be found in the bush, forest or by the road side.
Small-scale irrigation	Practicing small-scale irrigation on the farm, e.g. bucket irrigation, hose irrigation or using canals.
Fast-maturing seeds	Using fast-maturing seeds (known as 'short seeds' locally) which take less time to mature. Depending on the type of seed, maturing can take e.g. 3 or 4 months.
Hire casual farm labourers	Hiring casual labourers to help on the farm, usually during farm preparation (soil tillage using the hoe) and/or harvesting.

Hire tractor	Hiring or using a tractor to facilitate or improve soil tillage.
Manure	Applying organic matter to the farm land or crops to improve crop growth and soil fertility.
Fertilizers	Applying non-organic or industrial fertilizers to the farm land or crops.
Sell assets to buy food	Selling assets such as a television, phone or livestock to get money to buy food.
Valley farming	Farming lowland where the soil holds more moisture and irrigation is possible through digging traditional wells. An agricultural water management strategy.

Source: Survey questionnaire by author

Table 6. Questionnaire interviews per gender and village

Village	*Vikenge*	*Changarawe*	*Kiwege*	*Sinyaulime*	*Total*
Female	107	112	124	114	457
Male	92	90	113	92	387
Total	199	202	237	206	844

The respondents in the questionnaire were selected through a random sample of households from each of the four villages. Random sampling helped to avoid selection bias and thereby increases the study's internal validity. A first selection requirement was that respondents were involved in farming activities. Secondly, the selection of respondents also entailed proportional representation across subvillages by estimated population numbers. Thirdly, we aimed to include about 65% of married or cohabiting couples among the respondents. This target was applied for reasons of sample size, but was not fixed. In villages where more single-headed households were encountered, relatively more of them were interviewed and vice versa. On average, the questionnaire included 68.3% of married or cohabiting households across the four villages. In households that consisted of a couple, both the husband and wife were interviewed. Husbands were interviewed by male enumerators, while wives were – simultaneously – interviewed by a female enumerator. Enumerators therefore worked in teams of two, consisting of one male and one female enumerator. We organized interviews with spouses at the same time, so that spouses would not disrupt each other's questionnaire interviews and to ensure sufficient privacy during the interviews. This was done to prevent socially desirable answering and increase the study's construct validity. Note that female-headed households were occasionally interviewed by male enumerators due to practical reasons (there were more female-headed than single, male-headed households in the villages). As villages did not have a 'population list', we had to rely on other methods to ensure a random sample. The procedure involved a first day of field work in which appointments were scheduled for the rest of the week. Each team of enumerators worked in one subvillage and during this first day, was accompanied by the subvillage chairperson. This was practical for various reasons. First, the subvillage chairperson knew where the boundaries of the subvillage were (to avoid enumerator teams questioning the same respondents), and in more rural areas they knew where dispersed houses were to be found. Second, the chairperson introduced the enumerators to respondents so as to avoid suspicion about our role and function. During the rest of the week in the subvillage, enumerators would visit the households with whom they made appointments by themselves,

i.e. without the chairperson. However, the chairpersons' involvement also posed a challenge to the random selection of respondents, due to their role of gatekeeper and thus their influence on who is and who is not included in our sample. We mediated this risk through enumerators' active interference in randomly choosing houses, especially in densely populated areas. Research assistants selected every other house and local leaders primarily served to introduce the researchers to the inhabitants (of the selected houses). For example, in one subvillage of Sinyaulime we came across a large Maasai settlement, and although the local chairperson initially seemed hesitant to introduce us to these households, we insisted and the chairperson agreed. A sample of these Maasai households have been included in the questionnaire.

2.3.2. HOUSEHOLD INTERVIEWS (SUBSAMPLE OF QUESTIONNAIRE RESPONDENTS)

Next, in each village we purposively selected (Devers and Frankel, 2000) an average of eight households from those that were involved in the questionnaire. The aim of the purposive selection was to interview a range of different household types and thereby improve the external validity of the research findings (Shadish, Cook and Campbell, 2002). Based on questionnaire answers we selected some households that indicated joint decision-making, and some that indicated more female, respectively more male decision-making. Furthermore, we ensured variation in ages of the respondents as well as location across subvillages. We also interviewed at least one single-headed household per village.[15] These qualitative interviews were carried out by the researcher and a translator (a university student at Mzumbe) and took the form of semi-structured interviews. Topics of the interviews were respondents' adaptation strategies as well as the intrahousehold decision-making process with regard to adaptation. Specifically, we started by establishing the respondent's livelihood sources, the different crops they grow, etc. Then, we asked about their perceptions about the weather and climatic changes, and how this affected their livelihood. We established how they dealt with the last period of drought (which effect did it have on the household; how did they cope with it), and how they would deal with a future situation of drought. To discuss intrahousehold decision-making we tried to ask questions about actual and specific practices and spouses' past household decisions. For example, we asked about issues spouses had had disagreement about in recent years and how they had solved this argument. We also asked about respondents' perceptions about

[15] Note that these qualitative interviews also allowed the researcher to 'control' enumerator teams and the quality of their work, and thus questionnaire results.

household relations, and responsibilities of different household members such as 'the household head'.

Table 7. Household interviews per household type and per village

Village	*Changarawe*	*Kiwege*	*Sinyaulime*	*Vikenge*	*Total*
Single-headed households	1	2	2	1	6
Married/cohabiting households	8	5	6	7	26
Total	9	7	8	8	32

2.4. SECONDARY DATA COLLECTION

Next to the primary data that was collected during the research we also relied on secondary data. On the one hand, literature review of academic literature from various disciplines as well as grey literature exposed knowledge gaps and consequently informed the direction and hypotheses of the study. On the other hand, we used secondary data such as surveys conducted in the area (e.g. Tanzania's Demographic and Health Survey (DHS)), documents from the national policy level, as well as from the Mvomero District Office and Wami-Ruvu River Basin. We used data on functional water points in the villages (i.e. Water Point Mapping) from both the government and international organizations such as SNV (a Dutch development organisation). Finally, we obtained rainfall and temperature data from the Tanzania Meteorological Agency (TMA) in Dar es Salaam.

3. ANALYSIS

In this section, we provide an overview of the analysis methods used to answer each research question, as well as a brief description of how we have approached qualitative data analysis. Table 8 below outlines per chapter the main research question and the analysis methods (qualitative and quantitative) that were used to answer the question. A complete list of (main and specific) research questions per chapter can be found in chapter 1 (see table 1). Note that more details on each analysis method can be found in the subsequent chapters.

Table 8. Analysis methods used per research question and per chapter

	Main research question	*Analysis methods used*
3	How do Tanzanian climate change policy documents address issues of adaptation and gender relations?	- Document analysis of policy documents, strategies, guidelines and (action) plans. - Qualitative analysis of data from group discussions to illustrate farmers' views of who bears responsibility for climate change adaptation.
4	How can we understand farmers' lived experiences of climate change and its gendered nature?	- Qualitative analysis of interview data (i.e. of group discussions, household interviews and change stories). - To visualize farmers' prioritization of livelihood stressors we present a cross-tabulation of quantitative information from the group discussions. This table illustrates the priority that groups attribute to climate change and their concomitant argumentation.
5	How do intersections of gender and marital status structure farmers' access to adaptation strategies?	- Statistical analysis: cross-tabulation, t-tests, and logistic regression. The dependent variables in the logistic regression analyses are the adoption (1) or non-adoption (0) of the adaptation strategies (in the fields of agricultural water management and livelihood diversification). - We used qualitative analysis of interview data to help explain findings. Specifically, qualitative analysis contributed to understand what constraints and opportunities work

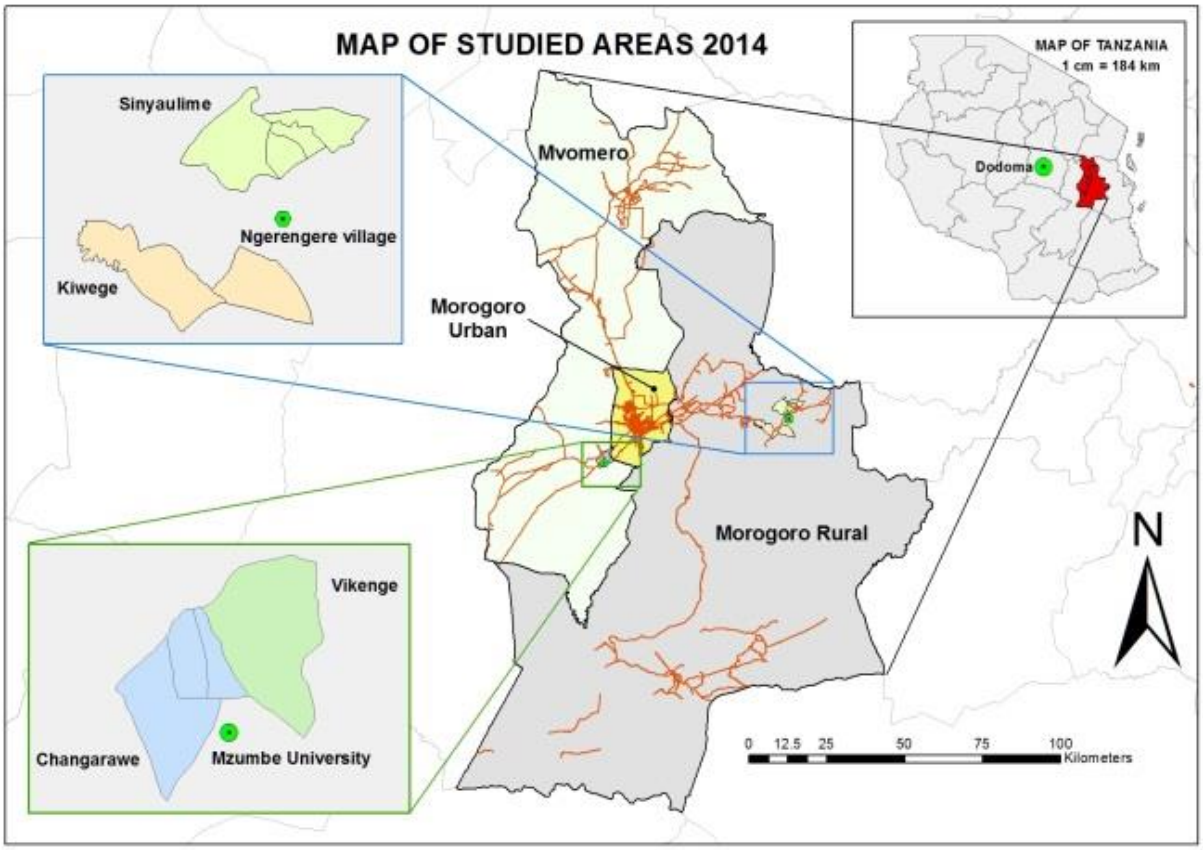
		towards determining the differential paths to adaptation of the various marital categories. - To illustrate farmers' adaptation preferences we used quantitative data from group discussions. Specifically, across gender groups we compared the number of groups who mentioned the adaptation strategies in question and the 'perceived effectiveness scores' attributed to these strategies.
6	How can we understand intrahousehold bargaining power and the adaptation decision-making process in married couples?	- Literature review and document analysis of legislative documents, in order to outline which Tanzanian legislation affects women and men's intrahousehold bargaining powers, and in which ways. - Qualitative analysis of interview data, to understand how respondents speak about intrahousehold relations and decision-making, which different forms 'joint' decision-making takes, and how husbands and wives deal with intrahousehold disagreement.
7	What are the drivers' of women and men's decision-making power of climate change adaptation among married couples?	- Structural Equation Modelling (SEM) is used to estimate an Actor-Partner Interdependence Model or APIM. The two outcome variables are the adaptation decision-making powers of respectively husband and wife.
8	In married couples, what is the relation between women's intrahousehold decision-making participation and households' adaptation behaviour?	- Logistic regression analysis: we estimate logistic regression models using as dependent variable the adoption (1) or non-adoption (0) of each of the 18 adaptation practices. - Qualitative analysis of interview data to contextualise and help explain findings. Specifically, qualitative analysis helps to understand (the absence of) correlations between wives' intrahousehold decision-making participation and households' adaptation behaviour, through notions of bargaining sets, coping strategies and quasi-public household goods.

3.1. QUALITATIVE DATA ANALYSIS

Group discussions and qualitative interviews were coded and analysed in the Nvivo software (open and axial coding). Open coding is "the interpretive process by which data are broken down analytically" (Corbin and Strauss, 1990: 12). In this step, conceptual labels were attached to words, sentences, and statements. Conceptually similar data was thus grouped together into categories and subcategories. To investigate data from group discussions, we started with a coding scheme based on Corbin and Strauss' (1990) which distinguishes between phenomena, conditions, context, strategies (actions and interactions), and consequences. For example, phenomena such as local climate change manifestations (e.g. unpredictable rainfall) and its consequences to farmers, were put next to conditions that gave rise to these manifestations and consequences (e.g. deforestation, lack of technology that hinders farmers' adaptation), and context (e.g. agricultural realities of low crop yields, infertile soils, etc.). Actions and interactions that were distinguished include different adaptation and coping strategies or practices, and consequences varied from agricultural challenges such as crop diseases, and the inability to practice farming, to time and labour allocation such as women spending increasing amounts of time fetching water and young men struggling to find employment after leaving school. The initial coding scheme that was used to analyse interviews on (intrahousehold) decision-making distinguished between various (theory and literature-based) characteristics of the decision-making process, such as 'cooperation', 'conflict', 'advise' and 'refusing implementation', as well as characteristics of the decision-maker, e.g. 'husband', 'wife', 'spouses jointly', 'the person who provides labour', etc. The initial coding schemes were adjusted during the research process when different themes came forth from the qualitative data. In the axial coding phase, "categories are related to their subcategories, and the relationships tested against data" (Corbin and Strauss, 1990: 13). In this phase we brought concepts and themes together and investigated patterns that emerged from the data.

4. STUDY VILLAGES

Figure 3. Map situating the four study villages



Source: map by the researcher and dr. Ha Minh Tri

Location and village selection. The four villages we studied belong to the Ngerengere sub-catchment of the Ruvu River Basin and are located in the Morogoro Region of Tanzania (Mvomero and Morogoro Rural Districts). We selected two neighboring rural villages (Kiwege and Sinyaulime in Morogoro Rural) and two neighboring semi-rural ones (Vikenge and Changarawe in Mvomero). The location of the villages is visualized in the map (figure 3).

We chose the four villages for the purpose of comparative analysis along the lines of 'ruralness', access to labour markets and heterogeneity of the population. In terms of external validity (Shadish, Cook and Campbell, 2002), it is possible to extend the study findings to other rural areas in Tanzania that show similar socio-economic and gender relations and face comparable climatic challenges. In particular, our research findings can be generalized to other rural areas of the Morogoro Region and the Wami-Ruvu River Basin.

4.1. SOCIO-ECONOMIC CHARACTERISTICS

The villages within each district are highly comparable in terms of natural resource base, agricultural practices, infrastructure, living standard, and population composition. However, some differences exist between the villages across district borders. Specifically, the two villages in Mvomero have better access to Morogoro Town (25 km via the main road and regular bus connection), are located close to the campus of Mzumbe University, and are more highly populated and more developed. For example, some houses in these villages are connected to the electricity network and at least some functional water taps are present. The two villages in Morogoro Rural District are more rural as the main Morogoro-Dar es Salaam road is on average an hour travel by car on untarred road. Bus services are available although less frequently compared to the two villages in Mvomero District. Furthermore, access to the labour market is easier in Mvomero District, due to proximity of Morogoro Town as well as casual wage labour opportunities at Mzumbe University and in the transport sector. Farmers in Morogoro Rural District, on the other hand, can more easily rely on forests and natural resources to sustain their livelihood, e.g. through access to forests for production of charcoal and for collection of wild fruits and vegetables. Population density and heterogeneity is also higher in Mvomero District due to considerable numbers of students and university staff members living in the villages, and could even be considered as peri-urban (personal communication Mvomero District Office). Farmers across the four villages grow similar crops, including maize, rice, cassava, yams, vegetables, millet, sesame and fruits like banana.

Our quantitative questionnaire shows that in terms of religion, about half of the randomly sampled population in Changarawe (43.6%) and Vikenge (51.8%) are Muslim, compared to a majority of the villagers in Kiwege (84.8%) and Sinyaulime (78.2%). In Changarawe and Vikenge, a large proportion of the villagers is Roman Catholic (respectively 46.5% and 34.7%), compared to only 8% in Kiwege and 16% in Sinyaulime. The remainder are Protestant, Pentecostal and Seventh day Adventists.

Furthermore, as the villages in Mvomero District are close to Mzumbe University many students are living in the villages (especially in Changarawe). This also creates quite some opportunities for casual employment for local villagers, e.g. catering, maintenance, security work. In all villages, however, the majority of the population relies on subsistence farming (87.3% of our sample across the four villages). There are somewhat higher levels of commercial farming in Vikenge (11.6%) and Changarawe (6%), compared to 4.9% in Sinyaulime and merely 3.4% in Kiwege. In Kiwege, there seem to be least opportunities for non-farm income-earning activities,

as only 2.5% of the sample indicates that farming is not their main livelihood activity, compared to 7% of the sample in Vikenge and Sinyaulime and 10% in Changarawe.

In Changarawe and Vikenge at least part of the village is connected to the electricity network. These villages also have better access to health care services (at least two health facilities) and education (3 primary schools and 2 secondary schools). In Kiwege and Sinyaulime, distances to school are much greater, as there is only one primary school in Kiwege and one school building (that is not in use) in Sinyaulime. A secondary school can be found in the neighbouring village Ngerengere. Health facilities are also more sparse, as there is only one health centre in Kiwege, and a small hospital in neighbouring Ngerengere.

In terms of gender and household relations, monogamous marriages are the norm across all villages, also among Muslims. Nevertheless, polygamous marriages did occur and many spouses (men) involved in so-called monogamous marriages had '*nyumba ndogo'* (literally small houses, i.e. they had long-term girlfriends outside of marriage). Divorce and separation, as well as couples cohabiting without being married, occurred in all villages. In none of the villages did norms prohibit women from working outside of the home.

4.2. CLIMATIC DETAILS

The future effects of a changing climate are uncertain in the Morogoro Region of Tanzania. Given the bimodal rainfall pattern in at least part of the region, the potential exists for an increase in rainfall. However, it is also possible that the area will evolve towards a more unimodal rainfall pattern and therefore face a decrease in rain (Paavola, 2008; United Republic of Tanzania, 2014: 21). Generally, the region is expected to experience a warmer, longer dry season and worsening periods of drought. Moreover, the flow of water in the Ruvu River is likely to diminish; its minimum flow during the dry season is expected to be less than half of what it is today (IPCC, 2014; Paavola, 2008; United Republic of Tanzania, 2007).

TMA temperature data was available for Morogoro Town measurement station, while rainfall data was also available for Ngerengere station. As the measurements in Ngerengere started later compared to Morogoro Town and due to large gaps of missing data (especially 2006-2008 and 2012) our trend analysis' scope for this station is limited to the period of 1986 to 2005, versus 1971 to 2013 for Morogoro Town. The trend statistics Kendall's Tau and Sen's slope estimator are presented in table 9. With regard to temperature, the trend statistics show that minimum temperature and to a somewhat lesser extent maximum temperature are undergoing significant increasing trends. The magnitude of this trend is predicted by Sen's slope estimator and varies between an increase of the maximum temperature of 0.040°C/year in December and

of 0.023°C/year in October. Increases in minimum temperatures are more varied: from an increase of 0.056°C/year in August to an increase of 0.020°C/year in April. The increase in maximum temperatures is especially pronounced during the dry period between the long (*masika*) and short (*vuli*) rainy seasons, i.e. June to September.[16] Rainfall data are somewhat less pronounced, with Sen's slope estimators both indicating increasing and decreasing trends throughout the year. However, only one month portrays a significant trend for each measuring station: Morogoro Town has faced a significant decreasing trend of rainfall in July, while Ngerengere has been confronted with decreasing rainfall in May. The lack of clear trends in rainfall during the other months offers further evidence of (ongoing or increasing) variability of rainfall in the region. An indication of this increasing variability is that between 2003 and 2013, the meteorological agency measured both the two lowest and the highest yearly rainfall since recordings started in 1971. Especially later decades seem to be subject to increasing rainfall variability, and these variations in weather conditions pose many challenges to farmers.

[16] The short rainy season usually lasts from October to December, and the main or long rainy season from February to May.

Table 9. Trend statistics: Kendall's Tau (italic) and Sen's slope estimator (bold)

	Max temperature (1971-2013)	**Min temperature (1971-2013)**	**Rainfall Morogoro (1971-2013)**	**Rainfall Ngerengere (1986-2005)**
Annual (seasonal)	*0.076**	*0.125****	*-0.012**	*0.035*
	0.002	**0.003**	**-0.012**	**-0.037**
January	*0.218**	*0.381***	*-0.145*	*-0.105*
	0.033	**0.027**	**-0.994**	**-1.407**
February	*0.122*	*0.315***	*0.037*	*0.042*
	0.020	**0.024**	**0.172**	**0.473**
March	*0.170*	*0.389***	*0.068*	*0.032*
	0.014	**0.029**	**0.354**	**0.741**
April	*0.137*	0.338**	*-0.052*	*0.200*
	0.015	**0.020**	**-0.400**	**4.540**
May	*0.371***	*0.321***	*-0.163*	*-0.326**
	0.026	**0.029**	**-0.867**	**-4.194**
June	*0.373***	*0.329***	*-0.072*	*0.006*
	0.030	**0.050**	**-0.161**	**0.000**
July	*0.305***	*0.258**	*-0.330***	*-0.096*
	0.026	**0.025**	**-0.212**	**-0.175**
August	*0.400***	*0.557***	*0.002*	*-0.232*
	0.026	**0.056**	**0.000**	**-1.033**
September	*0.453***	*0.508***	*-0.133*	*0.187*
	0.032	**0.036**	**-0.073**	**0.450**
October	*0.259**	*0.456***	*0.024*	*0.069*
	0.023	**0.040**	**0.035**	**0.479**
November	*0.117*	*0.387***	*0.008*	*-0.211*
	0.013	**0.032**	**0.047**	**-3.392**
December	*0.237**	*0.362***	*-0.048*	*-0.164*
	0.040	**0.027**	**-0.462**	**-3.164**

*Source: author's own analysis based on Tanzania Meteorological Agency data (Morogoro Town and Ngerengere measurement stations). Note: * if p < 0.05 and ** if p < 0.01.*

This is in line with qualitative evidence from the study villages. One participant (Sinyaulime, FG2m) in a group discussion stated that:

> "I don't know what God is thinking of our village. We used to have short rain and long rain. Now, the short rain has disappeared and the long rain has turned into short rain. Only one rainy season is left. … Even when it rains, it rains very heavily and all that was being cultivated is carried away."

Specifically, group discussions showed that farmers defined the weather related problems they faced as climate variability; unpredictable rainfall; increased occurrence and severity of drought; more concentrated and destructive rainfall; less rainfall during the October–December rainy season (*vuli*) and, to a lesser extent, higher temperatures ('strong sun') and increased occurrences of floods and heavy rainfall.

4.3. LIVELIHOOD CHALLENGES IN THE VILLAGES

Local-level studies such as these of Hamisi et al. (2012) on Tanzania, Perez et al. (2015) on Eastern and Western Africa, Coulibaly et al. (2015) on Malawi, Nielsen and Vigh (2012) on Burkina Faso, Cobbinah and Anane (2015) and Antwi-Agyei et al. (2014) on Ghana, and Sudgen et al. (2014) on India and Nepal, have shown that climate is only one among several stressors on agricultural livelihoods, and only one factor among many influencing people's adaptation behaviour. It is therefore useful to understand the other livelihood challenges or stressors that farmers in the study villages face.

Table 10 shows the top 10 livelihood challenges that were most frequently mentioned in group discussions across the four villages. Most identified livelihood challenges are related to agriculture, although others relate to business and non-farm income-earning activities, as well as access to water, education and health services. Climate change-related challenges such as drought and unpredictable rainfall seem to be a high priority to farmers, as they were respectively second and third-most frequently mentioned. However, farmers' adaptation strategies are not solely directed to adapting to climate change, but are responses to overlapping stressors such as poor agricultural tools, low output prices and harsh economic conditions, drought and the resultant lack of water. Farmers' lived experiences of climate change can therefore not be understood in isolation from these other lived experiences and livelihood challenges (see also Abbott and Wilson, 2015; and chapter 4 of this PhD which deals

on lived experiences of climate change). As an example, social conditions such as restraints on women's mobility and their many care and domestic tasks, as well as economic and structural constraints such as poor infrastructural provisions, have implications for women's options to undertake livelihood diversification. In Morogoro Rural in particular, most women consequently embark on very similar business ventures such as selling donuts, and experience a lack of market opportunities. Nearly half of the group discussions included a lack of customers for small businesses as a livelihood challenge, and the majority of these groups were female. This not only has implications for how they experience their households' wellbeing and their own financial independence, but also how they experience their vulnerability to climate change and their adaptation options. Rural women and their households are consequently likely to be highly dependent on agriculture and natural resources – even during prolonged periods of drought – due to the barriers women face in diversifying their livelihoods.

Table 10. Top ten of livelihood challenges identified in the study villages

Livelihood challenge	*# groups that mentioned the challenge (out of 41)*
Poor farming tools and inputs	32
Drought	26
Unpredictable rainfall	24
Wild animals intruding farm and destroying crops	22
Conflict between farmers and pastoralists (cattle intruding farm)	22
Livestock diseases	21
Crop diseases and pests	20
Lack of customers for small businesses	18
Lack of clean domestic water	13
Poor and expensive health services	12

Source: group discussions

The livelihood challenges also vary per village. For example, wild animals were a problem primarily in the two more rural village (Sinyaulime and Kiwege), but less so in the more densely populated areas of Mvomero District where wild animals were less common (especially less wild pigs). Similarly, conflicts between farmers and pastoralists were more scarce in Changarawe and Vikenge where less livestock was reared in the immediate environment of farm plots. An issue that is not mentioned in the table relates to access to farm land. In both sets of villages farm land was becoming more scarce. In Changarawe and Vikenge, this was the case because of high population density and competition for good-quality land. In these villages it was not uncommon to rent land. In Sinyaulime and Kiwege, on the other hand, access to farm land was restricted by military areas surrounding the village. Although farmers could get permission to use farm plots on the military domain, access is uncertain and certain restrictions hold, for example no planting of permanent crops and timely harvesting (lest crops might be destroyed).

5. RESEARCH CHALLENGES AND OPPORTUNITIES

In this section, we describe five challenges that were faced during the research, how these might have influenced the research design or research outcome, and how we tried to limit negative impacts and create research opportunities instead.

A first challenge we faced was our *dependency on local leaders* and 'fixers'[17] to gain access to the village and to research participants. To gain access to the village, the researcher and research assistants met village leaders (village chairperson, VEO and subvillage chairpersons) to explain the purpose of the research, what the village could (and could not) expect from the research, and the kind of assistance we required. For the organization of the group discussions and questionnaire, we were also dependent upon local leaders and they thus had an influence on who we did and who we did not speak to. This was the case especially in group discussions for which local leaders brought participants together at agreed upon moments (in the different subvillages). Chairpersons' influence in the questionnaire data collection was mediated by enumerators' active role in the (random) selection of respondents. Although we thus actively tried to prevent selection bias, we should acknowledge the possibility that some people may have been excluded by local leaders.

A second challenge related to the *requirement of interpretation and translation* (Bujra, 2006). The researcher has a basic understanding of the Swahili language, thanks to a language course, self-study and practice in Tanzania. Nevertheless, a translator was required to undertake qualitative interviews. These translators were usually masters' students or university graduates and had not received specific training to undertake translation work. In this regard, my own knowledge of the language was helpful in communicating certain terms or concepts to both interpreter and respondent, and it allowed me to monitor certain elements of the translation. Furthermore, I relied on transcripts of the qualitative interviews, which were usually written by another translator than the interpreter who was present during the interview. Nevertheless, the language barrier sometimes hindered 'natural' interaction with research participants.

[17] For example, in Kiwege we relied on the connections of a doctor who worked in the hospital of Ngerengere and who was a relative of one of the research assistants. This doctor assisted us in arranging transport, driving and introducing us to village leaders.

Third, another element that might have influenced the findings of the study relates to the *weather at the time of the research*. During the first research phase (from March to May 2014) the rainy season was in full swing. Rainfall was particularly high in 2014 and consequently caused flooding of streets, as well as flooding of the Ngerengere river – and blocking the local bridge – in Sinyaulime. Moreover, many farmers complained about the high concentration of rainfall and its destructive force which had meant the loss of crops (in particular maize that was planted in valleys). Consequently, farmers might have put more emphasis on the negative effects of high, concentrated rainfall and flooding than they would have in other years (e.g. when drought or dry spells were more prominent). However, this was partly compensated by the collection of questionnaire data during the dry season of the same year (July-August 2014). While the research findings cannot be generalized to drought years or dry areas (arid and semi-arid), they are likely to hold for other areas in the country that experience high rainfall variation and successions of dry and wet years.

Fourth: the position of the researcher. It is important to do the exercise of "locating one's self in one's work" (Greene, 2007: 27) to understand how my own personal worldviews, beliefs and characteristics have influenced the study. Several elements have been influential in this regard. First, being a white, female, European researcher and an outsider of the community led not only to a language barriers (see above), but also to high expectations of research participants. At the onset of each interview we explained the purpose of the research, and elaborately emphasized that the research would not feed into a project to e.g. improve water taps. We explained that we were researchers from Mzumbe University (which respondents were familiar with, especially in Vikenge and Changarawe) and that we were not connected to the government in any way. We then asked if respondents still wanted to contribute to the research, and if they understood they would not gain any immediate benefits from participation. Nevertheless, at the end of the interview many respondents inquired about future projects and benefits to the village. Furthermore, as a clear outsider, some respondents did not feel particularly comfortable in my presence. For example, I had to leave one questionnaire interview I was attending (in a very remote subvillages) as it became clear that the respondent felt uncomfortable with my presence and was hesitant to answer questions openly. According to the enumerator, the respondent relaxed and answered questions more freely when I had left them. However during other, and especially qualitative, interviews (female) participants spoke more freely because they considered me as a clear outsider that was neutral, especially with regard to more sensitive topics such as marital relations. Second, my personal feminist beliefs surfaced in the study in various ways (Wolf, 1996). One way in which my feminist ideas have become apparent is

through my commitment to engaging with the diversity of gender relations (i.e. attention to intersectionality) as well as a justice perspective through paying attention to drivers of (gender) inequality and asking questions about 'whose knowledge counts', but also 'whose vulnerability' and 'whose resilience' counts? The latter is an issue I have been struggling with throughout the research, as it often felt as if I was pacifying (certain groups of) women by labelling them as 'vulnerable' to climate change. Consequently, I felt morally obliged to also emphasize their agency and how such women deal with the limitations they are facing. Finally, I am committed to the well-being of women and this includes their ability to participate in (practical or strategic life) decisions, or to exercise their voice. This for instance becomes apparent in chapter 7 where I address the different factors that influence women's intrahousehold decision-making power with regard to adaptation decisions. This is an issue that I consider as important in its own right, independent of whether or not women's decision-making power has a differential impact on adaptation compared to men's decision-making (which is the topic of chapter 8). Thirdly, the fact that I am a young woman influenced the study in a number of ways. On the one hand, my status as a young, female and relatively unexperienced researcher, meant that certain local leaders did not take my position as main researcher seriously (Momsen, 2006). These leaders tended to address male research assistants instead, especially with regard to questions about money. I was lucky enough to stand on good terms with these male research assistants and we effectively manoeuvred such situations by cooperating well. In such cases, I usually remained on the 'side-line' and asked the male assistant to negotiate e.g. access to the village and remuneration of chairpersons. This to remain on good terms with the local leaders. On the other hand, I felt it was relatively easy for me to get access to and interact with young women as well as older women, who sometimes seemed to compare me to their own daughters. This facilitated open communication between us, especially with regard to more intimate and sensitive topics that were considered as typically female subjects of conversation. One helpful aspect in this regard was my status as married/in a long-term relationship, which somehow seemed to be an indicator of achievement. However, this also posed some respondents to (critically) question me on why I was in Tanzania instead of at home with my husband, and why I did not have any children. Fifth, throughout the study I was influenced by my training in sociology, economics and gender analysis in development. Moreover, I found that I approached much of the research through the lens of economic bargaining theory. This was the case because the initial research project was framed as such, and it was the first batch of literature I engaged with at the start of my PhD study. Consequently, I discovered that initially I tended to focus too much on household bargaining (or conflict) and less on household cooperation. This was especially the case when I was thinking about 'rural women' whom I apparently did not attribute much voice to, while I did

not apply this model of thinking to my own household or relationships. However, being aware of this projection upon rural women and men (as '*others'*), helped to prevent that the economic bargaining theory would become the only, or dominant perspective through which I enquired the social phenomenon of climate change and gender.

Fifth, being an outsider myself, I heavily depended on research assistants as facilitators in group discussions, enumerators and interpreters or translators. These research assistants were so-to-speak my entry point or way into the local community. However, I found that many of my *research assistants also struggled with their position* and that this also influenced the study in certain ways. Most assistants with whom I worked had studied either economics or development studies (Mzumbe), or wildlife management (SUA). Furthermore, they were urban, young, fashionable men and women, who were visibly more prosperous than the farmers they interviewed. Some of them were initially even adverse to eating local food and worried about getting their shoes dirty. Furthermore, they were from various ethnic groups from across the country and thus did not speak the local vernacular languages. They therefore had to rely on Kiswahili to communicate with respondents, which did not generally pose problems.[18] While the fact that assistants were not local was a disadvantage in terms of vernacular language, local connections and knowledge of the research site, it proved an advantage as some respondents were more open towards 'outsiders' whom they considered as more neutral. Another element that should be mentioned is that nearly all research assistants were Christian (except one). Nevertheless, as described above (section 4) most respondents were Muslim. While I could not establish how this might have influenced research output, I can only suspect that it would have caused occasional (reciprocal) misunderstandings or sensitivities. While in general Tanzanians appear very open towards other religions and ethnicities, and are proud of their peaceful coexistence, I also heard occasional prejudices.[19] I am nevertheless convinced that these barriers between assistants and research participants were less problematic in the group discussions (compared to questionnaire interviews). The more informal nature of the group discussions allowed for participants to feel more at ease (e.g. participants outnumbered researchers) and more powerful (i.e. they were clearly sharing their knowledge with us and the other group members). While this might not have completely reversed power relations, it did overcome at

[18] With the exception of some elderly respondents. For these interviews, we relied on additional translation or assistance from e.g. chairpersons.

[19] For example, some research assistants were convinced that people of the East of the country are 'lazy' and not willing to help themselves out of poverty. Similarly, Luguru were sometimes labelled as 'backward' by respondents from other ethnicities, especially in Vikenge and Changarawe.

least part of the barrier between researcher and *subject*. Consequently, I felt that most participants of the group discussions had enjoyed the exercise. Interaction with respondents during the household questionnaire, on the other hand, seemed to be more difficult for some research assistants and barriers remained more in place. This might have been because enumerators did not feel they had any tools to bridge this gap, as the tool of questionnaire data collection is more 'distant' in nature (e.g. less open-ended questions, respondents did not always seem to see the relevance of certain questions, nor did they understand the links between certain questions) (see also Gill, 1993).

Research permission

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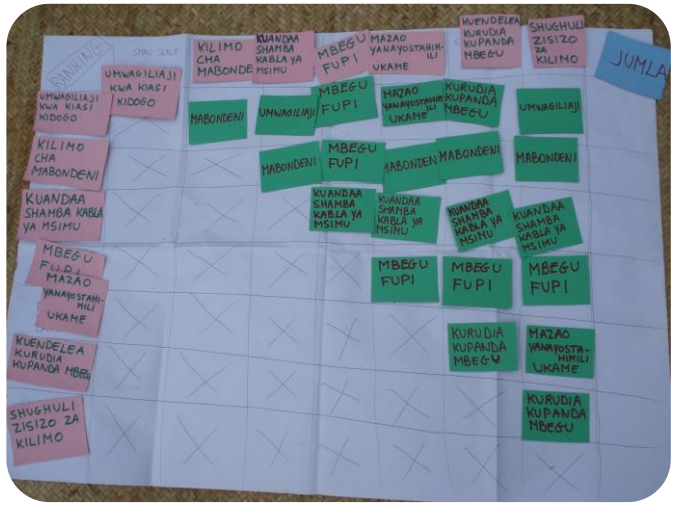
APPENDIX

Pictures of group discussions in various subvillages of Kiwege

Pictures of pair-wise ranking exercises in Vikenge and Changarawe



Pictures of questionnaire interviews in Kiwege and Sinyaulime

Pictures of household interviews in Changarawe and Vikenge

Water user interviews (Changarawe and Vikenge)

Dysfunctional water tap in Kiwege

Water fetching in Sinyaulime and Kiwege

Research assistant at water tap

CHAPTER 3

POLICY ANALYSIS OF TANZANIA'S CLIMATE CHANGE PLANS AND STRATEGIES

1. INTRODUCTION

In this chapter we present a brief policy analysis of Tanzania's climate change policies, plans and strategies. Specifically, we ask which framings of climate change (adaptation) are dominant in the country's climate change policy documents (sections 2 and 3), and we pay particular attention to the framing of gender in these documents (section 4). Finally, in section 5 we offer an overview of the institutional or governance arrangements for the mainstreaming of (gender in) climate change. Through the lens of multi-sector, multi-level and multi-actor governance, we aim to provide insights into which actors, levels and sectors bear responsibility for climate change mainstreaming.

Throughout this chapter, we draw on earlier studies, academic literature and policy analyses of climate change adaptation (some on Tanzania, e.g. Holvoet and Inberg, 2014; Smucker et al., 2015; Shemdoe et al., 2015; and some on other regions, e.g. Crabbé, 2011; Crabbé et al., 2015 on Flanders and The Netherlands). This chapter is based on document analysis of Tanzanian policy documents, strategies, action plans and guidelines. Future research would benefit from interviews with policy-makers and implementers to gain complementary and in-depth information on the reasons behind certain framings. Such interviews could provide insights into, for example, *why* gender concerns are barely incorporated in climate change policy documents; whether and *how* the Ministry of Community Development, Gender and Children is trying to get gender on the climate change agenda; and whether and how the Gender Ministry is cooperating – or lacking cooperation – with the Vice-President's Office (Division of Environment).

1.1. FRAMING AND FRAMES

Framing is a sense-making process in which meaning is constructed and frames are developed to make sense of a situation (Horstmann, 2008; Gamson and Modigliani, 1989; Entman, 1993; Benford and Snow, 2000). Frames or framings, in turn, are "interpretive storylines that set a specific train of thought in motion, communicating why an issue might be a problem, who or what might be responsible for it, and what should be done about it" (Nisbet, 2009: 15). Frames draw upon actors' underlying beliefs, values, worldviews and (professional) experiences (Kaufman et al., 2013) and in this way guide both analysis and action. Policy documents (such as those climate change plans and strategies we look at in this chapter) are the result of a process of framing in the form of ongoing interactions and exchanges between actors drawing on their own discourses and meanings. Together, these actors produce frames that inform action, and

concurrent interactions and reframing (i.e. interactional approach to framing) (Goffman, 1974; Dewulf et al., 2009; Fairclough, 1992; Hardy et al., 2005).

When dealing with a complex social phenomenon such as climate change, policy-makers use frames to leap from 'what is' to 'what ought to be' (Rein and Schön, 1996). Different policy frames imply different actions as framing informs what is a 'suitable' direction of change (O'Brien et al., 2007; Nisbet and Huge, 2006). Negotiating the framing of (the problem of) climate change and it solutions (e.g. adaptation) is therefore not a neutral issue (Horstmann, 2008). Indeed, Ogunseitan (2003) illustrates the influence frames have on action (in his study on vulnerability assessments in Africa) and argues that "uncritical frame reflection can lead to loss of opportunities for articulating local solutions to global problems with serious local repercussions" (Ogunseitan, 2003: 109). In this chapter, we therefore look at the following frames of climate change (adaptation) (presented in table 11). First, we consider the framing of 'the problem' of climate change as either an opportunity or a threat (see e.g. McMichael et al., 2009; Robinson et al., 2006), and as requiring either an adaptation or a mitigation focus. Second, we consider the employed frames of adaptation in terms of the paradigms of system resilience and vulnerability (Eakin et al., 2009; Adger, 2006). Third, we dig deeper into the frames employed with regard to gender and climate change. In this context, it is important to understand that "a frame links two concepts, so that after exposure to this linkage, the intended audience now accepts the concepts' connection" (Nisbet, 2009: 17). We argue that if policy documents frame climate change and gender as unrelated, policy-makers and implementers will not consider the linkages between both concepts, and the resulting interventions will be gender-blind. Based on the literature on gender and environment, and gender and development, we investigate in which sectors women's issues and gender relations are thought to matter (4.1), and analyse the presence of the women's vulnerability and virtuousness frames (Arora-Jonsson, 2011) on the one hand, and of the gender and development frames of the 'welfare approach', 'Women in Development', and 'Gender and Development' on the other (more details in section 4.2).

Table 11. Overview of investigated frames

Frames of climate change	- climate change as threat or opportunity - mitigation or adaptation focus
Frames of adaptation	- adaptation paradigms: system resilience or vulnerability
Frames of gender and adaptation	- gender-relevant sectors - gender and environment frames: women's vulnerability or virtuousness - gender and development frames: welfare approach, Women in Development, Gender and Development

Source: author's own compilation of frames

1.2. FRAMING IN WHICH POLICY DOCUMENTS?

To start with, we offer an overview of the Tanzanian government's existing climate change related policy documents, i.e. plans, strategies and guidelines, that we investigate in this chapter.[20] For our purpose, we distinguish three types of policy documents. First, there are the climate change specific plans and strategies. Within the UN Framework Convention on Climate Change (UNFCCC), Tanzania has published its *Initial National Communication* to UNFCCC in 2003, its *National Adaptation Program of Action* (NAPA) in 2007, and its *National Climate Change Strategy* (NCCS) and Action Plan in 2012. The *Second National Communication* to UNFCCC has not yet been finalized and send to UNFCCC. These documents are part of "a process for Least Developed Countries to identify priority activities that respond to their urgent and immediate needs to adapt to climate change – those for which further delay would increase vulnerability and/or costs at a later stage" (UNFCCC, 2016).

Second, there are two documents that are specifically related to gender and climate change. These were both published in 2013, although by different ministries. The *National Strategy on Gender and Climate Change* was drafted by the Division of Environment, Vice-President's Office,

[20] Note that Tanzania's climate change policy documents (plans, strategies and guidelines) are not enforceable as they have not been integrated into national policies (Smucker et al., 2015; Norrington-Davies and Thornton, 2011). Consequently, to date, the non-climate change specific Environmental Management Act (EMA) of 2004 is the sole legislative document guiding climate change action.

while the *National Guidelines for Mainstreaming Gender into Climate Change related Policies, Plans and Strategies* was published by the Ministry of Community Development, Gender and Children. While both documents show a certain degree of overlap, they nevertheless put emphasis on different gender dimensions (see section 4).

Third, there are sector-specific plans and policies that are relevant to climate change. Some sectoral ministries have already drafted their sector's climate change plan, hereby answering the NCCS's call for sectors to develop climate change action plans to implement the strategic interventions. In particular, in 2014 the Ministry of Agriculture, Food Security and Cooperatives published the *Tanzania Agriculture Climate Resilience Plan* (2014-2019), in what follows referred to as ACRP. However, when most sectoral policies deal with climate change, this happens in an indirect way (Shemdoe et al., 2015). While sectoral policy documents might recognize the importance of climate change to its sectoral goals,[21] many do not move beyond this acknowledgement to actually engage with the climate change challenges. In other words, climate change is usually not sufficiently mainstreamed in sectoral policies (see Smucker et al., 2015; Norrington-Davies and Thornton, 2011). In this regard, the agricultural sector is offering a good example with its Agriculture Climate Resilience Plan (ACRP).

[21] For example, the ACRP states that "climate challenges of agriculture are reflected at the highest levels in Tanzania's development plans. For example, the Five-Year Development Plan (FYDP) includes climate change as a *threat to economic growth* and an 'underlying prerequisite' which must be addressed to ensure success of agriculture as a core growth priority. The second National Strategy for Growth and Reduction of Poverty (NSGRP, also known by the Swahili acronym MKUKUTA-II) also explicitly focuses on the risks of climate change to reducing poverty and inclusive economic growth, particularly in agriculture and disaster risk reduction." (ACRP, p.10).

2. FRAMES OF CLIMATE CHANGE

The first question we ask is whether climate change is framed as a threat or an opportunity, and to what or whom? Overall, the policy documents frame climate change as a threat rather than an opportunity. Attention is paid to the risks, uncertainties and adverse impacts that accompany climate change. For example, the ACRP sees climate change mainly as a threat to *food security*. The NCCS states that climate change "is a serious risk to *poverty reduction* and threatens to undo decades of *development* efforts" (NCCS: p. v; emphasis added), and therefore describes climate change as a threat to people's survival, but also to physical *infrastructure, energy provisions*, etc. Furthermore, the *National Guidelines for Mainstreaming Gender into Climate Change* establish climate change as a threat to the achieved level of *gender equality* and development (p.xxii). On the other hand, the ACRP also distinguishes potential opportunities for each manifestation of climate change, next to negative impacts. For example, a small temperature rise (of minimum 1.5°C by 2100) might offer a favourable environment to some crops such as sunflower (p.25), and higher, more concentrated rainfall could lead to an "increase in food production for water-loving crops" such as rice (p.27).

Second, we could ask if the suitable response to climate change is framed as mitigation or adaptation actions? The *National Guidelines for Mainstreaming Gender into Climate Change* is the sole investigated policy document that is explicit about the fact that climate change is caused by developed countries through industrialization and the exploitation of natural resources, while the impact is mainly felt in developing countries (p.5). In terms of the international dimension of climate change, the NCCS does state that "the impacts [of climate change] are more pronounced in poor countries such as Tanzania with the least adaptive capacity" (p. v) and that "many developed countries have not adequately taken stringent measures to reduce emissions in line with scientific findings and recommendations of the [Kyoto] Protocol and related climate discussions" (p.4). This are reasons for Tanzania to focus on climate change adaptation rather than mitigation. While the NAPA focuses solely on adaptation, the NCCS distinguishes strategies for several sectors in terms of both adaptation and mitigation. See table 12 for an overview of the sectors in the NCCS for which adaptation respectively mitigation strategies have been developed. The third column represents cross-cutting themes that have been distinguished in the NCCS, including the theme 'gender and vulnerable groups'. The focus on adaptation holds for most policy documents. For example, the ACRP states that for the agricultural sector the climate change focus lies on adaptation (p.12), and both gender and climate change mainstreaming documents focus on adaptation.

Table 12. Sectors and themes included in NCCS

Sectors for which adaptation strategies are developed	**Sectors for which mitigation strategies are developed**	**Cross-cutting themes**
- water resources	- energy	- research and development
- coastal and marine environment	- industry	- information, communication, education and public awareness
- forestry	- livestock	- technology transfer and development
- wildlife	- transport	- capacity building and institutional strengthening
- agriculture and food security	- mining	- systematic observation
- human health	- waste management	- early warning systems
- tourism	- forestry	- disaster and risk management
- energy	- agriculture	- impacts of response measures
- industry		- gender and vulnerable groups
- livestock		- planning and financing
- fisheries		- international cooperation
- infrastructure		- climate change and security
- human settlements		
- land use		

Source: United Republic of Tanzania (2012). *National Climate Change Strategy*. Vice President's Office: Division of Environment.

While the NAPA establishes vulnerabilities, existing and potential adaptation strategies for most of the above sectors, the NCCS offers a more concrete description of goals, objectives and interventions for each of the sectors. NAPA on the other hand distinguishes 14 priority projects. However, as the ACRP states: "to implement strategic interventions for adaptation and mitigation, the NCCS calls on sectors to develop climate change action plans" (p.11). In section 5, we further investigate Tanzania's institutional arrangements for multi-sector governance of climate change.

3. FRAMES OF ADAPTATION

We distinguish two dominant adaptation paradigms: system resilience and vulnerability approach.[22] The system resilience paradigm considers improving resilience against the impacts of climate change by preventing the breakdown and instability of human and natural systems (Eakin et al., 2009) and the smooth return to system stability after a shock (Adger, 2006). On the other hand, a vulnerability approach aims to attract attention to issues of justice and deep-rooted unequal power relations, and looks at the causes of this vulnerability within the social, political and economic system (Eakin et al., 2009). Vulnerability-informed adaptation actions will focus on specific socially vulnerable groups that are considered as more at risk of harm in the face of climate change (Paavola and Adger, 2002; Vogel and O'Brien, 2004), while the resilience paradigm emphasises the balanced functioning of social and ecosystems, disregarding its (positive or negative) impacts on socially vulnerable groups (Crabbé, 2011).

We argue that Tanzania's policy documents tend towards a system resilience paradigm, attaching little attention to justice elements and displaying only limited insights into vulnerability issues. Smucker et al. (2015) investigated Tanzania's adaptation policies (in particular NAPA and NCCS) and find that they do not pay any attention to issues of equity. Smucker et al. argue that adaptation is inherently a political process, meaning that it is "not merely an unavoidable response to environmental change but a set of individual and collective choices embedded within existing institutions and structures of development" (p.40). However, Tanzania's climate change policies and policy choices are framed as purely technical and neutral (i.e. in line with system resilience paradigm striving for system balance). In reality, its apolitical framing facilitates the policies' contribution to the status quo and avoids the call for transformation. Rather, the climate change policies seem in line with neo-liberal development policies such as *Kilimo Kwanza* (Agriculture First), the "agricultural policy initiative that promotes foreign agribusiness at the expense of addressing the complex and differentiated livelihood needs of pastoralists and small farmers" (Smucker et al., 2015: 40). Therefore, Smucker et al. argue: "if adaptation is inherently political... its political dimensions and related questions on equity and justice may be concealed by the apolitical framings, simplifying discourses and technocratic policies that we associate with an adaptation imperative" (p.40).[23]

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[22] Although we by no means wish to argue that these are the only two adaptation frames that exist. For example, an alternative frame or paradigm is adaptation as sustainable development.

[23] Note that the framing of climate change adaptation as merely technical and therefore *neutral* is largely influenced by the natural sciences which remain to dominate the field of climate change research. However, how

Similar trends are visible in the *Agriculture Climate Resilience Plan* which states that: "Responding to the potential impacts of climate change will be complex, which calls for an approach that can facilitate prioritization of adaptation measures based on risk" (p.25). The document then moves on to discuss the ACRP stakeholder workshop that focused on risk-based planning and identified "the most significant climate change impacts" (p.25). Furthermore, in the face of uncertainty, they acknowledge that an update of the ACRP will be necessary in the future "especially as new information from better data and more accurate modelling comes online, and planning processes gain traction at the local level" (p.25). This framing seems to indicate that risk is a purely technical issue: there is no description of how the ministry and/or stakeholder workshop decided which risks are urgent, which risks count and, most importantly, *whose* risks count. Although it is explained that the stakeholder workshop was constituted by "specialists from the Technical Working Group, academia and NGOs with specializations ranging from agricultural water management, to pests and diseases, to land and soil management" (p.26), its specific functioning remains a black box. Nevertheless, compared to the NAPA and NCCS, the ACRP has at least some attention to equity, in the sense that it draws attention to the mismatch that the most vulnerable areas are not being targeted for agricultural investments. Specifically, the ACRP pinpoints that most agricultural investments are centred on large-scale commercial farming investments, rather than smallholder farming, and that the more vulnerable semi-arid areas are not considered as suitable for such investments (p.32).

Furthermore, while the NCCS states that "small-scale farmers are more vulnerable as they are highly dependent upon rain fed production" (p.45), the strategy does not pay any attention to non-climate change drivers of this vulnerability. Moreover, within the same section it moves on to discuss the vulnerability of agro-based industries, Tanzania's electricity supply and infrastructure. The *Agriculture Climate Resilience Plan* (ACRP) mainly speaks of vulnerability in terms of 'areas', usually denoting semi-arid areas. However, the ACRP does not address the question who within these areas is particularly vulnerable, except for the occasional reference to vulnerable 'smallholders' without further differentiating this category. For example, the

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Tanzanian policy-makers choose to frame adaptation is also influenced by the country's post-colonial history, and in particular its socialist legacy and ideology of self-reliance (*kujitegemea*). *Mwalimu* Nyerere, founding father of the nation and the country's first president, advocated the ideology of self-reliance with the aim of breaking away from its historical dependence on, or conditioning by, industrial countries; as well as to promote development and reduce hunger (see Mosha, 1990; Biersteker, 1980). To achieve self-reliance, Nyerere attributed a key role to education and, among others, the restructuring of existing class relations, development of new – and appropriate – technologies and stimulation of citizens' political participation (Biersteker, 1980). In this sense, a technological framing and the valuation of scientific expertise might be considered as a way to liberate the individual from traditional authority. Indeed, science can offer solutions that individual farmers can adopt – and adapt – to solve their own problems and achieve individual self-reliance (see Nyerere, 1967).

document states that “smallholder farmers are among the most vulnerable to even small variations in the climate, with major impacts on livelihoods and food security (p.32)” and that “climate change is likely to affect the most vulnerable households at their most vulnerable time of year” (p.32), meaning the “onset of the rain season... as households have almost exhausted their food stocks and even their income base is low.” (p.32). However, similar to the NCCS, the ACRP document does not pay any attention to non-climate change drivers of vulnerability such as socio-economic and political factors (poverty, land access, gender, etc.). Rather, the documents frame vulnerability as if it were only related to climate change impacts (see also Smucker et al., 2015). It follow that the policy documents have no attention to how gender structures vulnerability (see section 4 on gender). Smucker et al. (2015) argue that the NAPA and NCCS homogenise vulnerable rural communities. For example, in the NAPA, it is stated that “climate change is a threat mainly to the agrarian population that still depends on subsistence agriculture for their daily livelihood” (p.viii). Therefore, Smucker et al. argue that “on the whole, the policy narrative constructs rural Tanzania as populated by *undifferentiated, passive victims* of climate change in need of urgent external intervention” (Smucker et al., 2015: p.43; emphasis added).

In the next section, we see that this framing extends to how gender equity is viewed in climate change policy documents. We specifically analyse how gender is framed in adaptation issues by, first, looking at whether the policy documents mention gender or women’s interests at all, and whether the ‘relevance of gender’ is considered to be confined to specific sectors. Next, we analyse the presence of different frames of women and the environment, specifically vulnerability and virtuousness, and link these to frames of gender and development (namely the welfare approach, Women In Development approach and Gender and Development approach).

4. FRAMES OF GENDER AND DEVELOPMENT

4.1. 'GENDER-RELEVANT' SECTORS

Tanzania's climate specific policy documents are largely genderblind. To give an example, the *Initial National Communication to the UNFCCC (2003)* does not mention gender, and only mentions women with regard to their more frequent involvement in firewood and water fetching. Next to that, the document refers to women once in regard to the goals of the Agricultural and Livestock Policy of 1997, which includes the aim to "promote access of women and youth to land, credit, education and information" (p.51). However, the Initial National Communication does not further engage with this goal.

Similarly, the *NAPA (2007)* does not offer any meaningful engagement with the gender dimensions of climate change. Gender is mentioned merely once, and this in relation to the United Nations Millennium Development Goals (p.42). Furthermore, with regard to health and in particular malaria, the document groups women and children into one group of 'vulnerable people', "due to the roles they play in the society" (p.8), and refers to poverty as a barrier to people's ability to adapt to malaria and cholera. In the water sector, women and girls are recognized as carrying the burden of being the main water fetchers, and emphasis lies on the fact that they walk long distances and spend a lot of time fetching water. That is, time that could have been spent on other productive activities (p.40). Finally, women's groups are mentioned as one of the actors that could help strengthen community participation in conservation and capacity building in climate change adaptation (p.45-46).

The *National Climate Change Strategy (2012)* was expected to be less gender-insensitive due to the concurrent drafting of the two gender mainstreaming documents (published in 2013; see below). However, in the 116-page document, gender is mentioned merely once in reference to water (p.29), and is otherwise restricted to a section on 'gender and vulnerable groups' (p.73). The strategic interventions proposed for the theme 'gender and vulnerable groups' are furthermore very vague and non-specific, and do not propose any tangible goals or indicators. For example, the most specific "strategic intervention" states that various actors (including government departments and ministries, civil society organizations, research centres, and the private sector) should enhance "equitable representation of women and vulnerable groups at all levels in planning, decision making and implementation of adaptation and mitigation initiatives" and ensure "that climate change researches generate gender disaggregated data on impacts and response" (p.73). Although gender is mentioned as a cross-cutting issue, this is

hardly put into practice in a convincing gender mainstreaming approach. This, despite good hopes that the final draft of the NCCS would take into account the National Strategy on Gender and Climate Change (IUCN, 2011; National Strategy on Gender and Climate Change, 2013, p.3, 8). Invariably grouping together women with marginalized (p.68) and vulnerable (p.73) groups, the NCCS exhibits limited insights into the complex gender dimensions of climate change, and does not build on the two gender mainstreaming documents which propose a more rich engagement with gender and climate change.

In a similar vein and visibly building upon the NCSS, the gender focus of the *Tanzania Agriculture Climate Resilience Plan (2014-2019)* remains restricted to 'gender and vulnerable groups'. While the document pays attention to women's important role in smallholder farming (p.15), it does not meaningfully engage with gender outside of the section on 'gender and vulnerable groups' as one of the three strategic interventions that constitute Action 4, 'strengthening knowledge and systems to target climate action'. However, despite the ACRP's attention to gender as a cross-cutting issue, it does not mention gender in other parts of the document, and does not even propose specific practices to achieve its gender goals (see table 13). This goes to show that gender diagnosis is not translated into concrete actions, measures and indicators. The integration of gender rather waters down throughout the policy process (i.e. policy evaporation), and is particularly low in the budgeting and M&E phase.

Table 13. ACRP's proposed key investments on gender and vulnerable groups

Policy	Planning	Practices
Conduct a comprehensive assessment on gender and climate change issues in the agricultural sector, including (i) Climate change impacts on women and girls, (ii) Develop recommendations and guidelines for mainstreaming gender into CCA related policies, strategies, programs, and budgets in respective areas of jurisdiction, (iii) Identify best practices in Tanzania and other countries, and (iv) Identify gender-appropriate technologies for activities related to water management, climate-smart agriculture, and postharvest processing and value addition, (v) Capacity building and awareness on climate change for women farmers, (vi) Recommendations for increasing women's access to financial and productive resources.	Develop a gender and agriculture coordination mechanisms between the Ministry of Agriculture, Food Security and Cooperatives (MAFC) gender desk, gender committee, and the Environmental Management Unit (EMU). EMU will work with the gender desk to mainstream gender in CCA in each stage of the project, programme, policy cycle. The gender committee should meet quarterly to evaluate progress for gender mainstreaming in CCA related policies, strategies, programs and budgets.	*Gender not mentioned*

Source: United Republic of Tanzania (2014). Tanzania Agriculture Climate Resilience Plan, 2014-2019*. Ministry for Agriculture, Food Security and Cooperatives. Page 66.*

Recognizing the gender blindness of the Initial Communication and NAPA, two gender and climate change documents were published in 2013. The *National Strategy on Gender and*

Climate Change (later *National Strategy*) was drafted by the Division of Environment, Vice-President's Office which holds a key responsibility for climate change affairs. While an initiative of the Minister of State of the Vice-President's Office, and largely building upon a three-day workshop (2011) in which various agencies, ministries and civil society organizations participated, a major role in the drafting of the document was played by the IUCN (International Union for Conservation of Nature). Furthermore, the process was funded by the Government of Finland. Through among others the multistakeholder workshop, efforts were made to influence how gender was addressed in the NCCS which was finalized in 2013 (as the drafting of both documents happened more or less concurrently). The *National Guidelines for Mainstreaming Gender into Climate Change related Policies, Plans and Strategies* (later *National Guidelines*) was published by the Ministry of Community Development, Gender and Children, the ministry responsible for gender issues. Both documents show a certain degree of overlap, but nevertheless put emphasis on different gender dimensions (see also section 4.2 on gender framing in these policy documents). It is interesting to note, however, that the *National Guidelines* do not even mention the existence of the *National Strategy*, although members of the Ministry of Community Development, Gender and Children were present at the abovementioned IUCN workshop. It therefore seems as if coordination between the two gender mainstreaming initiatives has been problematic or largely non-existent.

In terms of sectoral focus, it is clear that when the climate change policy documents – with exclusion of the two gender mainstreaming documents – consider women or gender, this either remains restricted to the water or health sectors, or it is named as a cross-cutting issue which is however not incorporated throughout the document. This is in line with previous findings of development policy analysis (see e.g. Kabeer, 1994, p.6), which show that women are typically associated with 'soft' sectors (i.e. social welfare sectors) that are related to their reproductive roles, rather than to the (so-called) productive sectors. The two gender mainstreaming documents, on the other hand, offer gender insights for an array of sectors. Both documents look at the sectors of agriculture, water, health, energy, forests and coastal management. The *National Guidelines* discusses three additional sectors: disasters, human settlements and infrastructure, and education. While the National Guidelines primarily presents a brief gender analysis for the sectors,[24] the National Strategy moves beyond this and also offers concrete

[24] The National Guidelines do not propose sector-specific interventions later on in the document, when gender mainstreaming is made more concrete.

proposals for actions. This is done by distinguishing objectives, action steps to reach the objectives, indicators of success, and the responsible agencies or actors.

4.2. FRAMES OF GENDER AND CLIMATE CHANGE

The gender and environment literature has distinguished various approaches to or frames in gender in climate change policy documents. We first offer an overview of these different justifications that have been used to argue in favour of the inclusion of gender in climate change policies, and then move on to show which of these arguments are present in Tanzania's policy documents.

Arora-Jonsson (2011) distinguishes two dominant frames in the gender and climate change literature. She argues that women are either spoken about as vulnerable or as virtuousness (both frames that have already been around for a while, see e.g. Jackson, 1993). The vulnerability argument stems from the view that women (in developing countries) are expected to be more affected by climate change than men, and are said to be less well positioned to cope with the adverse impacts of climate change, i.e. their adaptive capacities are lower. In turn, the virtuousness argument relates to ideas of women as more in touch with nature, more environmentally conscious, and less polluting. Women are thought of as possessing certain virtues of environmentalism that men lack, and are therefore considered better natural resource managers. Authors such as Resurrección (2013) have pinpointed the associated risk of attributing the burden of environmental care to women only, thereby increasing their labour burden and responsibility while 'letting men off the hook'. Holvoet and Inberg (2014) in their analysis of the gender-sensitivity of NAPAs in Sub Saharan Africa established that these documents mainly focus on a vulnerability frame. They find the virtuousness frame in NAPAs to be less strong (see also Rodenberg, 2009). Holvoet and Inberg furthermore link these frames to the different women and development paradigms, and find that most NAPAs draw upon welfare arguments (pre-Women in Development). In the welfare approach women are considered as recipients of (anti-poverty) government programs, and these programs are often limited to their reproductive and domestic roles. However, Holvoet and Inberg expect the WID (Women in Development) approach to become more prevalent in those policy documents in the future. The WID anti-poverty and efficiency approach focuses primarily on the additional development and welfare that can be achieved by investing in women's productive potential. In this approach, attention is drawn to women's productive roles which had largely been unrecognized before, for example, women's prime role as agricultural producers. While this recognition of women's economic potential was an important step forward, a WID approach can in certain situations

facilitate the instrumentalization of women's empowerment and gender equality goals for development objectives. A third approach is the Gender and Development (GAD) approach which addresses systems and mechanisms of gender inequality, by drawing attention to power relations and the social status of both sexes. GAD aims to prevent the reproduction of gender inequalities. However, Holvoet and Inberg did not find any evidence of a GAD approach in the NAPAs under study. The NAPA policy documents pay little to no attention to the barriers and underlying gender structures that influence men and women's adaptive capacities. Furthermore, women and men are considered as homogeneous groups and no attention is paid to intersections such as class, race or ethnicity (Holvoet and Inberg, 2014). In what follows, we discuss which of these approaches to gender and climate change are visible in Tanzania's climate change documents. Bear in mind that the different approaches are not mutually exclusive and are often intertwined in practice.

In the Tanzanian climate change policy documents under study, women's *vulnerability* is the most prominent frame that is relied on to justify the inclusion of gender in climate change. For example, in the ACRP the vulnerability approach is prominent, e.g. even in the fact that the section on gender is labelled 'gender and vulnerable groups'. The document mentions that the ACRP "is an opportunity to build resilience of female farmers through carrying out the recommendations of the National Strategy on Gender and Climate Change" (p.65). Nevertheless, it does not propose any specific actions as to how female farmers' vulnerability could be diminished or their resilience improved, nor does it engage with recommendations from the gender mainstreaming document it refers to. In the NAPA, the NCCS and the Initial National Communication, women are only addressed from the vulnerability angle.

In the gender mainstreaming documents, vulnerability is one among several approaches present. For example, in the *National Guidelines* it is stated that "women are often more vulnerable, because of their historic disadvantages, limited access to resources and decision making" (p.4). However, throughout the document vulnerability is understood as the vulnerability of *communities*, that results from existing or exacerbated gender inequalities. The *National Strategy*, in turn, stresses that women are more vulnerable because they are on average poorer, and the Strategy sometimes nearly equates women with the poor. For example, it reads: "The poor, the majority of whom are women living in development countries, will be disproportionately negatively affected [by climate change]" (p.16). This is in line with the *welfare approach* that considers women as (poor) welfare recipients, but also with the *WID approach* that understands inequalities between men and women as in the first place driven by women's relative poverty. WID understands that "women are productive agents whose potential had

been underutilized under welfare-oriented approaches" (Kabeer, 1994, p.8) and assumes women's unused potential can reduce poverty and solve inequality.

This brings us to the frame of women's *virtuousness*, which is - to a lesser extent - also present in the two gender mainstreaming documents, in particular through emphasis on women's specific indigenous knowledge. For example, the *National Strategy* portrays women as powerful, in the sense that their experience as farmers and natural resource managers "makes them good innovators and repositories of critical knowledge, including indigenous knowledge on natural resource management". The document furthermore adds that women's role as mothers facilitates them passing down knowledge on climate change adaptation to future generations (p.16). This feeds into the assumption in the *National Guidelines* that women, when given the decision-making power, will naturally make sustainable natural resources decisions. For example, it states that "women can be agents of change in forest management for climate change adaptation contributing to sustainability, efficiency and effectiveness of such programmes, if they are given equal access to land, forests and forest resources, and decision-making" (p.27). It is thus assumed that women will manage forests more sustainably than men, not paying attention to potential frictions between development and environmental goals such as preventing resources exploitation. In fact, throughout the *National Guidelines* women's participation and decision-making seems to be considered as a magic solution to all climate change and equity problems.

This leads us to the framing of women as *active agents of change*. Both gender mainstreaming documents emphasize that women are not just passive victims, but that they are also active agents of change. For example, the *National Guidelines* says that "Women possess many coping strategies that enhance their resilience and adaptation to climate change" (p.4). While being more vulnerable, women also possess specific mechanisms to deal with climate stress. One of the areas in which women's active role becomes most evident is in their assumed indigenous knowledge and sustainable natural resources management (cf. virtuousness frame). Consequently, their potentially *instrumental* role in reaching development and climate change adaptation goals comes to the forefront. In the *National Guidelines*, for instance, women's empowerment and gender equality is considered as instrumental to reducing the vulnerability of communities in which women live. In the ACRP, such an instrumental *WID efficiency* approach is more pronounced. The document mentions that "better mainstreaming gender could have significant benefits for uptake of climate smart agricultural practices... If gender is well-mainstreamed in climate smart agriculture, this could increase the success of scaling up

initiatives" (p.65). Involving women can facilitate the spread and uptake of climate smart agricultural practices and technologies. In the *National Guidelines* gender equality is framed as instrumental to reducing the negative impacts of climate change, and it is the predominant way in which this document justifies attention to gender in climate change adaptation. For example: "Gender inequality can worsen the impacts of climate change. However taking steps to narrow the gender gap and empowering women can reduce these impacts" (p.4). The *National Guidelines* furthermore state that: "Women can be instrumental in use of indigenous knowledge and their knowledge of natural resource management and disaster preparedness and response especially ensuring food security, preservation techniques and storage" (p.19). Similarly, the *National Strategy* argues that less gender inequality can ensure that negative climate change impacts are reduced: "By exacerbating inequality overall, climate change slows down progress towards gender equality and henceforth impedes efforts to achieve wider goals such as poverty reduction and sustainable development" (p.16). The document furthermore conceptualizes gender as a development issue by saying that "existing gender imbalances and inequalities in society prevent it from realizing its full potential in all the activities of development in economic, social and political dimension" (p.18).

One of the gender mainstreaming documents pays attention to the drivers of gender inequality. The *National Strategy* discusses the underlying barriers that women are facing in adapting to climate change by stating that it is "important that women have equal access to knowledge, awareness, capacity building, resources and technology, which are prerequisites in influencing climate change" (p.16). Consequently, the strategy recognizes that "mainstreaming gender aims to transform unequal social and institutional structures by recognizing the promotion of gender equality as a central driving principle" (p.17) rather than gender retro-fitting or ad-hoc, technical interventions. Such statements fit more in a *GAD approach*. However, the *National Guidelines* do not pay attention to underlying power relations and drivers of inequality. On the contrary, the document seems to legitimize its concern with gender by not focussing on women alone, but also on particular male vulnerabilities in the face of climate change. The message seems that as men can also be disadvantaged by climate change, they can also benefit from gender policies. For example, when the *National Guidelines* discuss the water sector, attention is addressed to women first, as they are the main water fetchers, are disproportionately disadvantaged by poor sanitation, and risk gender-based violence when fetching water. Next, the document moves on to emphasise that pastoralist boys are also disadvantaged, as climate change forces them to spend more time looking for water for cattle. Pastoralist boys are therefore becoming less likely to attend school. As part of the proposed gender checklist for policy documents, it is stated to

"check if potential negative impacts of the intervention has been considered such as potential increased burden of women or social isolation of men" (p.45). However, nowhere else in the document is men's potential disadvantage in terms of social isolation related to climate change, and the link is thus not really clear. While attention to men can certainly be legitimate, it seems unfounded in this case, and solely aimed at pre-empting critiques of a women-only approach. Overall, a GAD approach is, however, lacking in the gender mainstreaming documents, and gendered power relations are not questioned. This is also visible in the fact that women and men are considered as homogeneous categories, and that no attention is paid to potential intersecting factors that affect climate change vulnerability (e.g. wealth, age, education and marital status). We focus on such intersections in vulnerability and adaptation in chapter 5 of this thesis, indicating their relevance in determining people's access to adaptation strategies.

5. MAINSTREAMING CLIMATE CHANGE, AND MAINSTREAMING GENDER

How climate change (adaptation) is framed is also linked to or has implications for which actors, governance levels and sectors are considered as responsible to deal with climate change. In this section, we consider the institutional or governance arrangements for the mainstreaming of climate change, as well as the mainstreaming of gender in climate change. We discuss facets of multi-sector, multi-level and multi-actor climate governance (Leroy and Arts, 2006) and visualize the organisational framework of responsible actors and agencies (see figure 4).

Multi-sector governance means that several policy domains share responsibilities designing and implementing policies (Leroy and Arts, 2006). In its climate change plans and strategies, Tanzania chooses for a sector-based approach. The NCCS calls for all sectors to develop climate change action plans to implement the strategic climate change interventions. Crabbé et al. (2015: p.64) argue that in a sector-based approach "the complexity of climate change in general is reduced to the lesser complexity of [e.g. sectoral] water management". Primary responsibility for climate change, however, remains with the Vice President's Office, Division of Environment (as per the Environmental Management Act (EMA) of 2004). More specifically, the NCCS attributes key roles to the *National Climate Change Steering Committee* (NCCSC) and the *National Climate Change Technical Committee* (NCCTC) which are cross-sectoral committees – located in the Vice President's Office – responsible for guiding and coordinating the implementation of the NCCS. While the NCCSC provides policy guidance and coordinates actions in various sectors, the NCCTC provides technical advice to Environmental Coordination and Management Offices and National Climate Change Focal Point. There thus is some form of horizontal coordination and oversight between the various sectors or line ministries. The specific authorities that are responsible for climate change (adaptation) are visualized in the left hand side of figure 4.

Multi-level governance, in turn, refers to the fact that policies are debated, designed, and implemented at different levels of government (Leroy and Arts, 2006). Framings of adaptation (policies) induce ideas about the proper level at which to tackle adaptation. Some argue that adaptation is best steered through local actions (decentralized or bottom-up), while other argue in favour of intervention at higher governance levels (top-down) (see e.g. Jordan et al., 2010; Adger, 2001). In Tanzania, different policy levels are involved in the legislation, coordination and implementation of climate change plans and strategies (i.e. multi-level governance). The NCCS

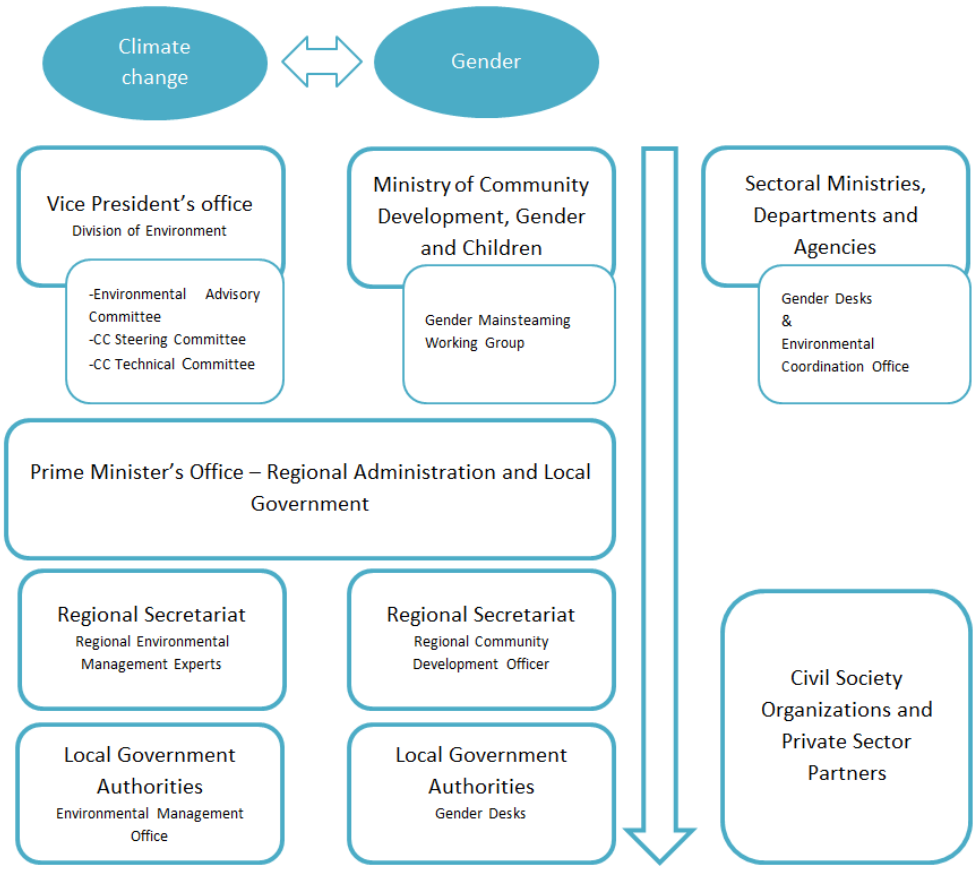
(p.77) states that: "The implementation of specific strategic interventions and activities will be done in the respective Ministries, Departments and Agencies, and Local Government Authorities according to their roles and responsibilities under the Environmental Management Act and mandates." This brings us to one particular challenge of the implementation of Tanzania's climate change adaptation plans. The policy documents have been designed at the national level, but implementation is expected to happen at the local level. Although the policy process usually involves some form of stakeholder consultation or participation, mainly through workshops or working groups, the process and end result is in essence *top-down*. Shemdoe et al. (2015: p.32) state that "in the Tanzanian context, climate change issues are addressed mainly at the national level while coping with its impacts such as flooding and drought is left to local communities or individuals at the local government levels." Local Government Authorities (LGAs)[25] are thus expected to implement the national policies, facing a heavy responsibility while possessing few resources and know-how. Smucker et al. (2015: p.43) argue that "the capacity of formal institutions to address adaptation needs – both in terms of equitably guiding resource access and enabling innovation sensitive to local needs – appears to be severely constructed." National adaptation plans are furthermore not customised to specific local settings and LGAs thus lack handles or specific guidelines on how to deal with climate change impacts in their local ecosystems and communities.[26]

For gender mainstreaming the institutional set-up is similar, or rather parallel, to the mainstreaming of climate change (see visualization in middle column of figure 4). The Ministry of Community Development, Gender and Children bears the overall responsibility for the coordination of gender mainstreaming, and implementation in actions and interventions happens by the gender desks or gender focal points at all subsequent governance levels. To facilitate gender mainstreaming in climate change, the *National Guidelines* propose the set-up of Gender Committees at all governance levels and within all Ministries, Departments and Agencies. Such Gender Committees should consist of staff of both the Gender Desk and the Environmental Office, responsible for climate change. Nevertheless, unclarity remains with regard to the gender mainstreaming roles as the *National Guidelines* seem to ascribe overlapping responsibilities to various actors. It is therefore not clear who would be held

[25] In rural areas LGAs are further divided into four levels: District, Ward, Village and Subvillage (*kitongoji*). All these levels are supposed to have an Environmental Management Officer and Environmental Management Committee (NCCS, 2013, p.51).
[26] Note also that no clear roles and responsibilities are assigned to institutions such as the River Basin Offices.

responsible for a failure of mainstreaming gender into climate change practices, which poses an accountability challenge.

Figure 4. Organisational framework of climate change and gender mainstreaming



Source: author's *own compilation on basis of National Climate Change Strategy (2012) and National Guidelines for Mainstreaming Gender into Climate Change related Policies, Plans and Strategies (2013)*

Finally, *multi-actor governance* denotes that several actors are involved and share responsibilities to implement policies. Besides governments, this might mean the involvement of private partners in industries, NGOs and civil society organisations (Leroy and Arts, 2006). Next to government agencies, the NCCS also sees a role for private actors, in particular in the *implementation* of climate change plans and strategies. The NCCS states that "NGOs, civil society organisations, religious organisations, educational institutions etc. are encouraged to participate by facilitating the implementation of specific adaptation and mitigation projects at a community level." (p.77). This is visualized in figure 4 by the actor 'civil society and private sector' at the local level.

6. CONCLUSIONS

First, in this chapter we found that Tanzanian climate change policy documents frame climate change as a threat to, on the one hand, physical infrastructure such as the electricity network and dams, and on the other, the livelihood security of its most vulnerable inhabitants, in particular small-scale farmers. Overall, there is a consensus in policy documents that the country's focus should lie on adaptation rather than mitigation, but documents are less in agreement on which sectors should adapt to the changing climate. It is clear that different policy documents offer rather dissimilar framings of climate change. This holds for their framing of adaptation as well. Although the NCCS, NAPA and ACRP tend towards a system resilience paradigm, other documents (in particular the two gender mainstreaming documents) adopt a clearer vulnerability paradigm. We argue that a consequence of policies' focus on system resilience (as well as their alignment with neo-liberal development policies) is that many adaptation initiatives do not even target small-scale farmers. Indeed, as the ACRP pinpoints, most agricultural investments are centred on large-scale commercial farming investments, rather than smallholder farming, and the more vulnerable semi-arid areas are not considered as suitable for such adaptation investments.

This brings us to the mismatch of attributed responsibilities and resources to different policy levels. Local government authorities (LGA) are expected to implement most adaptation plans and strategies, but lack the required resources and know-how. Furthermore, climate change has not yet been sufficiently mainstreamed into sectoral policies, and the concurrent lack of climate change-specific interventions turns adaptation actions largely invisible. This contributes to farmers' understanding of climate change (adaptation) as a game of trial and error over which they (and their governments) have little control (as we argue in chapter 4). Indeed, facilitated group discussions in the four study villages revealed that most farmers lack confidence in the government and do not believe that it will take up a considerable climate change adaptation responsibility in the near future.[27] As one female participant in Kiwege stated:

[27] Next to other potential reasons, such as farmers' own conceptualisations of climate change through their belief in god as bringer of rain (see chapter 4). Farmers therefore feel that the climate (and adaptation) lies outside of their (and the government's) control. Another potential explanation, which requires more research, is citizens' potential lack of confidence in government institutions due to e.g. corruption and nepotism.

> "You need to dig wells and make sure you have water. Even if you bring the problem to the government, you will still be the one suffering when the government doesn't do anything for you." (4FKi).

Even though the government might be able to help farmers to adapt to climate change, and farmers indeed named many ways in which the (local) government could do so,[28] farmers considered it likely that the government would not, or at least not in a timely way. In this case, it would be unprepared farmers who would suffer. In this regard, farmers' emphasis on individual (or private) responsibility could be considered as a (temporary) necessity in times when collective (or public) responsibility is largely lacking. Farmers need to ensure their own protection and adaptation, and this typically happens in the form of small, marginal changes to their agricultural and livelihood practices (Kristjanson et al., 2012; see also section 2.1.2. in chapter 1). In the remainder of this PhD thesis, we focus on such small-scale adaptation and coping actions and ask questions such as: Are farmers able to take up these practices; which farmers are and which are not (chapter 5 and 8); and who decides about the adoption of such practices within the household (chapter 6, 7 and 8)?

On top of that there is the challenge of mainstreaming gender in climate change plans. To date, rather than gender mainstreaming, policy documents seem to be stuck at a level of gender retrofitting or gender-proofing. Even though policy document such as the *National Strategy on Gender and Climate Change* offer very concrete and sector-specific proposals for gender actions that can be undertaken, to date little use is made of this by line ministries. While climate change plans such as the NCCS and ACRP at least mention gender in their diagnosis and priority-setting sections, they completely ignore gender in later phases of the policy process, in particular budgeting and Management and Evaluation (M&E) (in line with other findings on NAPAs, see Holvoet and Inberg, 2014). Gender diagnosis and goals are not translated into concrete actions, measures and indicators. The integration of gender thus waters down throughout the policy process (i.e. policy evaporation), and is particularly low in the budgeting and M&E phase (e.g. in the formulation of indicators). Furthermore, we find that climate policy documents paint a one-dimensional picture of women, either presenting them as vulnerable – passive – victims, or as

[28] E.g. creating livelihood diversification options by setting up beekeeping programmes, improving access to weather forecasts and to information and training by agricultural extension officers, investing in irrigation infrastructure such as dams, enforcing environmental conservation laws, and supplying food aid in situations of drought.

instrumental to overcoming negative climate change impacts and improving community resilience.

As the process of framing necessitates selective simplification of complex social dimensions of a phenomenon such as climate change (Kaufman et al., 2013), we argue that in this case policy-makers chose to neglect or simplify gender dimension. However, in this PhD thesis we confront these policy frames with empirical material that illustrates the complexity of reality. Throughout the chapters, we illustrate different facets of the complex phenomenon of gender and climate change (employing a range of complementary methods, as discussed in chapter 2). In this way, we aim to provide policy-makers with insights that might contribute to a positive reframing of gender in climate change policy documents. For example, in chapter 5 we question the one-dimensional picture of women, and of female-headed households in particular. In this chapter, we illustrate how different types of female-headed households hold different entitlements based on their marital status, and consequently have access to different adaptation pathways. Female household heads might thus be disadvantaged in terms of one adaptation domain, but might have easier access to other adaptation strategies. From this, policy-makers can learn that women and men cannot be considered as simple homogeneous categories: women are not all equally vulnerable to climate change, and men do not all possess high adaptive capacities. Next, in chapters 6 to 8, we investigate how spouses make adaptation decisions. Considering that certain policy documents regard women as instrumental to improving community resilience, we ask if women who possess more intrahousehold decision-making power are more able to positively influence their households' climate change resilience. Furthermore, policy-makers might learn from chapter 4 that climate change can influence gender divisions of labour (and potentially gender relations). This raises the question if climate change (policies) can be used as an entry point for achieving greater gender equality, a commitment that is enshrined in Tanzanian statutory laws and to which the country is internationally committed (Dancer, 2015).

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CHAPTER 4

RAIN, GOD AND GENDER: FARMERS' LIVED EXPERIENCES OF CLIMATE CHANGE IN RURAL TANZANIA

Note: This chapter has been submitted for review to the *Journal of Modern African Studies*.

1. INTRODUCTION

The intertwined effects of socio-economic and global environmental change are central in much of the literature on climate change in the Global South (see e.g. Adger, 1999; Below et al., 2012; Berrang-Ford et al., 2011; Cobbinah and Anane, 2015; Hamisi et al., 2012; Nielsen and Vigh, 2010; Nyantakyi-Frimpong and Bezner-Kerr, 2015; Perez et al., 2015). Furthermore, many studies have closely investigated local perceptions of and local level adaptation behaviour in dealing with climate change and other livelihood challenges (see e.g. Hoang et al., 2014 and Bryan et al., 2013 on Kenya; MacDonald et al., 2013 on Inuit youth). Yet, scholars have rightfully argued that global climate change is a highly complex or 'wicked' problem (Lazarus, 2009; Levin et al., 2012) that has to date been researched primarily through a focus on objectively measurable elements such as adopted adaptation strategies, while paying little attention to "how subjective and intersubjective perspectives relate to and interact with behaviours and systems" (O'Brien, 2010: 543).

To this end, the concept of 'lived experience of climate change' offers a useful approach in guiding research on what climate change means to local people, since through living their lives, people make sense of the changing climate (Abbott and Wilson, 2015).[29] Lived experiences are very diverse, rich and complex, and it is not the aim of this chapter to present a complete set of lived experiences of climate change from our study villages. Rather, this chapter offers some insights into Tanzanian farmers' experiences of climate change through their everyday life practices, and draws attention to two factors that have to date received only scant attention in the climate change literature. The first factor concerns what farmers' prioritization of various livelihood stressors reveals about their conceptualisation of climate change, and the centrality of farming, cosmologies and collective histories therein. Second, how lived experiences of climate change are gendered, and whether or not climate change can, in tandem with adaptation behaviour, induce transformations in gendered divisions of labour. In the next paragraphs we contextualise these factors within the literature.

First, people's lived experiences of climate change are important as these mediate how people conceive of climate change, how they make sense of it, and whether they consider it as

[29] Note that similar concepts have been proposed in the literature, including by Brugger and Crimmins (2013) who speak of 'living with climate change' and oppose this to a more technical 'adapting to climate change'. They argue that through a conceptual approach of 'living with climate change' it is possible to understand "how adaptation actually unfolds on the ground" (Brugger and Crimmins, 2013: 1830) and to uncover the underlying causes of vulnerability and adaptive capacities.

problematic in the first place. The variety and multiplicity of stressors that farmers in the Global South face, has been described in a large volume of studies, ranging from reviews of published studies such as Berrang-Ford et al.'s (2011), to local-level studies as these of Hamisi et al. (2012), Perez et al. (2015), Coulibaly et al. (2015), Nielsen and Vigh (2010), Cobbinah and Anane (2015), Antwi-Agyei et al. (2014), and Sudgen et al. (2014). These studies show that climate is only one among several stressors on agricultural livelihoods, and only one factor among many influencing people's adaptation behaviour. Nyantakyi-Frimpong and Bezner-Kerr (2015), in their study of Ghana, stress that "climate change should be addressed as one problem among many socio-ecological challenges facing smallholder farmers" (p.40), including the challenge of gender inequality. Other studies have focused on developing methodologies to identify local priorities (e.g. Lee et al., 2014) and show that local accounts of multiple stressors can add to our understanding of the meaning of climate change in people's everyday lives.

Related to this are studies, particularly within the anthropological field, that have emphasized the relevance of cosmologies, religions and worldviews in shaping how people view nature, the environment, and weather and climate patterns (Nelson and Stathers, 2009), and consequently how people view the changing climate and which meaning they attach to this. Crate (2011) furthermore argues that societies frame their *responses* to uncertain climate change effects "with understandings and adaptations based upon [both] an ancestral past and a contemporary lived experience" (Crate, 2011: 151). However, few studies draw attention to the influence of people's traditions and the meanings these have in their current lived experiences of climate change. In this chapter we argue that collective histories of traditional Luguru rain rituals, God's role as bringer of rain, and the idea that climate change is a gamble or wager, form a key part of farmers' lived experiences of climate change in the Morogoro Region of Tanzania.

Secondly, several local-level studies have indicated the gendered nature of people's lived experiences of climate change, although they are not usually naming it as such. To begin with, a considerable number of studies have indicated how different groups within society have varying degrees of vulnerability to climate change, and varying means of accessing adaptation strategies. These divisions are often gendered, but also run along intersecting lines of class, ethnicity, et cetera. For example, in chapter 5 we argue that in Tanzania, women's adoption of adaptation strategies depends on their marital status, while this is a less vital factor in the case of men (Van Aelst and Holvoet, 2016). Furthermore, different social groups access different adaptation strategies. In the same chapter, widows and female divorcees are found to face more barriers in accessing agricultural water management strategies, while female divorcees depend more on non-farm income-earning activities compared to other women (see chapter 5; Van

Aelst and Holvoet, 2016). Other studies from Eastern Africa have also found gendered differences in access to adaptation strategies. Perez et al. (2015) established a lack of access to cash and (good quality) land as barriers to East African women managing their changing environments. Fisher and Carr (2015) found gendered access to drought-tolerant maize in Uganda (see also Mnimbo et al., 2015 on Tanzania; and Nielsen and Reenberg, 2010 on Burkina Faso). Such studies show the variety of local gendered vulnerabilities and barriers to adaptation, and the necessity to properly contextualise climate change debates and take into account power relations (Aroro-Jonsson, 2011; Bee, 2016).

However, few studies have investigated how changes in gender roles form an active part of households' adaptation strategies. Carr (2008) established that in Ghana, some households adopt a risk-reduction strategy of household-level livelihood diversification, with wives specializing in subsistence crops in their farm plots, while husbands are growing market crops in their fields. A similar strategy has been observed in Tanzania, with husbands engaging primarily in non-farm livelihoods, while wives specialize as farmers in the household plots (Eriksen et al., 2005; Van Aelst and Holvoet, 2016; see also chapter 5). Besides these studies investigating changes in division of labour through livelihood diversification, a limited number of studies have looked at changes in the domestic or reproductive sphere. Awumbila and Momser (1995), for example, employ measures of women's time use as a proxy of changing gender roles within a context of environmental change. In South Africa, Babugura (2010) observes changes in gender division of labour resulting from a combination of stressors, including drought and economic transformations, and in particular high levels of male unemployment. She finds that (young) men are increasingly involved in home gardening and water and firewood fetching, while in households with unemployed men women are taking charge of decision-making.[30] However, studies from other fields of research have questioned that change in gendered participation rates (in this case of local service users) have led to the challenging of gendered power relations (Masanyiwa et al., 2014). In this chapter, we offer some insights into the gendered nature of farmers' lived experiences of climate change, through investigating changes in domestic water fetching in rural Tanzania within the context of poor water infrastructure, prolonged drought and dry spells. Furthermore, we ask whether such changes in gender division of labour, as part of households' adaptation strategies, go hand in hand with a more structural transformation in gender norms or whether gendered power relations remain untouched.

[30] Note that in a similar vein, other studies have found evidence of male unemployment leading to men taking up occupations that were previously considered as exclusively female (specifically retail jobs in Ghana) (Overa, 2007).

This chapter is organized as follows. In section two we describe the research context of the four villages included in the study, before offering an overview of the data collection methods and analysis in section three. Section four starts with a brief overview of local climate change manifestations, a discussion of farmers' conceptualisation of climate change as a gamble or wager, and of their prioritization of climate change-related challenges vis-à-vis other challenges (4.1). Next, we investigate why certain farmers attribute low priority to climate change, in particular in relation to collective histories of traditional rain rituals and cosmologies (4.2), before looking at changes in division of labour in water fetching, and exploring links to transport means and the cash economy (4.3). Finally, section five and six offer a discussion of results and conclusion.

2. STUDY VILLAGES

The researcher collected data in four villages belonging to the Ngerengere sub-catchment of the Ruvu River Basin and the Morogoro Region of Tanzania. Two villages (Kiwege and Sinyaulime) lie within the Morogoro Rural District, while the two other villages (Changarawe and Vikenge) are located in the Mvomero District. The villages within each district are highly comparable in terms of natural resource base, agricultural practices, infrastructure, living standard, and population composition. However, some differences exist between the villages across district borders. Specifically, the two villages in Mvomero have better access to Morogoro Town (25 km via the main road and regular bus connection), are located close to the campus of Mzumbe University, and are more highly populated and more developed. For example, some houses in these villages are connected to the electricity network and at least some functional water taps are present. The two villages in Morogoro Rural District are more rural as they are about an hour travel (by car) on untarred road from the main Morogoro-Dar es Salaam road. Bus services are available although less frequently compared to the two villages in Mvomero District. Furthermore, access to the labour market is easier in Mvomero District, due to proximity of Morogoro Town as well as casual wage labour opportunities at Mzumbe University and in the transport sector. Farmers in Morogoro Rural District, on the other hand, can more easily rely on forests and natural resources to sustain their livelihood, e.g. through access to forests for production of charcoal and for collection of wild fruits and vegetables. Population density and heterogeneity is also higher in Mvomero District due to considerable numbers of students and university staff members living in the villages, and could even be considered as semi-urban (personal communication Mvomero District Office). Farmers across the four villages grow similar crops, including maize, rice, cassava, yams, vegetables, millet, sesame and fruits like banana.

3. METHODS

This chapter relies on a variety of primary data collection methods: group discussions using Participatory Rural Appraisal (PRA) methods, change stories, semi-structured interviews with men fetching water, and with household heads and their partner, as well as a household questionnaire. This variety in methods, as well as reliance on secondary data (see below) enables us to triangulate the research findings. First, 41 group discussions (Barbour, 2008) were conducted between March and May 2014, in which we included elements of PRA such as Venn Diagramming, problem ranking and scoring (Chambers, 2008). Each group consisted of either women or men, but were mixed in terms of age, marital status and class. In total 25 group discussions were organized with women and 16 with men. Groups were composed of between three to seven participants and were facilitated in Swahili by four trained university graduates. In each group discussion, participants were asked to discuss the different livelihood challenges they are facing, as well as to rank these livelihood challenges vis-à-vis each other. Participants then proceeded to distinguish potential and actual strategies to react to the threats, and attached scores to each strategy to indicate how successful or effective they considered it.

Second, 24 interviews on 'stories of change' were conducted between March and April 2014. These took the form of semi-structured interviews in which farmers discussed changes they had perceived in the village, ranging from social and economic changes to environmental changes. Change story respondents had been living in the village for at least thirty years. Third, a household questionnaire based on a random sample of 844 respondents across the four study villages, was conducted in July and August 2014. The questionnaire data provide insights into adoption rates of climate change adaptation strategies, as well as information on respondents' water fetching practices. Next, in each village we purposively selected (Devers and Frankel, 2000) eight households from those that were involved in the questionnaire. During July and August 2014, we conducted in-depth semi-structured interviews with each of the spouses, or with the single household head. Topics of the interviews were respondents' adaptation strategies as well as the intrahousehold decision-making process with regard to adaptation. Finally, in October 2013 informal talks and brief semi-structured interviews were organized with 25 men fetching water at various taps in Changarawe and Vikenge. Respondents were asked about their practices with regard to water fetching and water vending. All qualitative material was coded using Nvivo software. Furthermore, secondary data in the form of Water Point Mapping data at both the village level (most recent data 2011) and the ward level (2016 data), was used to sketch a picture of the number of operational water points across the study villages.

In the next section, we analyse local climate change manifestations and farmers' concomitant conceptualisation of climate change (4.1), how traditional Luguru rain rituals are related to farmers' lived experiences of climate change (4.2), and the gendered nature of lived experiences with regard to water fetching (4.3).

4. RESULTS

4.1. UNPREDICTABLE RAINFALL AND WAGERING

In chapter two (section 4.2) we have offered evidence of ongoing or increasing variability of rainfall in the Morogoro region. We emphasized that much uncertainty exists about future climate change impacts, especially in bimodal rainfall areas. Generally, it is expected that the region will experience warmer, longer dry season and worsening periods of drought, and that the flow of water in the Ruvu River will diminish. The results from the meteorological trend analysis in chapter 2 are consistent with trends distinguished by farmers themselves, as discussed in qualitative interviews and group discussions. Farmers' main observations are a later onset of the rainy season, more concentrated rainfall in a shorter period of time, less rain during the *vuli* (short) rainy season, more unpredictable rainfall, as well as increased occurrence and severity of drought and dry spells. Farmers furthermore mentioned stronger sun compared to earlier times and occasionally complained about flooding. Farmers emphasized rainfall unpredictability. For example, one respondent exclaimed: *"The seasons have disappeared"* (Kiwege FG2m), while another expressed the increased uncertainty in decision-making due to climate change as follows: *"Unpredictable rainfall forces us to play with what is possible"* (Sinyaulime, FG3f).

It has been argued by Abbott and Wilson (2015) that climate change is often spoken about in terms of a *battle*. However, in our study site we find that rainfall unpredictability and climate change – and in particular *adaptation* thereto – is typically construed as a *gamble* or *wager*, that is a game of trial and error. For example, with regard to changing planting dates and pre-seasonal farm preparation, farmers expressed the gamble they were taking:

> "To handle these confusing rains, you can prepare your farm early, but not many people do this because it doesn't always work. It is like a lottery." (Sinyaulime, FG9f)

Another example refers to fast-maturing seeds, which are typically promoted by agricultural extension officers and sometimes distributed by the government. However, respondents frequently expressed their discontent with the seeds, in particular their proneness to pests in situations of heavy rainfall. Farmers explained that:

> "...this *chotara* seed [short seed or fast-maturing seeds], it is easy to be infected with pests compared to *star* [long seed]." (Vikenge 0084)

> "Short seeds tend to give good harvest when the weather is good, but when the weather is not good it doesn't give a good harvest and it is easy to be affected by pests compared to long seeds." (Kiwege 0094)

During group discussions, farmers listed the various livelihood challenges they are facing. Most identified challenges related to agriculture, while others related to non-farm income-earning activities, access to water, and education and health services. Out of the 41 group discussions, only two did not (explicitly) mention climate- or weather-related livelihood challenges.[31] Farmers' lived experiences of climate change cannot be understood in isolation from their other livelihood challenges and lived experiences, as they are relational to each other, and can aggravate or compensate each other (Abbott and Wilson, 2015). To better grasp what climate change means to local farmers, in particular in relation to other livelihood stressors, we asked farmers to rank the different livelihood challenges they had identified, using Venn Diagramming techniques (Chambers, 2008). Table 14 illustrates the number of groups that ascribed respectively high, middle, and low priority to climate change-related challenges (rows), as well as the three main arguments that were put forward in the discussions with regard to the nature and urgency of climate change (columns). In what follows, we first explore why most farmers (23 out of 40) ascribed high priority to climate change-related challenges.

A first group of farmers judged climate-related threats as a priority based on the perceived scale of its impact vis-à-vis the impact of the other livelihood threats. They argued that the lack and unpredictability of rainfall was significantly disturbing their livelihood security, imposing situations where they suffer from hunger and are unable to provide for their families. For example, during a group discussion in Changarawe (FG1F), participants identified the lack of agricultural tools as their second most urgent challenge, after unpredictable rainfall. These women argued that unlike unpredictable rainfall, the poor quality of tools they depend on do not jeopardize their survival as such, rather it limits the growth of their agricultural activities as it prevents them from farming bigger plots or producing surpluses that they can sell.

[31] Both groups consisted of male participants and one of them did distinguish the threat of a lack of (clean and safe) water for domestic use, which was recognised to be linked to issues of drought.

Table 14. Distribution of discussion groups according to climate change prioritization

Ranking climate change as a...	*Climate change is...*				
	"...disturbing our livelihood security"	*"...precedes other challenges"*	*"...up to the will of God"*	*(other)*	*Total*
High priority	**9**	**8**	0	6	23
Middle-range priority	3	2	0	2	7
Low priority	2	0	**7**	1	10

Source: *40 group discussions that identified climate change-related livelihood threats. High priority is defined as being in the top 3 of identified priorities.*

The second group of farmers that ascribed high priority to climate related threats, argued that it should be their main priority because 'rain comes first', chronologically, and thus precedes all subsequent livelihood challenges. The latter group argued that with the occurrence of drought, all subsequent agricultural gains would be jeopardized; while the presence of good rains would make some of their other livelihood challenges superfluous. This feeds into respondents' recognition of the centrality of agriculture in their livelihoods, as well as the vulnerability of a peasant society in which there is no food without rain. For example, during the ranking exercise in a group discussion, one respondent argued that: *"Unpredictable rainfall should be first, because agriculture is the backbone of our village. Without rain there cannot be agriculture and there cannot be food"* (Changarawe, FG1F). An army retiree in Sinyaulime expressed the centrality of farming by explaining that:

> "...agriculture is the backbone. I think that even if the father [in the household] is a government employee or business man, I reckon he cannot forget agriculture. Farming is like traditional work, the work that makes us grow. We see how our father and mother

> are going to the farm and learn from them. So even all adults, they will grow [crops]" (Sinyaulime, HH121m).[32]

Many villagers thus felt that meeting the conditions for engagement in agriculture should be a priority, as they *are farmers*. When rain fails to fall and farming can no longer provide in their needs, only then will many start to worry about finding other economic activities and diversifying their livelihoods. For example, one male farmer explained:

> "We depend on rain for us to cultivate, so when it happens there is no rainfall it is hard for us to cultivate anything. So we end up in a bad situation and during this time we depend on small businesses. ... It was hard. During the drought, I had to walk to different areas searching for labour activities so that I could support my children." (Kiwege, 0088)

4.2. RAINFALL, GOD AND TRADITIONAL LUGURU RAIN RITUALS

In group discussions where participants ascribed low priority to climate change-related threats, participants generally argued that rain depends solely upon the will of God. They hereby emphasized that rainfall patterns are outside of the realm of their own influence, and cannot be controlled by anyone. For instance, one respondent indicated that: *"Rain is only happening according to God's plan"* (Vikenge, change5), while another stated that: *"No-one can prevent or bring rain, only God"* (Vikenge, change3 wazee). Accordingly, during the ranking exercise, one discussion group member stated that: *"Drought is the last problem, because we have no mandate over the problem, only God himself"* (Kiwege FG2). This belief in God as bringer of rain is in line with earlier studies from Tanzania. For example, Slegers (2008: 2120) finds that farmers believe that "[w]hen God or ancestors are dissatisfied, e.g. when sacred trees are cut, the farmers will be punished through the rain". The low priority these farmers' ascribed to climate change thus does not mean that they did not recognize the severe consequences thereof, but rather they felt that it ought not to be a policy priority since it lies outside of people's control. As one respondent put it: *"We have no authority on dealing with this problem, only God can rescue us from this situation"* (FG3 Sinyaulime). The reference to God thus seems less a matter of religious belief, or some orthodoxy, than an affirmation of humans as mere recipients of common natural resources such as rain.

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[32] Note that many Tanzanian civil servants will refer to their need to cultivate on top of their office job as a way of expressing criticism on their low salary.

Interestingly, an often recurring topic, especially among elder participants, was the performance of traditional rainmaking rituals, although these are no longer practiced today.[33] We argue that for these farmers, referring to the rainmaking rituals is a meaningful way of expressing their understanding and lived experience of climate change. Several respondents' accounts of the form these rituals took, allow us to sketch the common characteristics or typical course thereof.[34] First, money was collected from all villagers, to provide food and drinks for the elders (*wazee*, singular: *mzee*) who would go and undertake the rainmaking. The *wazee* walked by foot to the sacred rainforest, probably to the rain shrines of the deity Koleo (or Kolelo) in a cave in the Uluguru Mountains. In the literature, Koleo has been described as an agricultural deity "associated with agriculture, famine and social health" (Sunseri, 1997, p.243), who punished its people through (withholding) rain. Sunseri (1997, p.243) explains: "When rains failed, locusts invaded fields or famine threatened, it was because Koleo was angry and needed to be placated".[35] At least one *mzee* wore black cloth (*kaniki*), which is also associated with rainmaking rituals among other ethnicities (Sunseri, 1997) and might have been one of the gifts to the forest spirits (Swantz, 1985).[36] As part of the ritual, some food was usually prepared and consumed using resources from the place of worship, e.g. preparation of *ugali* or sorghum using water from the cave. Prayers and sacrifices were also part of the ritual. When returning to their village, the *wazee* were subject to certain restrictions, such as not being allowed to look back, nor speaking or even returning greetings to passers-by, lest the ritual would fail. One discussion participant clarified: *"When returning to the village, the mzee wearing the kaniki is not allowed to go and sit anywhere, he can rest only in his own village... he is carrying the rain and cannot leave the rain behind before reaching the village"* (Sinyaulime, FG8). In the meantime, some rules of conduct usually prevailed in the village as well, e.g. with regard to the ways in which people could light fire. When the *wazee* returned, all villagers then came and collected fire from a common source, before lightening their own cooking fires, or commonly consumed some food.

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[33] Accounts of when the rituals were last performed vary, with one respondent indicating the last rain ritual in Sinyaulime village was in 1978 (SinFG 5F), while a group of elderly men stated the rituals had not been performed in Changarawe village since 1949.

[34] It is likely that the rain rituals have taken different forms over time. The rituals as they are described in this chapter refer to the form the rituals took during the last decades that they were performed. Note that similar rituals would have taken place to dam the spread of diseases (Sinyaulime, change 10), expel the cold during the rainy season (Sinyaulime change 9), etc.

[35] Note that Koleo was also a deity to the Zaramo people (Coastal area). Furthermore, Swantz (1985) makes mention of a woman of the Mlali clan who would have been an intermediary between Koleo and the community.

[36] Swantz (1985: 48-49) states that "Koleo was placated with gifts such as black cloth, beads, chickens and salt, and by charms placed in fields and along crossroads."

It was believed that it would start to rain the day the *wazee* arrived back into the village, or within the next couple of days.

This chapter argues that respondents' reference to these rainmaking rituals, which form part of the Luguru's collective history, reveals a nostalgic longing for times when villagers experienced a greater sense of control over rainfall and weather patterns, as these were believed to be steered by performance of the rituals. One respondent stated that:

> "In the past, this [the traditional rain rituals] was something farmers could have done. But it is nowadays no longer happening. ... Also, wells used to be given a traditional medicine to ensure that they would not dry up. This is now not happening anymore and this is why the wells are now dry." (FG 7FKi)

This woman indicates current farmers' lack of control over the climate, compared to the grip she believes villagers had on rainfall patterns through performance of rain rituals. Furthermore, she believes that having abandoned the rain rituals is one of the causes of the diminished rainfall over time. Before independence rain was the responsibility of the chief or king in most Bantu-speaking communities. His ancestors would annually be placated in a collective ceremony of 'breaking open the land' before the onset of the rainy season. After independence community elders replaced the chief and maintained rainmaking rituals, in this way continuing to (1) give a collective sense of control to the community, and to (2) ease the burden of choice (i.e. the wager or gamble) on individuals by providing a guideline on when to start ploughing and sowing (Stroeken, 2012). For some farmers, a sense of contemporary lack of control goes hand in hand with a longing for a past idealized as having permitted people to govern the climate, including the rains. The idealization seems salient here, mainly intending to condemn the current situation and express their discomfort with a sensed break with the past, as otherwise some respondents would actually have proposed to reinstall the ritual cycles. (Nevertheless, we know of at least one recent case, informally communicated to us by a healer (*mganga*), who was contacted by the elders of a village community in Mvomero district to bring rains. After the ritual they refused to pay and acknowledge his work out of fear of sanctions by higher authorities). Further research is required to fully comprehend the relationship between farmers' beliefs and lived experiences of climate change, and their coping and adaptation behaviour.

In the next section, we draw on an example from the domestic sphere, i.e. water fetching, which provides useful insights into how lived experiences of climate change can vary for women and men. Furthermore, the example illustrates how perceived climatic changes, in tandem with

other societal, economic and technological transformations, can manifest itself in farmers' actions, in particular through shifts in the gender division of labour.

4.3. WATER, TRANSPORT AND GENDER

The poor water infrastructure in each of the four study villages is unable to provide sufficient water for all inhabitants during the dry season. This is likely to be exacerbated even more as a result of climate change-induced dry spells and prolonged periods of drought. In the villages Sinyaulime and Kiwege, water infrastructure is least developed and people primarily dependent on unprotected wells, dams and rivers. Water Point Mapping (data of 2011) show only one functional water point in the whole of Kiwege village and merely three functional water points for Sinyaulime.[37] During drought, women are consequently forced to walk long distances to the next available water source and spend much time doing this. In Kiwege's most remote subvillage, Vianzi, women reported having to walk over two hours to fetch water during the dry season. It follows that women and girls' time for productive labour, care and domestic work, education, and leisure is restricted, which is visible in relatively low levels of school attendance of young female household members (Denton, 2002). In the villages Vikenge and Changarawe, the water infrastructure is more developed and depends more on taps, rather than unprotected wells or streams. In Changarawe and Vikenge, respectively ten and five functional water points were counted in 2011 (Water Point Mapping).[38] Nevertheless, in the dry season water is relatively scarce and needs to be rationed, to ensure sufficient supply to villages at the tail-end.[39] In times of scarcity, households can therefore only fetch water every couple of days and they may need to look for additional water sources that are further away, or buy water from local vendors. Across the four villages, 68% of married male questionnaire respondents, and 72% of married female respondents, indicated that the wife is the main person in the household fetching water during the dry season. The social (gender) norm that the activity of water fetching is typically female in nature, places a high labour burden on women (cf. Nelson and Stathers, 2009 on Tanzania; and more generally Kidder et al., 2010) and feeds the perception that women

[37] Water point mapping (2011): 5 water points for Kiwege (of which only 1 was functional); and 5 for Sinyaulime (of which only 3 were functional). More recent ward-level data shows that Ngerengere ward has a total of 7 water points of which 2 are functional and 5 are non-functional (data accessed 1 February 2016).
[38] Water point mapping (2011): Changarawe: 13 water points (of which 10 were functional); Vikenge: 7 water points (of which 5 were functional). More recent ward-level data shows that Mzumbe Ward has a total of 91 water points, of which 22 are functional, 13 are functional but in need of repair and 56 are non-functional (data accessed 1 February 2016).
[39] Also due to high population pressure in these villages and the fact that almost all neighbouring villages depend on Tangeni river for their water supply.

are the 'natural' managers of household water (see also Zwarteveen, 2006; Haggart, 2010; Cleaver, 1998).

An explorative study by UN Women found that in Morogoro Urban District men were becoming more involved in water collection tasks due to the tasks' increasing physical and time demands on women. Similar trends have been established in other areas of Sub-Saharan Africa. In South Africa, for instance, Babugura (2010) observes changes in the traditional gender division of labour due to drought and concomitant economic transformations, in particular high levels of male unemployment. In what follows, we investigate evidence of such a change in gender division of labour in water fetching in our study villages. The following quote from a male household head, Musa[40], is illustrative in this regard.

> "If it is drought season and the water is available near the house, my wife will go with a bucket and fetch water. But if the water is far away, then the husband gets involved. My wife will just collect the water and I use my bicycle to fetch the jerry cans she has filled, so that my wife doesn't need to put the buckets on her head. So the work of the wife should be just to collect the water at the water tap or well, then you go and fix like ten jerry cans to your bicycle and you bring it home. But if there is water at the river [nearby] then that responsibility of fetching is for the children and wife." (Musa, Sinyaulime, H121).[41]

This quote illustrates that men who assist their wives in fetching water – and thereby partly alleviate their traditionally female duties – typically do so when times are harsh, for example during the dry season when water sources are further off. This suggests that with the changing climate, there is, or is likely to be, some degree of change in the division of labour between the genders, as men become more involved in domestic water fetching. However, Musa also emphasizes that the nature of the task remains female: his wife walks to the water sources to fill the jerry cans, after which he will transport them home using his bicycle. This is in line with interviews with other men fetching water, who often claimed they were 'forced to help' their wives due to circumstances. For example, one respondent said: *"Distance forces me to help her..."* (Vikenge, w.m.25). Another man stated: *"Fetching water is not a good job for men. Because of the distance... I cannot stay at home and do nothing while my wife cannot bike to*

[40] This is not the respondent's actual name.
[41] Note, one jerry can of the type respondents are referring to holds around 22 litres of water.

this place to fetch water" (Changarawe, w.m.14). Even men who indicated to be positive towards their involvement in water fetching, and who emphasized wanting to alleviate their wives' labour burden, still considered their involvement in the task as an 'exceptional circumstance'. Most of the men fetching water only did this when water was not available within their own village, and fetching water 'nearby' thus remained the sole responsibility of women and children (e.g. Changarawe, w.m.15&17; Vikenge, w.m.25). This suggests that once the necessity to aid their wives fades away – when the circumstances become less harsh – the division of labour is likely to return to its original state, as the task of water fetching is still perceived as female in nature. Hence, the shift in task allocation in our case villages does not seem accompanied by an actual shift in the perception of this task.

We therefore ask whether this observed change in division of labour also implies a change in gender norms or gendered power relations. To understand this, it is helpful to further unpack men and women's differential lived experiences of water fetching in the context of climate change. We do this by looking at other societal transformations that happen in tandem to climate change, and that allow men to actively redefine their water fetching task in terms of public sphere practices: firstly, technological development of means of transport, and secondly, economic transformations of increasing water vending.

First, Musa's quote illustrates a technological development taking place in the community in the form of availability of intermediate means of transport. Musa describes how wives are predominantly fetching water by foot, carrying buckets on their heads, while men use their bicycles or motorcycles to fetch water. The local gender norm that bicycling should be limited to men and productive uses (see Mwankusye, 2002) leads to few women fetching water by bike – and those who do are primarily younger and unmarried women. The way in which water is fetched therefore implies a vastly different embodied experience of the task for men and women (see also Harcourt, 2009). We argue that men and women's bodily experience of water fetching is different as women's bodies are subject to neck and shoulder strain from carrying heavy buckets on their heads during long walks, often barefoot or wearing flip-flops. Moreover, they will usually walk to the water point several times per day. Men, on the other hand, fetch water by bike and can thus transport more water in a shorter period of time, or visit the water point at less frequent intervals if fetching for domestic use, and this in a way that is less demanding for the body (Beuchelt and Badstue, 2003). Nevertheless, carrying many jerry cans of water by bike can be hard work, in particular for younger boys. During observations, we met one 15-year-old boy fetching water in his neighbouring village. Selling water to domestic users in his home village, he rode his loaded bike between the two villages, 7 to 8 times per day. Visibly

exhausted, he showed us the many blisters and scars on his hands, and emphasized he was doing this job *"out of poverty"* (Vikenge, w.m.1).

This brings us to a second transformation that is happening at the same time: an economic shift. More and more water vending businesses are emerging, and we argue that this transformation coincides with the task of water fetching being taken up by men, and per bike. This is in line with earlier observations for the Morogoro Region of Tanzania that bikes are predominantly used for 'productive' purposes, and by men (Mwankusye, 2002). In our study villages, water is sold by male water vendors both for domestic purposes, i.e. to households, and for productive purposes, to businesses. The latter are in particular building businesses, brick production, and a car wash. In Changarawe and Vikenge, relatively big businesses have even developed, with motorcycle pick-ups and casual labourers fetching up to 35 jerry cans, 4 times per day (Changarawe w.m.16; Vikenge w.m.20). We argue that the task of water fetching is being valued differently as it becomes linked to the cash economy, technology and masculinity, and moves out of the realm of the purely domestic (care work and female sphere). This is in line with earlier studies with regard to irrigation water (see e.g. Zwarteveen, 2006).
Finally, we should remember the cross-cutting issue of locality. Within Tanzania, a large variety of gender norms exist, both across rural and urban areas. The following quote illustrates the respondent's attention to and surprise over what is considered as 'normal' locally, not being a native of the area himself.

> "In my home place [Iringa] the mother is the one fetching water. But over here, the father is supposed to fetch water. But it is good to help each other in every task. My wife, she also assists me in providing in the domestic needs of our family [she is a tailor]. ... Maybe because Iringa is more rural, but here women recognise themselves and demand help. In my village in Iringa, it is specified which task is whose." (Vikenge, w.m.20; married)

In the Morogoro Region, further research on the potential role of the Luguru's matrilineal heritage might be especially useful. However, it lies outside of the scope of this chapter to describe into detail the influence of locality. This study offered an analysis of specific elements of farmers' lived experiences of climate change in the four study villages, and external validity of research findings in other areas of Tanzania is limited.

5. DISCUSSION

The chapter explained that most farmers ascribe high priority to climate change-related livelihood threats such as drought and unreliable rainfall. Farmers furthermore emphasized that rainfall is in God's hands and outside of their control. We argue that as some farmers mention no-longer-practiced rain rituals, they express a longing for a feeling of control and their discomfort with the loss of communal responsibility over the rains. With the loss of rainmaking rituals, the burden of failed rains and harvests is no longer being shared.[42]

Respondents furthermore referred to climate change as a wager, which endorses the general feeling of lack of control over climate change and the idea that there is little farmers can do. Specifically, the few adaptation actions farmers can undertake are often on a trial and error basis. Understanding local interpretations of climate change (adaptation) is important to facilitate efficient, effective and just policy formulation and implementation on the ground (Becken et al., 2013). We therefore argue that policy makers should focus on awareness raising about possible adaptation options, specifically through extended use of farmer field schools and advice by agricultural extension officers. Furthermore, they should make sure that such initiatives focus not only on those farmers who are more confident about being able to adapt to climate change, but also to those who need more encouragement through safe ways of experimentation such as in farmer field schools. Moreover, improvement of infrastructure and the availability of non-farm employment would improve risk spreading when farming fails.

5.1. CHANGING GENDER NORMS AS A CONSEQUENCE OF ADAPTATION ACTIONS?

With regard to domestic water fetching, we found that in the context of environmental change, men increasingly assist women with this task. However we also ask whether this (partial) shift in gender division of labour has meant a change in gender norms, and argue that there is no evidence of such a change in gendered power relations for three reasons. First, domestic water fetching is still considered as a typically female activity and men frequently emphasize helping out only during drought, or because the circumstances required so, for example during pregnancy or illness of their wife. Second, men use means of transport that are less bodily

[42] This is also reflected in respondents' emphasis of lost solidarity in the community. Since liberalization of markets and services in the 1980s, emphasis lies on 'each for his own'. E.g. everyone has to decide for himself the appropriate moment of sowing.

straining compared to women who fetch water by foot. Therefore, even when both spouses are fetching domestic water, their embodiment of this experience will be rather different. Third, men fetching water often link this activity to the cash economy and 'productive' uses of water through fetching water for sale to businesses and households. We therefore argue that this change in division of labour does not structurally transform the valuation of women's versus men's work (i.e. gendered power relations). The task of water fetching is likely to be valued more when performed within the 'productive' sphere, typically associated with men, the cash economy and bicycle use, compared to when performed within the 'domestic' sphere, and thus linked to women and reproductive or care work.

Nevertheless, the changed division of labour is visibly present in the study villages – although only in certain situations or under specific circumstances – and we could argue that through an experiential learning cycle, a window of opportunity is formed where gender norms and ideologies can be influenced, as well as what is considered as 'mainstream'. Gender norms are continuously challenged and adapted and what is considered as gender-appropriate behaviour can change in response to political and social developments (Overa, 2007). We argue that in the study villages, this change in division of labour is more likely to be persistent precisely because men and women are fetching water in a distinctly different way (i.e. link to cash, bicycle use and masculinity). Indeed, Carr (2008: 697), in his research on Ghana, found that "adaptation persists because it mobilizes existing, naturalized gender roles in ... households". In our study villages, men are fetching water by bike and using it as an opportunity to earn cash, factors that are in line with existing and naturalized local gender roles. This mobilization of gender roles might facilitate the mainstreaming of the water fetching task among men, and although not structurally changing the valuation of women's work or challenging gendered power relations, potentially alleviate a share of women's work burden.

However, it is important not to homogenize categories of men and women, and we should therefore ask questions such as: in which households are men joining in the effort of water fetching?; which women's time is being freed up and which women's strain and drudgery work is alleviated? It should be remembered that women's lived experiences of climate change are very diverse, and as men's, are both collective and personal in nature (Abbott and Wilson, 2015). Women's lived experience of climate change, drought and water fetching are shaped by several elements, including whether or not they have male household members who can and are willing to fetch water, and whether they have access to bicycles and thus live in a relatively well-off household or not. Women in richer households are more likely to have a private tap near their house or to (choose to) buy water from water vendors, especially in Vikenge and Changarawe

where supply is more extended. This significantly transforms richer women's experience of accessing domestic water. Furthermore, women's experience of fetching water for domestic use will also interact with the other livelihood challenges they are facing, through time and physical constraints of involvement in e.g. non-farm activities such as a small business. We therefore argue in favour of an intersectionality approach and apply this in chapter 5.

Policy makers could facilitate the persistence of this shift in division of labour by improving the availability of bicycles (also to women), as well as by promoting more flexible gender norms with regard to bicycle use by setting up awareness raising programmes. Such programmes could potentially rely on the diversity of gender norms across the country and could focus on the fact that women *can* ride bicycles and the benefits it might bring to them. Future research on gender norms with regard to water fetching and bicycle use could further inform policy makers. Furthermore, it is advised to further invest in Tanzania's water infrastructure, especially in rural areas, through installation of more and especially more functional water points. In doing so, attention should be paid to *access* to water, in order to prevent discrimination of vulnerable and marginalized groups such as female-headed households, the landless, the poor and minority groups.

6. CONCLUSIONS

This chapter contributes to the literature on lived experience of climate change by drawing attention to two elements that play a crucial role in Tanzanian farmers' lived experiences. Namely, the interplay between multiple stressors, farmer identities and cosmologies; and the gendered nature of these lived experiences. This chapter argued that understanding people's lived experience of climate change is key, as lived experiences mediate, first, how people conceive of climate change and make sense of it, and whether and how they consider of it as problematic. We illustrated that farmers' prioritization of climate-related challenges depends on both the centrality they attribute to agriculture, as well as their beliefs in God as bringer of rain. Farmers therefore considered of climate change as out of their control and adaptation as a wager, or game of trial and error, and some seemed to refer to former rainmaking rituals to remember times in their collective history when the climate was perceived of as more 'manageable'. Second, lived experiences mediate how people act upon the challenge of climate change, and which adaptation strategies they undertake. Illustrative were men's accounts of how change is forced upon them by conditions of drought, male unemployment and high female labour burdens. Third, lived experiences mediate how – through experiential learning – adaptation strategies bring about societal (e.g. gender) transformations (or not). We argued that the changed division of labour does not imply a structural revaluation of women's work or the challenging of gendered power relations. Nevertheless, the reallocation of tasks can be persistent in nature due to the mobilization of existing and naturalized local gender roles, in particular men's water fetching activities as an entry point to the cash economy, and by bicycle – as opposed to women fetching water by foot.

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CHAPTER 5

INTERSECTIONS OF GENDER AND MARITAL STATUS IN ACCESSING CLIMATE CHANGE ADAPTATION: EVIDENCE FROM RURAL TANZANIA

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1. INTRODUCTION

1.1. ADAPTING TO A CHANGING CLIMATE

The contribution of this chapter to the climate change literature is to improve our understanding of how gender and marital status intersect in determining the access that different types of households have to various adaptive strategies. Although an increasing number of climate scholars acknowledge the importance of gender, they often do so merely to note the different impacts of climate change on women and men, or on female- versus male-headed households. Here we analyze how weather related changes might affect women and men differently in terms of their access to resources and adaptive strategies, such as livelihood diversification and agricultural water management. We argue that, while a comparison between male- and female-headed households is a valuable first step in climate change analysis, it is also important to try and transcend this level of analysis and to recognize the diverse positions of different types of female-headed households (Bhattarai et al., 2015; Huynh and Resurrección, 2014), as well as the different positions of women and men in male-headed households. Consequently, the relevance of this research to policy lies in its conclusion that it is unwise to assume that homogeneity exists among 'women', 'men' or 'female-headed households', for these categories consist of individuals with varying degrees of access to climate change adaptation strategies.

In the research presented here, we focus on intersections of gender and marital status and compare married (or cohabiting), divorced (or separated), widowed and single (having never married) men and women. Based on academic literature reviews and on the group discussions that the researcher conducted during field research in the Morogoro Region of Tanzania, we select two dimensions of climate change adaptation for discussion – livelihood diversification and agricultural water management (irrigation and valley farming).[43] We combined the data from the group discussions with those from a questionnaire derived from 844 respondents across four villages to answer the following two research questions. First, to what extent does a person's gender and marital status determine his or her adoption of adaptive strategies in both the fields of agricultural water management and livelihood diversification? In other words, how do the statuses of being married, divorced, widowed or single affect a person's access to these

[43] This is not to say that there are no other relevant dimensions of adaptation besides agricultural water management and livelihood diversification. However, in this chapter we have chosen to select these two, since in the group discussions they systematically proved to be highly relevant for the villages being studied. In chapter 7 and 8 we analyse the adoption of a broader range of adaptation practices.

adaptive strategies? We develop a typology to illustrate the intersections between gender, marital status and access to adaptive strategies. Second, given that a person's marital status has a bearing on his or her level of vulnerability and ability to adapt to climate change, what constraints and opportunities work towards determining the differential paths to adaptation of the various marital categories?

We have structured this chapter as follows. Section 1 continues with a brief discussion of climate change and adaptation in Tanzania, followed by an introduction to the intersectionality approach we use. Subsequently, we give an overview of, first, the literature that compares adaptation across male- and female-headed households and, second, research that has taken the analysis a step further by using an intersectionality perspective. Then, after a brief description of our data collection and research methods, we embark on a description of the study site (section 2). Section 3 comprises the empirical analysis, followed by a discussion (section 4), then summary of the main results and concluding remarks (section 5).

1.2. GENDERED VULNERABILITY AND ADAPTATION IN TANZANIA

Tanzania, like many other Sub-Saharan African countries, is facing the challenge of having to adapt to a changing climate. The impacts of the projected climate change for Tanzania range from growing incidences of natural hazards like droughts, earthquakes, floods and storms (World Bank, 2014: 302), rising temperatures and changes in river flows to less predictability of already highly variable rainfalls. Likely manifestations of the latter are shifts in the onset of the rainy season, as well as more concentrated and heavier rainfalls (IPCC, 2014; United Republic of Tanzania, 2014). The consequences of this are dire for local farmers, who mostly depend for their survival on small-scale, rain-fed agriculture (United Republic of Tanzania, 2014). The changing climatic conditions threaten their livelihoods and food security (Arndt et al., 2011; Kakota et al., 2011) because they are causing reductions in the yields of, among other crops, maize, sorghum and rice (Rowhani et al., 2011).

Adaptation to climate change refers to a strategy to reduce and manage the risks associated with the phenomenon (IPCC, 2014). Among the adaptive strategies that small-scale farmers[44] use in the Morogoro Region are livelihood diversification, migration, agricultural intensification – for example, irrigation and switching to 'fast crops' that produce a larger number of harvests

[44] We use the term 'small-scale farming' to refer to farming that is family based, where output and input are relatively low and the scale of operation is too small to attract the services that would be needed to increase productivity significantly. In the Morogoro Region, this for example means that small-scale farmers rarely own tractors and use a considerable portion of their harvest for family consumption (see Kirsten and van Zyl, 1998).

per year – and coping strategies such as selling assets and livestock to purchase food and applying for government food assistance (Below et al., 2012; Eriksen et al., 2005; Goldman and Riosmena, 2013; Paavola, 2008; Ponte, 2002; van Donge, 1992). Adaptation strategies can thus take many different forms and they often reflect local development strategies (such as practices that also improve livelihood security or increase agricultural production). Livelihood diversification and agricultural water management are thus strategies that respond not only to climate change but also to the other environmental, social and economic drivers that the changing climate exacerbates and reinforces (Eakin, 2005).

As discussed in chapter 3 of this thesis, Tanzania's climate change policies largely neglect the interplay between climate change and the various socio-cultural, institutional and politicial dimensions of development that influence an individual's vulnerability, namely the exposure to risk as well as the ability or inability to deal with risky events (Ellis, 2006). More specifically, Tanzania's National Adaptation Programme of Action (NAPA) (United Republic of Tanzania, 2007) and the National Climate Change Strategy (United Republic of Tanzania, 2012) ignore the fact that different categories of farmers might be differentially exposed to climate change risks, for instance because they are more dependent on natural resources. These policies also fail to acknowledge that some categories of farmers may find it more difficult than others to handle risky climate change events. For example, a lack of resources such as cash, credit, land, networks, education or time may lower their adaptive capacity (Adger, 1999; Below et al., 2012; Berman et al., 2015). Along the same lines, Tanzanian climate policies are insensitive to gender issues and treat women as one homogeneous group; in other words, they disregard the fact that some of the adaptation strategies discussed above might be less available to specific categories of women, such as female household heads. As Smucker et al. (2015) point out, this neglect of differentiated vulnerability and adapative capacity alongside the existing cultural, institutional and political drivers of inequality does not entirely come as a surprise; it is in keeping with Tanzania's development policies, which tend to seek system stability by strengthening the status quo.

If anything, such simplified diagnoses and the policies arising from them, which treat rural communities as undifferentiated, run the risk of exacerbating rather than addressing existing inequalities. This is exactly why we decided to adopt an intersectionality approach to this research, which focuses specifically on the intersections of 'gender' and 'marital status'.

1.3. INTERSECTIONALITY

Intersectionality addresses the relationships between the multiple dimensions of social identities and subject formations (Crenshaw, 1989; McCall, 2005). It denotes the various ways in which categories such as race and gender organize social relations, as well as reinforce and mutually constitute each other (Shields, 2008). In this chapter, when we use the word intersectionality, we mean that gender and other social categories such as marital status interact to shape people's experiences of climate change. Marital status is a non-static social category that structures the social (gender) relations, rights and duties, especially of women. We understand gender, intersecting with the category of marital status, as discursively produced (Butler, 1990; Francis, 2008) and manifested in women's and men's concrete actions (Nayak and Kehily, 2006). While women and men discursively produce and reproduce their gender subjectivities through everyday practices, they are nevertheless able, as subjects, to negotiate these subjectivities through subversive acts and speech (Foucault, 1978).

Although climate scholars do take gender into account, most do so in a way that differentiates the climatic impacts on allegedly homogeneous categories of women and men, rather than analyzing how weather-related changes are likely to affect different types of women and men. Gradually, however, more research is emerging that addresses gender in a more nuanced way. In what follows we give an overview of studies on agricultural water management and livelihood diversification, starting with those that analyze differences between male- and female-headed households, then followed by those that address the differences among female-headed households.

Chant (1997) argues that women in female-headed households experience poverty – and we could argue vulnerability – differently from women in male-headed ones. While women in female-headed households often have to endure the problem of a limited asset base, women in male-headed ones have less access to and control over the assets *in* the household. Upperman (2000) illustrates how female-headed households are unable to compete with male-headed ones in accessing irrigation water in northern Tanzania mainly because they lack certain resources, such as time, and have weaker social relations with the male water guards. The evidence on land titling, however, shows female-headed households occasionally able to reap the benefits of their greater independence. Englert (2008) illustrates this point in her study on land access among the Luguru people (Morogoro Region). She found that even when women

are aware of their rights to joint land registration,[45] they tend to be hesitant about claiming these rights in case their husband takes it as a sign that they plan to leave the marriage. In other words, women are likely to prioritize marital harmony over their individual land rights (which is in line with our findings in chapter 6 where we describe the strong normative ideal of household harmony and cooperation). Englert's findings illustrate, first, that since unmarried, divorced and widowed women find it *easier* to buy land in their own right, marital status indeed plays a crucial role in women's access to land rights and, second, that a married woman's access to resources such as land depends on the nature of her relationship with her husband.

The literature also examines livelihood diversification from the vantage points of male- as opposed to female-headed households. As an adaptive strategy, livelihood diversification can take many different forms: for example, it can be seasonal or permanent; it can entail non-farm income earning activities; or it can take the form of casual work on other people's farms. Ellis and Mdoe (2003) describe how the proportion of non-farm income and overall household welfare seem to go hand in hand in contemporary developing countries. They find that the better-off households generally diversify their activities into salaried employment or small-scale enterprises such as brick making, shopkeeping and transport, while the poorer households tend to engage in casual wage labour on other people's farms and remain more dependent on agriculture. Also, evidence among the Maasai in northern Tanzania suggests that men are generally supportive of their wives' business efforts and help their spouses secure the required start-up capital (Smith, 2014). This is a form of material support that female-headed households often lack.

Taking the analysis deeper by comparing different types of female-headed households (Chant, 1997; Handa, 1994) offers us an intersectional gaze into climate change research, which in turn guards against overgeneralizing or simplifying complex local realities, and consequently wrongly informing policy (Arora-Jonsson, 2011; Holvoet and Inberg, 2014). Some studies have analyzed how women's marital status – one level of intersection – influences their access to land, water, jobs and other resources. Rwebangira (1996), for instance, argues that Tanzania's laws in practice penalize women for remaining in a marriage until their spouse's death. A divorcee can expect a division of matrimonial assets of up to 50 per cent, while a widow often gets nothing at all because she can only inherit in the event of there being no male children or male relatives (see also chapter 6 and Dilger, 2006).[46] A woman's entitlements can also depend on her status

[45] In accordance with Tanzania's National Land Policy and Village Land Act of 1999, as we will discuss in detail in chapter 6; see also McAuslan (2010) and Peterman (2011).

[46] As will be discussed in detail in chapter 6, Tanzania's inheritance law is legally pluralistic, consisting of customary,

as a married woman. For example, a study in western Kenya found that widows still benefit from their status as *once-married women* to access marital resources (Mutongi, 1999). Mutongi found that widows displayed their grief in public as a way of emphasizing their (past) marital achievements and thus their claim to the (marital) support to which they are still entitled. Elderly single women, however, could not rely on such a strategy. Marital status – especially for women – automatically brings certain entitlements and socio-economic returns that have repercussions in terms of adaptive capacity. We also recognize the importance of differentiating between *de facto* and *de jure* female-headed households, for the former can often rely on male labour remittances to mediate their vulnerability (Klasen et al., 2015). However, in this research we cannot take into account the category of *de facto* female-headed households because temporary labour migration was fairly rare in the villages we studied as they are sufficiently close to Morogoro Town or to other sites (for example Mzumbe University) where there is a demand for casual and permanent wage labour.[47]

Scholars have looked at the intersections of gender, poverty and landlessness in relation to gaining access to water (Harris, 2008), and of class, age, education, credit and household headship in terms of broadening or narrowing women's attempts to diversify their livelihoods (Huynh and Resurrección, 2014). Huynh and Resurrección found that well-off women were more likely to enter self-employment, while those who were poor were more likely to engage in less lucrative and irregular waged labour activities. Not all female-headed households are equally well adapted, so it is therefore crucial to distinguish between the different types of female-headed households (Klasen et al., 2015).

One study undertaken in Tanzania and Kenya, which focused specifically on the position of married women in male-headed households, found evidence of the use of an increasing level of intra-household specialization as an income diversification strategy at the household level (Eriksen et al., 2005). It worked as a successful coping strategy to ensure a steady income during periods of drought, especially if the husband engaged in casual labour or charcoal production. Women were often unable to devote longer periods of time to specialized non-farm activities because of their domestic duties and because they had to bear the brunt of responsibility for

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Islamic and statutory law, and including specific ordinances such as the Indian Successian Act and the non-Christian Asiatic Succession Ordinance. The country's Law of Marriage Act (LMA) of 1971 regulates the division of matrimonial assets and the custody of children in cases of separation or divorce. Section 114(2) prescribes that marital property must be divided according to a spouse's contributions – that is, property acquired through joint effort must be divided equally. However, there is a lot of discussion on the interpretation of this section (Rwebangira, 1996).

[47] Although not visible in the quantitative data, some of the few de facto female-headed households across the villages have been included in the study through qualitative interviews.

many agricultural tasks. Moreover, custom precludes women from engaging in certain economic activities (Smith, 2014). Consequently, married women in male-headed households risk becoming more dependent on men. This is because 'if an individual who had specialized in one activity ceased to contribute to the household economy, the remaining members become more at risk' (Eriksen et al., 2005: 301).[48]

[48] In terms of intrahousehold bargaining theory (see chapter 6), this could especially be problematic in case of marital break-up or when moving to a non-cooperative equilibrium inside the household. For if women specialize in on-farm activities while their husbands do not, their perceived contribution to the household risks becoming less visible, and hence their intrahousehold bargaining power more constrained (see also chapter 7).

2. RESEARCH METHODOLOGY AND CONTEXT

In this study we use a mix of qualitative and quantitative methods to triangulate the data and research findings. We draw on both primary and secondary sources, including meteorological data obtained from the Tanzania Meteorological Agency and academic literature. The primary data collection occurred in three stages and involved the collection of both qualitative and quantitative data. The first round of exploratory field research, which took place between September and November 2013, included interviewing key informants and experts, as well as consulting local researchers to ensure construct validity of the research findings and to elicit input for the design of the questionnaire. The second phase involved qualitative data collection, in particular faciliated group discussions (held between March and May 2014). The 41 group discussions, which were either women-only or men-only with three to seven participants per group, were held in Swahili and facilitated by trained local university graduates. Using participatory approaches such as drawing, Venn-Diagram ranking and scoring, the participants aired the livelihood challenges they faced in their villages and discussed what strategies they could appropriately employ to respond to those challenges. The selected participants were made up of a range of household types and marital statuses and all were at least partially engaged in farming. To ensure spatial representation of the participants, group discussions were organized in all the administrative subvillages, each providing a local chairperson to assist in the selection procedure. The qualitative data provided input for the household questionnaire organized in July–August 2014 (the third phase of data collection). The household survey consisted of a random sample of households from each of the four villages being studied. Apart from the requirement that the respondents had to be involved in farming, the selection also entailed proportional representation across subvillages by estimated number of inhabitants. The aim was to include about 65 per cent of married or cohabiting households among the respondents.[49] Where the household consisted of a couple, the husband and wife were interviewed separately. A total of 844 respondents were included in the questionnaire, of whom 686 were married (340 complete couples) while 159 (114 females and 45 males) comprised single-headed households. Six local enumerators received a five-day training and undertook the questionnaire interviews in Swahili. Furthermore, participants received a small payment as compensation for the time spent participating in the research. Qualitative data were coded

[49] This share of 65 per cent was a target applied for reasons of sample size. In villages where more single-headed households were encountered, relatively more of them were interviewed and vice versa. On average, across the four villages, 68.3 per cent of households interviewed consisted of married or cohabiting respondents.

(open and axial) and analyzed using Nvivo-software. Questionnaire data were analyzed statistically in SPSS via cross-tabulation, t-tests and logistic regression.

From the group discussions, we selected two adaptation strategies for discussion in this chapter; these are livelihood diversification and agricultural water management (with the latter including both irrigation and valley farming). Our respondents saw both strategies as important responses to climate unpredictability, dry spells and drought. We asked the group discussion participants, differentiated by gender into 16 male and 25 female groups, to identify what problems threatened their livelihoods. Only one group (a male one) disagreed that weather or climate-related issues presented a problem. The other 40, however, went on to discuss potential and actual solutions to, or strategies for coping with, climatic threats. As a group, the participants attributed a score of 0 to 10 to each of the different strategies available to protect themselves from the effects of climate change (the higher the score the greater its perceived effectiveness). During their discussions, the participants used beans or small stones to tot up the scores, which gave them the flexibility they needed to alter them as the talks progressed (Chambers, 2008), though of course the final scores were more illustrative of a particular viewpoint than an objective number.

Table 18 in the Appendix to this chapter provides detailed information on the basic characteristics of the sample, which includes the frequencies of the relevant explanatory socio-economic variables in each given marital status. The table shows that the widows in the sample, in particular, tended to lack education, whereas the majority of the other categories had at least passed Standard 7 (that is finished primary school). Furthermore, the never-married women (23.10 per cent), never-married men (40 per cent) and divorced women (17.50 per cent) were the households most likely to depend *exclusively* on rented farmland. The commercial farmers, on the other hand, tended to be single men (13.3 per cent), divorced men (10 per cent) and married women (8.70 per cent).

2.1. STUDY SITE

The four villages we studied belong to the Ngerengere sub-catchment of the Ruvu River Basin and they are located in the Morogoro Region of Tanzania (Mvomero and Morogoro Rural Districts). We selected two neighboring rural villages (Kiwege and Sinyaulime) and two neighboring semi-rural ones (Vikenge and Changarawe). The latter pair are located closer to Morogoro Town and a local university (Mzumbe University). We selected the villages to represent a variation in access to infrastructure and the labour market, as well as the degree of heterogeneity in the composition of their populations (in terms of ethnicity, occupation and

wealth). It is possible to extend the study findings to other rural areas in Tanzania that show similar socio-economic and gender relations and face comparable climatic challenges. Our research findings are therefore especially relevant (in terms of external validity) to other rural areas of the Morogoro Region and the Wami-Ruvu River Basin. Below, we describe the study area and its climatic data in greater detail.

The future effects of a changing climate are uncertain in the Morogoro Region of Tanzania. Given the bimodal rainfall pattern in at least part of the region, the potential exists for an increase in rainfall. However, it is also possible that the area will evolve towards a more unimodal rainfall pattern and therefore see a decrease in rain (Paavola, 2008; United Republic of Tanzania, 2014: 21). Generally, the region is expected to experience a warmer, longer dry season and worsening periods of drought. Moreover, the flow of water in the Ruvu River is likely to diminish; its minimum flow during the dry season is expected to be less than half of what it is today (IPCC, 2014; Paavola, 2008; United Republic of Tanzania, 2007).

Table 15. Trend in monthly decrease and increase in rainfall (mm) in Morogoro Town

Period	J	F	M	A	M	J	J	A	S	O	N	D	Yearly
1971–2013	-		+		-	-	--		-				-
2004–2013	-	-	---	-	++	-	---	-		-	-		--

- and + if R^2 is between 0.01 and 0.1; -- and ++ if R^2 is between 0.1 and 0.2; --- and +++ if R^2 is bigger than 0.2.

Source: analysis based on rainfall data from the Tanzania Meteorological Agency; reporting format based on Huynh and Resurreccion, 2014.

The rainfall data for Morogoro Town (see Table 15) indeed indicate increasing climate variability. Between 2003 and 2013, the meteorological agency measured both the two lowest and the highest yearly rainfall readings since recordings started in 1971. Furthermore, the data show a declining trend in mean yearly rainfall since the 1970s. Paavola (2008) observed the same trend. Moreover, Table 15 suggests that changes in rainfall were more pronounced in the last decade (compared with the 1971–2013 period), especially decreasing in March and July, increasing in May and slightly decreasing in the other months (except September and December, which

remained constant). The data suggest more concentrated rainfall in a shorter period of time; a later onset of both the short (*vuli*) and main (*masika*) rainy seasons, which usually start in October/November and February/March respectively; and decreasing rainfall during the *vuli* rainy reason. The following quotation from a participant (Sinyaulime, FG2m) in a group discussion illustrates this point:

> "I don't know what God is thinking of our village. We used to have short rain and long rain. Now, the short rain has disappeared and the long rain has turned into short rain. Only one rainy season is left. … Even when it rains, it rains very heavily and all that was being cultivated is carried away."

Group discussions conducted at the study site show that farmers defined the weather related problems they faced as climate variability; unpredictable rainfall; increased occurrence and severity of drought; less rainfall during the October–December rainy season (*vuli*) and, to a lesser extent, higher temperatures ('strong sun') and increased occurrences of floods and heavy rainfall.

3. FINDINGS AND ANALYSIS

In this section, we first outline the reasons for and importance of the two climate change adaptation strategies we selected. Next, we rely on statistical analysis to differentiate the farmers by gender and marital status and compare their adoption of agricultural water management and livelihood diversification strategies. From these results, we develop an adaptation typology to demonstrate access to adaptive strategies by gender and marital status.

3.1. FARMERS' ADAPTATION PREFERENCES

In this section, we draw attention to the respective weights given during group discussions to the two adaptation strategies discussed in this chapter. The farmers emphasized the importance of using valley land for *agricultural water management* because it is both where irrigation is possible through digging traditional wells and where the soil holds more moisture.[50] As one farmer (Changarawe, R1m) explained, "I am going to the valley to grow short seeds. In the valley water will be available for these 60 days. When the last month of the rainy season gets dry, at least in the valley the maize will not be destroyed."

Of the 40 group discussions that considered climate change an issue, 11 and 12 respectively raised the strategies of irrigation and valley farming (see table 16). The female groups raised the strategy of valley farming slightly more frequently (36 per cent) than the male groups (20 per cent), but men and women mentioned irrigation equally often. On average, these groups gave the agricultural water management strategies scores of 8.36 and 6.41 respectively out of a perceived effectiveness scale of 10. Men and women ranked the practices similarly, but women gave lower scores, especially to irrigation (5.79 compared with an average 7.50 among the men). Valley farming was the strategy that scored highest, with men and women attributing it 9.33 and 8.00 respectively. The groups that gave high scores to valley farming generally argued that it was the longest standing and most tried and tested method of farming in the area – you have to farm in the valley to ensure at least some harvest. Low scores for valley farming generally meant that such land was inaccessible to some farmers and that even in the valley crops wither during periods of extreme drought. The groups that gave lower effectiveness scores to irrigation generally did so on the grounds of its high cost, insufficient availability of water and because the practice was not accessible to everyone, or at the times when it was most needed. High scores

[50] Valleys are the preferred areas for planting crops during seasons when drought is expected, while highlands are the preferred option when floods are expected.

for irrigation were mainly given by those who had access to it and they emphasized enjoying the security of getting a good harvest.

Table 16. Frequencies and scoring of adaptive practices

	Groups mentioning the strategy (absolute number and %)			*Average perceived effectiveness score attributed to the strategy (out of 10)*		
	Total[a]	*Female*[b]	*Male*[c]	*Total*	*Female*	*Male*
Non-farm activities	20 (50%)	16 (64%)	4 (27%)	7.32	7.07	8.25
Valley farming	12 (30%)	9 (36%)	3 (20%)	8.36	8.00	9.33
Irrigation	11 (27%)	7 (28%)	4 (27%)	6.41	5.79	7.50

Notes: [a] as a percentage of the total of 40 groups that considered the climatic condition as problematic; [b] out of 25 female groups; [c] out of 15 male groups.
Source: analysis based on group discussions.

With respect to *livelihood diversification*, the participants in the group discussions drew attention to the fact that rainfall patterns were becoming less and less predictable and that having to depend solely on farming was becoming increasingly risky. As one farmer (Kiwege, FG1m) pointed out, “there used to be two seasons of rainfall, but these days you don’t know when to cultivate anymore. The cultivation season can just pass by [without you growing anything].” In other words, the importance of (at least seasonal) livelihood diversification is becoming increasingly evident. In half of the group discussions, non-farm income-earning activities were mentioned as an adaptation strategy; however, significantly more women (64 per cent) than men (27 per cent) favoured that option. The overall average score out of 10 given for the perceived effectiveness of this strategy was 7.32. The women on average rated it at 7.07, while men placed it slightly higher at 8.25. This might be because men can expect higher returns than women from their involvement in non-farm activities. Those assigning a higher mark tended to do so because they believed that the potential pay-off would be more lucrative and that it was the way forward. Those choosing a lower one usually did so because they thought that non-farm activities earned them less money than agriculture and because the kinds of small businesses available to them rarely attracted more than a few customers. This was especially pertinent to the female respondents, who complained of the high levels of competition among

women offering the same or very similar products and services. The women, however, often admitted that, if they wanted to improve their livelihoods, they had no alternative but to try their luck with alternative work.

A farmer's appreciation of these strategies does not, of course, automatically lead to their adoption. Because some types of farmers find it more difficult than others to implement these practices, we shall now, in the next few paragraphs, look at their discrepant adoption rates through the lens of the farmers' various marital statuses.

3.2. ADAPTATION THROUGH AGRICULTURAL WATER MANAGEMENT

3.2.1. VALLEY FARMING

The questionnaire data from the four villages showed that 78 per cent of female household heads had access to valley land versus 84 per cent of male single-headed households and 89 per cent of married couples. Compared to married households, of which 66 per cent use the combination of lowlands and highlands, single-headed households are disadvantaged in terms of concurrent access to both types of farmlands (47 per cent for both male and female heads). Logistic regression (a in Table 17) controls for the extent of a respondent's farming involvement (occupation) and shows that female divorcees and widows are respectively 71 and 66 per cent less likely than married women to have access to valley land. There are no significant differences in the likelihood of using valley land between either married and single women or married women and the male categories. This indicates that certain categories of female-headed households – namely widows and female divorcees – have less flexibility in choosing where to plant their crops. Their lower adaptive capacity in terms of agricultural water management thus makes them more vulnerable to the impacts of climate change. Moreover, hardly surprisingly, the respondents who did not consider agriculture their primary occupation were 63 per cent less likely than subsistence farmers to use valley land.

Table 17. Logistic regression results with dependent variables 'valley farming', 'irrigation' and 'non-farm activities'

		a. Farming land in the valley			b. Irrigation of farm			c. Non-farm income-earning activities		
		B	**S.E.**	**Exp (B)**	**B**	**S.E.**	**Exp (B)**	**B**	**S.E.**	**Exp (B)**
Constant		2.127***	0.180	8.392	-1.215***	0.256	0.297	-0.391	0.447	0.676
Household type	Married female				-0.634**	0.199	0.530			
	Married male	0.287	0.265	1.332				1.936***	0.204	6.932
	Unmarried female	-0.439	0.577	0.644	-1.223	0.658	0.294	0.307	0.444	1.359
	Unmarried male	-0.241	0.788	0.786	0.737	0.601	2.090	2.027**	0.690	7.588
	Widowed female	-1.084**	0.380	0.338	-0.432	0.391	0.649	0.314	0.375	1.368
	Widowed male	-0.616	0.819	0.540	-1.138	1.093	0.320	0.983	0.749	2.671
	Divorced female	-1.240**	0.390	0.289	-1.049*	0.490	0.350	1.049**	0.383	2.855
	Divorced male	-0.803	0.588	0.448	-0.441	0.668	0.643	2.303***	0.566	10.003
Occupation	Commercial farmer	0.783	0.611	2.187	1.294***	0.317	3.646			
	Non-agricultural	-0.991**	0.365	0.371						
Village	Vikenge				0.383	0.247	1.467			
	Kiwege				-0.969**	0.327	0.380			
	Sinyaulime				0.897**	0.265	2.451			
Land ownership	HH rents land				0.253	0.264	1.288			
	HH owns and rents				0.942***	0.237	2.566			
	HH uses land for free				-0.977*	0.484	0.377			
Age	26–49 years old							0.780**	0.290	2.182
	50–69 years old							-0.305	0.331	0.737
	70+ years old							-0.901*	0.402	0.406
Education	Primary finished							-0.568	0.380	0.567
	Primary not finished							-0.649	0.452	0.522
	No formal education							-0.923*	0.410	0.397
		R^2 = 0.035 (Cox and Snell); 0.066 (Nagelkerke). Model chi^2 = 29.56 (p < 0.01**).			R^2 = 0.139 (Cox and Snell); 0.206 (Nagelkerke). Model chi^2 = 117.86 (p < 0.001***)			R^2 = 0.217 (Cox and Snell); 0.289 (Nagelkerke). Model chi^2 = 191.07 (p < 0.001 ***)		

Respondents with non-agricultural activities as their primary occupation were excluded from the analysis (regression b and c).

Significance: *** if p < 0.001 ; ** if p < 0.01 ; * if p < 0.05 **Reference categories**: Household type: married women for regression a and c, married men for regression b; Occupation: small-scale, subsistence farmer; Village: Changarawe; Land ownership: household that only owns land; Age: 15–25 years; Education: secondary education or higher.

Source: own analysis based on questionnaire data.

3.2.2. IRRIGATION

Furthermore, questionnaire data show that unmarried (single) men have the highest likelihood of irrigating (46.70 per cent), followed by married (27.10 per cent) and then divorced (25 per cent) men. Of those indicating that they irrigate their farms, 67.4 per cent claim to do so with buckets, 21 per cent with a pump and hose, and 11.6 per cent with irrigation channels. Married men are the most likely to use a pump and hose, while unmarried men are most likely to use buckets. Logistic regression b in Table 17 investigates in more detail which groups of men and women are more likely to irrigate their farm, controlling for a respondent's type of land ownership and village. The results suggest that the difference in use of irrigation between men and women is mainly because divorced and married women are significantly less likely to use it than married men (the latter being the reference category in the logistic regression). More specifically, divorced women are 65 per cent less likely and married women 47 per cent less likely to irrigate their farms than married men. While we expected to see evidence of a disadvantage in female-headed households, the results show no significant differences between the different female groups (when taking married women as the reference category). Nevertheless, it is reasonable to assume that when married women are not irrigating, their household plot is being irrigated by their husband (as household plots are the dominant type of land use in Morogoro). This assumption was confirmed in group discussions and it is therefore likely that the statistical analysis underestimates the differences between married women and female-headed households.

Next, the regression analysis shows that the more commercial farmers (defined as those selling at least half of their harvest) are 3.6 times more likely to irrigate their farms than subsistence farmers (who sell less than 50 per cent of their harvest). This is hardly surprising given that commercially directed farmers usually have more means at their disposal and can therefore more easily afford irrigation (for example by buying a pump). The village in which a farmer lives is also an important predictor of the use of irrigation and can be understood as a proxy for the irrigation infrastructure (for example there is a river nearby, pumps are available and the Irrigation Board functions). Finally, respondents who live in a household that both owns and rents land are more likely to irrigate their farms, while respondents living in households that use land for free (but land that others, such as relatives or the military, own) are less likely to irrigate their farm. The existence of restrictions on the use of land they do not own or where, for example, they are not allowed to dig a well, or an unwillingness to invest in the land because there is uncertainty about its future use might explain the latter finding. It is thus clear that, in

terms of irrigation, major intersections cut through the lines of marital status, commercial-mindedness of the farmer and the type of land ownership.

3.3. ADAPTATION THROUGH LIVELIHOOD DIVERSIFICATION

3.3.1. NON-FARM ACTIVITIES

In keeping with the literature, we found evidence of differences between men and women in the field of livelihood diversification, especially in terms of access to non-farm income-earning activities, including wage labour, casual work in maintenance or the transport sector, business, shopkeeping and charcoal production. In the four villages more than half the respondents (53.9 per cent) engaged in non-farm activities. Cross-tabulation showed men especially likely to do so – in fact, 80 per cent of unmarried men, 75 per cent of both divorced and married men, and 40 per cent of widowers. The figures are lower among women – 50 per cent of divorced and unmarried women, 35 per cent of married women and only 28 per cent of widows. Logistic regression (c in Table 17) shows that, compared with married women, controlling for age and educational level, all the male categories, with the exception of widowers, are more likely to engage in non-farm activities – with male divorcees, unmarried men and married men respectively 6.9, 10 and 7.6 times more likely. However, the regression results indicate no significant differences between married women and widows or unmarried women. Only female divorcees are significantly more likely than married women to engage in non-farm activities – or more specifically, they are 2.8 times more likely. Although female divorcees are more vulnerable in terms of access to valley land and irrigation, these women protect their families' welfare by undertaking activities outside farming.

Furthermore, our analysis shows that respondents without any formal education are 60 per cent less likely to engage in non-farm income-earning activities than those who have completed their secondary education or gone on to a higher level. This suggests that education increases a person's option to diversify his or her livelihood. Moreover, the respondents in the reproductive age group, those aged between 26 and 49, are most likely to be involved in non-farm income-earning activities (2.2 times more likely than those aged 25 or younger). Conversely, respondents aged 70 or above are significantly (60.3 per cent) less likely to engage in such non-farm activities. Since the other socio-economic dimensions made no significant contribution towards explaining why respondents engage in non-farm income-earning activities, we must infer that intersectionality for this practice is mainly manifested through social differences in education, marital status and age (life cycle).

3.3.2. OFF-FARM CASUAL LABOUR

We also find differences between men and women when we look at off-farm casual labour – that is working on other people's farms in return for money or food. This tends to take place either during the preparation of the farm, which is very labour intensive because of dependence on the hand hoe, or during harvesting. The questionnaire results revealed that men are more likely than women to engage in off-farm casual labour. More specifically, logistic regression showed that, compared with married women (the reference category), only widowers and male divorcees are significantly more likely to engage in casual farm labour. In other words, we found no evidence of significant differences among the different categories of women or female-headed households. Furthermore, we found that compared to the over 70s, all other age categories are more likely to work on other people's farms.

4. DISCUSSION

Figure 5 is a synthesis of the influence of the intersections of gender and marital status on a farmer's positioning in terms of adaptive strategies. In this section, we depict how the interplay between gender and marital status constrains and facilitates a person's access to each of the two adaptation strategies. We also confirm previous research that shows that while marital status is highly relevant for women, it is less so for men.

Figure 5. Typology of access to adaptive strategies by marital status

	LOW agricultural water management	HIGH agricultural water management
LOW livelihood diversification	Widows	Widowers Married women Unmarried women
HIGH livelihood diversification	Divorced women	Divorced men Married men Unmarried men

Source: own analysis.

We based Figure 5 on the results of our logistic regressions to show two adaptation dimensions – adaptation in agricultural water management (a combination of valley farming and irrigation) and in livelihood diversification (both non-farm income-earning activities and off-farm casual work). For each adaptation dimension we distinguish relatively high and low levels of adoption by gender and marital category. We assume that farmers who invest in both practices have a higher adaptive capacity because they are more effectively able to spread the risks induced by climate change. The typology illustrates the typically vulnerable position of widows on the 'low–low' spectrum and men's strong position, with the exception of widowers, at the 'high–high' end. The latter, together with unmarried women, are typically found on the 'high agricultural water management' but 'low livelihood diversification' spectrum, while female divorcees find themselves in the opposite compartment. We find married women's position more ambiguous

in terms of agricultural water management, while their individual levels of livelihood diversification are clearly lower than those of their husbands.[51]

4.1. AGRICULTURAL WATER MANAGEMENT

Female divorcees and widows, who are the most likely to face challenges in the area of agricultural water management, have less access to valley land largely because they cannot depend on a husband to secure their land rights (see Rwebangira, 1996). Group discussion data showed that they were not foregoing their land or irrigation rights by choice, for they displayed a distinct interest in these safety nets and opportunities to improve their harvests. As one participant in a group discussion comprised of female divorcees (Sinyaulime, FG9f) put it, "irrigation is very helpful to us: it works as our husband and gets us something to eat."

Unmarried women, by contrast, take on relatively more agricultural water management, but this is more to do with their being valley farmers than with them engaging in actual irrigation activities. The position of wives is more ambiguous, however, because their relationship with their husband mainly determines their access to agricultural water management. Although they are often the ones who implement the farm work, through for example irrigating, they lack independent access to, or control over, the household resources. The male is generally the legal owner of the land, with joint titles being rare in the sites of our study. This is hardly surprising given that only a few households (4.5 per cent of the 670 respondents who owned land) reported having a land title at all.[52]

4.2. LIVELIHOOD DIVERSIFICATION

For most of the women, who work under domestic labour constraints and bear the brunt of responsibility for agricultural tasks, it is a challenge to find time to embark on specialized non-farm activities (Eriksen et al., 2005). Our adaptive capacity typology shows that *widows* are disadvantaged not only in the area of agricultural water management but also in terms of their access to non-farm activities. There are several reasons for their lack of involvement in non-farm and off-farm activities, including old age and lower educational attainment (see table A1, which shows that their average age is 60 years and 51 per cent are without formal education).

[51] Note that chapters 6 to 8 aim to provide more insights into married couples' intrahousehold relations and decision-making about climate change adaptation.

[52] See also chapter 6 for more details on land access and control in marriage, and its relation to Tanzanian women's intrahousehold bargaining power.

Furthermore, the questionnaire revealed that, while an average of 18.2 per cent of all respondents received food support, widows and widowers (38.3 per cent and 40 per cent respectively) are the groups most likely to have to depend on support from government and relatives for food. In group discussions, widows and widowers said that their children mainly supported them, both financially and in kind. In line with earlier findings for Kenya (see Mutongi, 1999), elderly parents usually saw it as their right to receive support from their children. For instance, one elderly woman (Vikenge, hh61f) when asked 'who bears family responsibilities when there is a drought?', replied "all of my children … cooperate and … do it several times, *but you do not see us asking them for help*. Still, they send us stuff like food or money. Even as they work hard and have their own duties, they tend to remember us." Elderly respondents mentioned that they would find it embarrassing to have to *ask* for support, but nonetheless considererd it their legitimate right to receive it and in fact readily depended on it. We can thus assume that the legitimate claims of widows and widowers for support from their children and the government partly compensate for their compromised position; in fact, this key adaptive strategy utilized mainly by widows is less open to other groups. The *unmarried women*, like the widows, also depend mostly on farming, but cope with agricultural water management more successfully. Also like the widows, though to a lesser extent, the unmarried women stated that the material support and food that they occasionally received from their parents and/or the father of their child or children (23.1 per cent relied on occasional food donations) played an important role in their capacity to cope.

While the *female divorcees* coped less well with climate change in terms of agricultural water management, they engaged more in non-farm activities than the other categories of women. Huynh and Resurrección (2014) reached a similar conclusion when they established that, in attempting to support their families, female household heads were more likely than women in male-headed households to diversify their livelihoods through wage labour. Here, factors other than access to money also play a part; in particular level of education or individual skills. For instance, one entrepreneurial female divorcee (Vikenge, int.7f) spoke proudly of her very successful business in Changarawe village:

> "I used to trade cotton, bringing it from the local farmers. Then I shifted to my business of selling vegetables. Now I am also paying some labourers in Konga village to help me in producing and selling bricks and I am keeping chicken. There are not many people selling clay bricks now, so it is a good activity. I am always changing my activity according to the environment. If there are too many people doing the same business, it won't work and you don't gain much."

However, qualitative evidence suggests that the accomplishments of female divorcees are often less profitable than the more diverse activities of men, probably because they have less capital to invest in a small business. This is in contrast to women in male-headed households who, if they engage in non-farm activities, can often rely on financial support from their husbands (see Smith, 2014). This tradeoff between the advantages of financial support within marriage and decision-making autonomy outside marriage, which often encourages independent business activity, is illustrated by one female divorcee (Changarawe, hh.102f) who had a small business selling food and spoke about being in charge of decision-making:

> "It is easier for me because I am living alone and I am free. But at other times it is difficult for me to handle all of my family problems alone, this can also make decisions more difficult. … For other women [married women] it is more difficult because they need to ask permission from their husband if they want to sell anything."

The logistic regression results on *married women* confirm the earlier findings of diversification at the household level and specialization at the individual level. The men typically diversify into non-farming ventures (usually in addition to their agricultural activities), whereas the women usually become or remain the main farmers within the household (Eriksen et al., 2005). The constraints that child care and domestic labour impose on a married woman's time (see average number of children in table A1), as well as the reluctance of some husbands to allow their wives to work outside the home, can explain why married women are less involved in non-farm work. Several female interviewees spoke of their husband's reluctance to allow them to work away from the farm and their attempts to change their minds by using 'sweet words' and conjuring up images of a future with improved welfare provisions. (A more detailed account is offered in section 2 of chapter 6, where we describe the intrahousehold decision-making process and mechanisms through which spouses deal with internal disagreement.)

5. CONCLUSIONS

In this chapter, we have drawn some conclusions about how small-scale farmers in the Morogoro Region of Tanzania are adapting to climate change. First, because the interplay between gender and climate change is so complex, it is important to guard against any temptation to view 'men', 'women', and 'female-headed households' as homogeneous categories and fail to recognize their differential interests and/or access to adaptive strategies. We found that the farmer's marital status was an important factor in determining how various socio-economic and gendered entitlements, such as access to resources and receiving material support from family members, were likely to play out. For example, married, unmarried, divorced and widowed men and women each confront different barriers and opportunities in their attempts to adapt to climate change. We also noted that a woman's position within the adaptation typology (that is her access to adaptive strategies) depends more on her marital status than does a man's, for a married man's adaptation position does not typically worsen when he leaves the marriage.

This chapter has made several contributions to existing writings and practices. It adds a critical understanding to the gender and climate change literature by emphasizing that, if we are adequately to capture and understand farmers' differentiated needs and capacities, it is not enough to focus on a simple gender-based dichotomy. Borrowing from feminist scholars such as Crenshaw (1989), we argue in favor of a 'differentiated' gender approach that simultaneously studies the interplay of gender and other categories such as age, class and marital status (see Huynh and Resurrección, 2014; Smith, 2014). Our findings are particularly relevant and timely in the face of a growing plea for gender mainstreaming in climate change policies and implementation (see for example UNDP, 2011). In this context, it is important to warn against an overly narrow version of gender mainstreaming that disregards intersections with other dimensions, for that might eventually lead to ineffective policies and the further marginalization of certain groups of women and men. Findings from chapter 3 suggest that Tanzania's current climate change policy documents are at risk of doing just this. The proposed typology can help policy makers broaden their understanding of farmers' differential needs and allow for more precise targeting. Furthermore, by unveiling intersecting drivers of vulnerability and adaptive capacity, an intersectionality perspective can feed into more 'transitional forms of adaptation' that move beyond technological fixes and seek to address the social equity dimensions of climate change (Pelling, 2011; Smucker et al., 2015).

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APPENDIX

Table 18. Some socio-economic characteristics of sampled households by marital status and gender

	Married female	Married male	Single female	Single male	Widow	Widower	Divorced female	Divorced male	Total
Average age of respondent	41,30	49,10	34,30	27,30	59,90	74,50	51,20	54,30	**46,20**
Average number of household members	4,95	4,93	3,96	1,40	4,04	2,90	3,52	3,00	**4,66**
Average number of children younger than 18 in household	2,40	2,39	2,15	0,00	1,91	1,00	1,95	1,20	**2,25**
No formal education (%)	30,30	16,30	11,50	6,70	51,10	20,00	38,50	30,00	**25,10**
Primary not finished (%)	7,00	10,90	3,80	13,30	12,80	30,00	10,30	15,00	**9,50**
Primary finished (standard 7) (%)	59,50	62,70	65,40	60,00	34,00	50,00	48,70	55,00	**58,80**
Secondary or higher (%)	3,20	10,10	19,20	20,00	2,10	0,00	2,60	0,00	**6,60**
Household owns land only (%)	63,60	57,10	61,50	46,70	68,10	80,00	62,50	63,20	**61,00**
Household rents land only (%)	15,20	15,50	23,10	40,00	8,50	10,00	17,50	5,30	**15,40**
Household owns and rents land (%)	18,10	19,20	15,40	13,30	19,10	0,00	15,00	26,30	**18,30**
Household uses land owned by others (for free) (%)	3,20	8,20	0,00	0,00	4,30	10,00	5,00	5,30	**5,30**
Subsistence farming (%)	88,60	84,00	92,00	80,00	95,70	90,00	92,50	90,00	**87,30**
Commercial farming (%)	8,70	4,40	4,00	13,30	4,30	0,00	2,50	10,00	**6,30**
Main occupation is not farming (%)	2,60	11,70	4,00	6,70	0,00	10,00	5,00	0,00	**6,40**

Source: analysis based on questionnaire data; percentages are column %.

CHAPTER 6

INTRAHOUSEHOLD BARGAINING POWER AND UNPACKING THE HOUSEHOLD DECISION-MAKING PROCESS

Chapter 6 focuses on intrahousehold decision-making processes. The reader should consider this chapter as a bridging one, introducing the topic of intrahousehold bargaining and decision-making, before we move on to chapters 7 and 8 which explore the intrahousehold decision-making aspects specific to climate change adaptation. Chapter 6 therefore considers a broad range of decision-making domains and processes, without necessarily pinning itself down to decision-making on climate change adaptation. Nevertheless, wherever possible, we pinpoint agricultural and livelihood decisions that are closely related to household adaptation strategies. In the first section of this chapter, we give an overview of the economic intrahousehold bargaining literature and its different models or theories, and connect these to the Tanzanian context. We describe Tanzania's regulations and legislation with regard to marriage, divorce, employment, land and inheritance, and explain how these are impacting women's intrahousehold bargaining power. Compared to other African countries, Tanzania has progressive commitments to gender equality enshrined in its statutory laws (Dancer, 2015). While this is a valuable instrument to pursuing gender equality in access to resources and throughout legislative efforts, we find that on the ground many pitfalls exist that hinder the translation of this commitment into practice.

The second part of this chapter examines women's decision-making participation in Tanzania, and in the Morogoro Region in particular, as well as respondents' discourses surrounding the intrahousehold decision-making process. We first outline what is already known about women and men's participation in intrahousehold decision-making in the Morogoro Region of Tanzania. Next, we draw upon qualitative data collected during the PhD research, to illustrate how respondents speak about decision-making processes in their own households. Based on semi-structured interviews and group discussions, we illustrate respondents' tendency to emphasise household cooperation and family harmony, and we consider into more detail accounts of 'joint' decision-making and which forms this 'jointness' might take.

1. INTRAHOUSEHOLD BARGAINING

In this section, we start by giving an overview of the economic intrahousehold bargaining literature, which is a rapidly expanding branch of literature within feminist economics and development studies. The intrahousehold bargaining literature has become particularly popular since the 1990s when policy failures in various areas (children's education, health, microfinance) were traced back to the ignorance of household decision-making. It was increasingly

acknowledged that the household does not necessarily function as a harmonious neutral intermediary among policy-makers and individuals and that solid knowledge about what was happening inside the black box of the household was necessary for interventions to be effective. This understanding has given impetus to the emergence of two strands of household models that conceptualise household behaviour differently. In what follows, we present these two main household models: the Unitary and the Collective Preference Approach. We also outline some specific models and theories that form part of these approaches. Furthermore, we ask which assumptions these models make with regard to the functioning of intrahousehold decision-making or bargaining, and consequently, which factors are thought to influence women's intrahousehold bargaining power. In section 1.3. we focus on the case of Tanzania in particular, and ask which situations, laws and regulations are in place and how they influence women's bargaining power across the country.

1.1. THE UNITARY APPROACH

The unitary approach has been strongly influenced by classical economic theories and Gary Becker's Household Economics or New Home Economics (Becker, 1981), which project a neoclassical market logic on household functioning. Unitary models assume that the household possesses a single set of preferences and pools resources such as time, labour, and household and market goods, aiming to generate a maximum household utility. An altruistic household head or benevolent dictator is assumed to aggregate individual household members' utility functions into one joint utility function. The objective of the benevolent dictator is to ensure the interests of all household members: his/her individual utility depends positively on the utility of the other household members. Consequently, through the mechanism of interdependent utilities, the dictator's individual utility function is assumed to represent the household's joint utility function (Haddad et al., 1997; Becker, 1981).[53]

It is worth noting that while Becker considered altruism to be the dominant form of behaviour within the household, he expected the same people to behave selfishly outside of the household (i.e. in the market place people focus only on their individual utility maximisation). Consequently, many authors, including Creighton and Omari (1995), have critiqued the way in which the unitary model downplays intrahousehold conflict and the existence of opposing

[53] In this regard, a notable criticism on Becker's theory is that it is based on the assumption of perfect information. That is, for the altruistic household head or benevolent dictator to be able to take into account other household members' preferences, he/she needs to know their preferences. Such full and automatic disclosure of preferences is highly unlikely.

interests in family life (e.g. Rotten Kid Theorem). This critique of the underestimation of conflict in households has given rise to the collective preference approach (discussed below).

Within the unitary approach, the marriage market perspective claims that potential spouses negotiate in a pro-marriage state about the distribution of assets and gains from marriage. As a result of the competition between potential wedding candidates, those who can contribute more assets to the household, are promised higher future benefits from it (Fafchamps et al., 2009). Another explanation for inequality within households relates to bargaining within the household, and this has become the main focus of the collective preference models.

1.2. THE COLLECTIVE PREFERENCE APPROACH

In contrast to the Unitary Approach, the Collective Preference Approach takes into account both the theoretical notions and simultaneous existence of *cooperation* and *conflict*. It acknowledges that household members' preferences cannot simply be presented as an individual utility function of the household head. Rather, the Collective Preference Approach assumes that individual preferences are aggregated at the household level through an intrahousehold bargaining process. The approach consists of a variety of alternative bargaining models that each assume different rules of the bargaining 'game'. Nevertheless, all bargaining models assume that the stronger one's threat point or breakdown position is – i.e. one's well-being level in case the household (cooperation) breaks down (Sen, 1990) –, the better one's relative bargaining power vis-à-vis other household members. Household members will bargain over a range of collusive arrangements, all of which are preferred to the breakdown position by both spouses. At a certain point, only conflict will remain as household members rank the possible arrangements in exactly the opposite way (Haddad et al., 1997; Sen, 1990). However, as Sen stresses, "each person knows that the choice between any such collusive arrangement and the breakdown position is a matter of cooperation since the former is better for [all household members]" (Sen, 1990: 132).

In what follows, we consider first the cooperative, and next, the non-cooperative models that form part of the Collective Preference Approach.

1.2.1. COOPERATIVE COLLECTIVE PREFERENCE MODELS

Cooperative Collective Preference Models assume cooperation in the sense of pooling and joint allocation of resources. Some of the cooperative models assume Pareto-efficiency, i.e. through comparative advantages it is guaranteed that when a husband's opportunity cost of time

increases, his wife's labour is reallocated to the production of household public goods, rather than to market production (Haddad et al., 1997; Holvoet, 1999). Other cooperative models assume that a specific bargaining process is directing household allocations. Specifically, acknowledging that potential spouses cannot pre-commit to a specific distribution of utility within their future marriage implies that the intrahousehold allocation of resources depends on a bargaining process that is conducted during the marriage itself. These models will therefore focus on extra-household factors (or extra-marital environmental parameters, EEPs) that can influence spouses' respective threat points, and therefore their bargaining powers (Manser and Brown, 1980; McElroy and Horney, 1981).

However, threat points are conceptualized differently across cooperative models. The two main categories of threat points are, firstly, the *outside threat* option (i.e. separation from the household or divorce), and secondly, the *inside threat* option (i.e. non-cooperation within the existing household). The former, outside threat point models, assume that when there is disagreement within the marriage, spouses can return to a 'single state situation'. Put differently, the opportunity cost of marriage is the potential utility a spouse can obtain in case of divorce or separation. The single state position is therefore an approximation of the threat point (Manser and Brown, 1980; McElroy and Horney, 1981). The reasoning is that when a woman has better alternatives outside of the marriage, she will be more inclined towards ending her marriage or relationship, especially if the cost of being dominated by her husband is high and the cost of leaving the marriage is low (cf. Feminist Resource Theory: see e.g. Okun, 1986; McCall and Shields, 1986).

Secondly, inside threat point models question the effectiveness of divorce as a threat point in many situations. In some communities it might not be easy for women – or men – to ask for a divorce due to social stigma or divorce regulations. It is thus not a convincing threat if spouses are not really free to leave the marriage due to legal, social and cultural limitations. In other cases, the threat of marital dissolution might not be effective when the costs are disproportional compared to what is at stake in the bargaining process. In small, daily decision-making, threatening with divorce is not credible as its high transaction costs do not make it an attractive option. The inside threat point models therefore assume a non-cooperative equilibrium within the household as the threat point. This means that in the bargaining process, a spouse can threaten with non-cooperation, while remaining in the marriage. Such non-cooperative equilibria can take various forms, for example reduced contributions to the production of household public goods, disproportional use of household funds for one's own expenditure preferences, refusal to have sex, etc. (Fafchamps et al., 2009; Fafchamps and Quisumbing, 2002). The Separate Spheres Bargaining model (Lundberg and Pollak, 1993; 1996) is a form of

Cooperative Collective Preference model with inside threat point. This model is suited to communities where women's and men's everyday experiences are strongly separated. That is, men and women produce different crops, provide labour for different production stages, and have decision-making power over different spheres. In this case men and women are highly specialized along gender lines, have separate fields of decision-making, and consequently take as given the decisions their spouse makes within her/her own domain (Lundberg and Pollak, 1993). This separation might be induced by a desire to minimise coordination and transaction costs within marriage. In accordance with the inside threat point logic, the Separate Spheres Bargaining model predicts that individuals will remain at the separate spheres equilibrium as long as the transfer costs of leaving their non-cooperative equilibrium will be higher than the potential gains from cooperation. When spouses prefer the separate spheres equilibrium, there will typically be no explicit bargaining. However, the division of resources, tasks and time will follow the existing gender norms, roles and tasks (Lundberg and Pollak, 1993). This model thus conceptualises marriage as a cooperative game "but with a threat point that is a non-cooperative equilibrium within marriage, based on traditional gender roles" (Haddad et al., 1997: 9).

Along the same line, Amartya Sen's Cooperative Conflict model conceptualises the household as an institution where members simultaneously face a problem of cooperation and conflict: respectively adding to total household availabilities, and distributing these total availabilities within the household. Sen's model complements other bargaining models by its attention to perceptions and contributions. Sen does not assume clear and unambiguous perceptions of individual interest. He argues that the perception of one's contributions to the overall family well-being determine the legitimacy of one's claim to enjoy a certain share of the fruits of cooperation. That is, the perceived contributor is favoured with regard to the cooperative outcome. Sen labels this the perceived contribution response: "given other things, if in the accounting of the respective outcomes, a person was perceived as making a larger contribution to the overall opulence of the group, then the collusive solution, if different, would be more favourable to that person" (Sen, 1990: 136). In this regard, women are expected to be – on average – disadvantaged as their lower educational status and wage incomes negatively influence their perceived ability to contribute to the economic well-being of the family. This, in turn, worsens their breakdown position and thus their bargaining power (see also chapter 7 on the determinants of women and men's adaptation decision-making power).

1.2.2. NON-COOPERATIVE COLLECTIVE PREFERENCE MODELS

In Non-cooperative collective preference models household members' incomes are not assumed to be pooled, nor are Pareto-optimal outcomes assumed from the start. An example of the non-cooperative bargaining model is the Conjugal Contract Model, which sees households as consisting of autonomous gender-specific sub-economies that are connected by reciprocal claims on household members' income, land, goods and labour (Haddad et al., 1997). The 'conjugal contract' comprises those terms under which household members exchange goods, incomes and services (i.e. the level of intrahousehold transfers). According to this model, women respond to a reallocation of labour – along the lines of comparative advantages –, only if it is compensated by a re-bargaining of the conjugal contract. For example, if a re-bargaining would ensure a higher share of resources being allocated towards the female expenditure sphere. After the transfer level has been fixed, the spouses decide relatively autonomously about how they allocate resources in their own gender-specific economies. In this model, the degree of patriarchy in a society is a key factor determining the terms of the conjugal contract. For example, in case of complete patriarchy when women do not have a voice, the husband is the one who autonomously determines the terms of the conjugal contract. This model is most relevant in situations where spouses have their own separate agricultural plots, there is gender-segmentation at the crop level, and when household members possess separate budgets (Holvoet, 1999). It is therefore unlikely to hold in the Morogoro Region of Tanzania as these conditions are not met. On the contrary, in the region household farm plots are dominant, agricultural tasks not clearly segregated along gender lines and most spouses pool their resources (more details in section 2).

1.3. BARGAINING POWER IN TANZANIAN HOUSEHOLDS

In this section we focus on the case of Tanzania in particular, and ask which situations, laws and regulations are in place and how they influence Tanzanian women's (and men's) bargaining power. First, we present evidence on divorce and marriage regulations (section 1.3.1), before describing Tanzanian women's income-earning potential (section 1.3.2). Finally, we present some gendered aspects of Tanzania's land and inheritance laws. Throughout reading this chapter, it is useful to keep in mind that in Tanzania a wide variation of household forms exists. Marriages can be monogamous or polygamous, clans matrilineal or patrilineal, and households can establish their home in a patrilocal or matrilocal way. Differences in household formation exist not only across ethnic group and lineage, but also across religion and region (Forster, 1995).

1.3.1. DIVORCE: THE LAW OF MARRIAGE ACT

Based on the intrahousehold bargaining literature discussed above, we can ask a number of questions specific to Tanzanian households. Firstly, assuming an outside threat point in the bargaining process, we could ask if divorce is even a realistic option to Tanzanian women and men? That is, are Tanzania's divorce law and practices allowing spouses to seek divorce? Secondly, when wives (and husbands) get a divorce, which fallback position can they expect? In which (economic, financial and social) position would a female divorcee find herself? To answer these questions, we turn to Tanzania's legal framework in this regard. Prior to 1971, Tanzania's family law was governed by custom and religious belief, differing per local community (Peterman, 2011). In 1971, Tanzania's Law of Marriage Act (LMA) was approved, regulating and standardising marriage, divorce, the division of matrimonial assets, and the custody and maintenance of children. Standardising marriage and divorce throughout the country, the LMA legally supersedes Islamic and Customary law. Nevertheless, the latter still influence people's attitudes, behaviours, and practices, especially in rural areas (Rwebangira, 1996; Bryceson, 1995; Ansoms and Holvoet, 2008).[54] While in most (patrilineal) customary law, women are not entitled to claim (substantial) matrimonial property upon divorce,[55] the LMA, through statutory courts, is expected to protect the economic interests of divorced women and their children. The LMA ensures the possibility of judicial divorce, the settlement of maintenance fees, the custody of children,[56] and the division of matrimonial property. Specifically, it grants married women equal rights to men in acquiring, holding and disposing of property. In case of divorce, section

[54] Note that Tanzania's legal system is pluralistic, combining elements of customary, statutory and religious (Islamic) law. von Benda-Beckmann (2006: 14) defines legal pluralism as the coexistence "within the same social order, or social geographic space, of more than one body of law, pertaining to more or less the same set of activities". Meinzen-Dick and Pradhan (2002) argue that legal pluralism increases uncertainty, as it is not always clear which legal frameworks are applicable. Nevertheless, they argue that legal pluralism can potentially be beneficial as it allows for 'forum shopping'. That is, using "different normative repertoires in different contexts or forums depending on which law or interpretation of law they believe is most likely to support their claims" (Meinzen-Dick and Pradhan, 2002: 5; see also Ansoms and Holvoet, 2008 on Rwanda). However, others (e.g. Dancer, 2015) have argued that the stakeholder with the highest extra-household bargaining power will in practice be the one who chooses which legal framework is applicable.

[55] Dancer (2015) states that according to patrilineal customary law, upon divorce the husband usually keeps the house and the land acquired by joint effort, while the wife can keep the kitchen equipment and her personal belongings. Cattle, food and cash crops are supposed to be divided between the spouses. However, Islamic law does not recognize joint matrimonial property.

[56] The LMA offers mothers the possibility to demand custody of her children. This is an important right in Tanzania's mainly patrilineal society where children traditionally belong to the father's clan. The deciding element in the custody question is 'the children's welfare' (Dancer, 2015). However, Rwebangira (1996) argues that the father usually remains the one who is granted custody of the children. If he contests the mother's custody claim, he is likely to get custody. Only if he does not contest her claim, does she make a fair chance to regain custody of her children. During the court process, the mother usually has to leave her children behind. Nevertheless, for young children (7 years of age or younger) it is often considered in the interest of 'children's welfare' if the mother holds custody (van Vuuren, 2003; Dancer, 2015).

114(2) of the LMA prescribes that matrimonial property must be divided according to the spouses' contributions. That is, property acquired through joint effort shall be equally divided. There has been much discussion on the interpretation of 'joint effort'. It has long been the favoured interpretation in court that 'joint effort' implies both spouses having income-earning activities or contributing financially to the household. It was argued that women's unpaid domestic work did not really count as 'joint effort', but were simply their 'wifely duties'. In 1983 a landmark ruling in the Court of Appeal recognised women's domestic work and childcare activities as a contribution to matrimonial assets, and thus a joint effort. However, in practice some women do not acquire half of the matrimonial assets, as courts find it difficult to ascertain the actual household contribution made by wives. Similarly, customary law offers resistance to the LMA, contributing to the insecurity about what exactly the wife can expect to receive upon divorce (Rwebangira, 1996; Peterman, 2001; Ikdahl, 2008; Bryceson, 1995). Dancer (2015), furthermore finds that some women are reluctant to seek their share of matrimonial property, either because they are unaware of their rights, or because they feel they would be diminishing their children's assets (see also Rwebangira, 1996).

Another important stipulation in the LMA is that spouses are not allowed to dispose of, or mortgage, matrimonial property without the consent of their spouse (section 59). This is particularly relevant, as Dancer (2015) in her study of land conflicts in Tanzania, found that a frequent land claim of women against men involved a male family member selling or mortgaging the wife's or joint land without her consent. Section 115, furthermore, allows the court to order the husband to pay maintenance fees to his (former) wife.[57] Maintenance fees for children are requested from the father only. According to the LMA the father has to provide his children with accommodation, clothing, food and education (independent of whether or not they are in his custody). Mothers do not have this duty, except when the father has deceased, his whereabouts are not known or he is unable to provide the maintenance. However, in case the mother remarries, the father is no longer obliged to pay maintenance for his children. Nevertheless, van Vuuren (2003: 72) argues that "more often than not mothers receive no financial assistance at all for children of former husbands".

So, women can and do ask for divorce, and the LMA strengthens women's property rights upon divorce (despite the fact that some insecurity remains with regard to the distribution of matrimonial assets, child custody decisions and maintenance fees). However, van Vuuren finds

[57] Section 115(2), on the other hand, gives the court the power to order a woman to pay maintenance fees to her (former) husband, in case he is mentally or physically in ill-health and cannot earn his own livelihood, and if the court is convinced that the wife has enough means to do so. This is likely to be relatively exceptional as compared to maintenance fees paid to wives.

that many couples do not choose to have a formal divorce, but merely separate without officially registering the dissolution of the marriage. According to van Vuuren there are a range of reasons for this, including unawareness of their rights, a wife's fear her husband would no longer allow her to see her children or that the community would shun her. Discussing this insecurity, Dancer (2015) stipulates that in the LMA a couple who have been cohabiting for minimum two years 'as husband and wife' are treated as if they were married. However, this might pose problems if the husband has both a registered monogamous marriage and a *nyumba ndogo* (small house), "i.e. a relationship with another woman as his 'concubine'. Such relationships are not always conducted in secret and couples in these circumstances may be regarded by their family or local community as married. In other cases, the second 'wife' may not be aware of the husband's first relationship" (Dancer, 2015: 41). Consequently, the second 'wife' might assume marriage to her 'husband' and e.g. invest in the purchase of property in his name. However, if their relationship ends, she might find it difficult to prove the 'joint effort' in acquiring these properties, particularly when her 'husband' disputes the presumption of their 'marriage'.

van Vuuren (2003) finds that most divorced women "have taken care to secure their own source of income in order to be able to maintain themselves and their children" (211). When she does not have any resources, she often returns to her natal home (see also Dancer, 2015).

1.3.2. INCOME

This brings us to another element that determines women's well-being level in the fallback position (and thus their intrahousehold bargaining power): wives' income earned outside of the home. Many intrahousehold bargaining theorists argue that one's well-being at the breakdown position depends primarily on one's earnings outside of the household, or on one's potential income-earning possibilities outside of the home (see e.g. Sen, 1990; Fafchamps et al., 2009; Holvoet, 1999). These potential earnings of course depend on the specific labour market conditions a spouse is confronted with, for example whether labour markets are strongly gendered and women/men cannot perform work that belongs to the other sex's domain, or whether women's earnings are systematically lower than men's. A spouse's previous labour market decisions of course also influence his or her later possibilities. Foregoing wage labour to stay at home and care for the children increases one's marriage-specific capital[58] but

[58] Marriage-specific capital are skills built up within a specific household, and which cannot be transferred to other

substantially reduces market-specific human capital, and lowers one's earning capacity. A report of the FAO states that about 90% of Tanzanian women and 85% of men in rural areas work in the agricultural sector (mostly as subsistence farmers) and that men's economic activities are more diversified (FAO, 2014: 23). According to Morisset and Wane (2012) women make up merely 35% of total wage employment in Tanzania. The FAO study furthermore finds that in Tanzania, rural men in paid employment or self-employment earn an average cash wage that is higher than women's. Moreover, also women who are self-employed in agricultural activities earn less than men (FAO, 2014: 25).

Next to women's *actual* earnings outside of the household, what is also relevant is the *perception* of a woman's contributions to the household and the subsequent claims she can make in terms of intrahousehold resource allocation (in relation to her perceived contributions)(Sen, 1990). Note that – as was mentioned above – the LMA arranges potential maintenance fees to be paid to the divorced wife and/or her children if they are in her custody. Such alimony payments can also have a positive influence on women's income after divorce (Fafchamps et al., 2009).

1.3.3. LAND

Finally, an important element in the intrahousehold bargaining process is women's ownership of and control over resources or assets such as land. Asset ownership is relevant both in case of a divorce threat point – where the distribution of matrimonial assets between spouses is detrimental – and in case of a non-cooperative inside threat point – where the welfare of the spouse in the non-cooperative marriage is influential, i.e. how household assets are managed during the marriage itself. In the next paragraphs we focus on the asset of land since it is a key asset to agricultural livelihoods and communities. Moreover, it has in recent decades been subject to increasing commercialization, which does not only make it more 'economically valuable' but also crucial as a condition for access to e.g. credit. In addition, intrahousehold bargaining scholars have recognized it as a key asset in improving women's bargaining power (Agarwal, 1994).

Tanzania's land tenure reform resulted in its Land Act in 1999 and the Village Land Act of 2000 (in legal force since May 2001) (Dancer, 2015; McAuslan, 2010; Ikdahl, 2008). The National Land

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households or marriages. These skills are improving the pay-off of the specific marriage the person is in. For example, skills related to doing domestic work for a specific household, and time invested in the children that belong to the household. It can be assumed that the more marriage-specific capital is built up, the more stable the marriage becomes (Holvoet, 1999).

Policy (NLP) stands for the registration of existing land use, and the creation and facilitation of a land rights market, while ensuring non-discrimination (Ikdahl, 2008). Through the Village Land Act (VLA), much land administration tasks were decentralised to the village level, more specifically the registration, adjudication, titling and dispute resolution. The Land Acts hold important gender equality provisions, granting women equal rights to men in acquiring land. While inheritance of clan and family land continues to be governed by customary law (McAuslan, 2010), the Land Acts do not allow the application of customary law when it discriminates against women. According to Dancer (2015: 12) "the intention appears to be to recognise customary land tenure norms at the local level whilst mediating against any gender discriminatory aspects through a statutory clause enshrining men's and women's equal rights to land". The Land Acts allow for joint titling, i.e. the registration of land in the names of both spouses. More specifically, section 161 requires that when the parties do not explicitly demand for only one person to be registered as the owner, the names of both spouses should be included in the document. Furthermore, similar to the LMA, the Land Act (section 114) states that spousal consent is required to dispose of matrimonial land.

Implementation of the Land Acts has initially been limited, and much land remains unregistered today (Dancer, 2015). Similarly, Ikdahl (2008) finds that although land titling is supposed to protect people's livelihoods, in practice the commoditization of land rights might lead to more insecurity, distress sales and even landlessness among the poor. Furthermore, Ikdahl (2008) states that in the case of land claims against their husbands when the condition of 'spousal consent' was breached, courts have in practice often been unwilling to accept that the wife was not involved in the land sale. Similarly, Dancer (2015) finds that courts often rule differently depending on the type of land in question. She states that land courts are "more willing to void dispositions of self-acquired land than family land when spousal consent had not been obtained, notwithstanding that a wife's interest in both types of land is protected under the Land Acts" (2015: 157). Moreover, various studies have found that few joint titles are issued in practice (Dancer, 2015; Ikdahl, 2008; Daley, 2008). Many women are not aware of their right to joint registration, while others are hesitant to claim this right. Daley (2008) argues that women felt their husbands might read it as a sign that they want to leave the marriage. Consequently, Daley shows that, compared to married women, it was easier for unmarried, divorced and widowed women to buy land in their own right. Married women who did undertake their own market transactions were generally more self-confident, younger, well-educated, resources-rich and locally well-connected socially and politically. Furthermore, both Ikdahl (2008) and Dancer (2015) describe a male bias in court with regard to the handling of intrahousehold land claims. According to Ikdahl officials "would 'normally not deal with such conflicts'. Instead, they told the

wives to 'go home and clear the conflict', as they saw it as a household matter which was up to the couple to decide." (Ikdahl, 2008: 53). Similarly, Dancer reported that courts would send cases back home to 'go and make peace'. She observes the dominance of "wisdom and peace as normative discourses that reflect conciliatory approaches to doing justice by both land tribunals and family elders and local leaders" (Dancer, 2015: 155), and furthermore argues that these discourses are inherently conservative and serve "to preserve (male-dominated) social power relations" (2015: 155). Note that this behaviour of judges and officials is in line with dominant societal norms of household harmony (as discussed in section 2).

The inheritance of land

A challenge is that succession law is not equally advantageous to women as the Land Acts (which do not hold for inheritance) (McAuslan, 2010). Tanzania's inheritance law consists of customary, Islamic and statutory law, and includes specific ordinances such as the Indian Succession Act, and the non-Christian Asiatic Succession Ordinance (i.e. legal pluralism). Tanzania's codified customary law is patrilineal and protects clan and family land against alienation. Typically, female children cannot inherit clan or family land as they are 'transitional passengers' (*msafari*) who 'are married off' (*olewa*[59]) (Rwebangira, 1996; Dancer, 2015). Women can typically only inherit when there are no male heirs.[60] Similarly, in Islamic law women typically inherit in the third degree, i.e. after the eldest son, and all other sons. Statutory law applies to citizens of European origin and Christians for whom the customary law does not hold. While being more egalitarian towards male and female heirs, the statutory law is rarely applied, especially in rural areas and with regard to clan or family land (as opposed to 'self-acquired' land) (Rwebangira, 1996; Dancer, 2015; McAuslan, 2010). In matrilineal communities (in the upper mountains of the Uluguru), it are mainly daughters who inherit land (Englert, 2008).[61] However, Englert finds that mothers indicated that they were no longer willing to discriminate against their male

[59] Compare with '*kuoa'* in the active sense, which is used for men getting married. Furthermore, as part of the wedding celebration, the woman is the centre of attention in the '*send off* celebration' prior to the wedding ceremony (see also Dancer, 2015).

[60] When women do inherit clan or family land, there used to exist restrictions on women's land behaviour. That is, women were not allowed to sale or bequeath family land. However, in 1989, the High Court decided that forbidding only female heirs from disposing of clan land by sale was unconstitutional because of its discriminatory nature (Rwebangira, 1996). This improved women's *control* over family land (as opposed to only guarding their *access* to or ability to use these lands).

[61] Note that in the villages of the lower Uluguru mountains and in the peri-urban areas of Morogoro Town, patrilineal patterns have become more predominant. In these more patrilineal communities, both male and female children can inherit. Whether they get equal shares or not depends on the family (Englert, 2008).

children. Therefore, they looked for ways to renegotiate the traditional matrilineal inheritance systems and to allow their sons to inherit land from their mother's clan. Englert describes how some parents (silently) challenged the tradition that they no longer supported by distributing their land equally among all their children. "Others tried to please both sides... [and] often acting in conjunction with their husbands, bought land on the market to supplement the land they owned through the family clan. The purchased land can then be left to the male children without the parents having to worry that those children will eventually be harassed by the clan [reclaiming the land]" (Englert, 2008: 87).[62] Note that similar evolutions from matrilineal to bilineal patterns of inheritance have been observed by Dondeyne et al. (2003) in South Eastern Tanzania, and Swantz (1998) around Dar es Salaam. In a similar vein, Dancer (2015) finds that there is a "gradually growing practice of fathers allocating a small portion of land to daughters [by will] in case their marriages fail" (40) or when the daughters, rather than sons, are taking care of their elderly parents. These men thus aim to install a safety net for their daughters in case of marital break-up. Dancer argues that this practice "challenges the heart of gendered power relations and behaviour in marriage" (2015: 40). Particularly, it "may affect the way that she [the wife] is treated by her husband during the marriage" (2015: 149), i.e. it can improve not only her breakdown position (in case of divorce she has a piece of land to go to and depend on when she returns to her natal village), but also her bargaining power *within* the marriage.

In practice, however, women's ability to inherit land remains limited in many patrilineal communities (Oxfam International, 2013). Indeed, Dancer (2015) finds that especially women's claims to *inherited* land are difficult to attain and much disputed. Without support from key (male) family or community members, women "are unlikely to be in an evidential or social position to make or sustain their claim [in court]" (2015: 157). However, in our four study villages we find evidence of the prevalence of bilineal patterns of inheritance.[63]

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[62] Englert (2008) notes, however, that as men in these matrilineal communities increasingly bring their cases to court, it has – paradoxically – become more difficult for their parents to give them a part of the clan land. This is because the land struggles have now become more 'visible'. Consequently, especially the granting of temporary use-rights of clan land to sons has become less common, as parents fear their sons might not be willing to return the land upon their marriage.

[63] In the questionnaire, 241 respondents indicated that land came into the household's possession through inheritance by a male household member, compared to 112 respondents who got land through inheritance by a female household member. Moreover, land ownership through acquisition was also very common, with 257 respondents indicating they (or their household) had bought land (out of a total of 670 respondents who owned land).

2. THE INTRAHOUSEHOLD DECISION-MAKING PROCESS IN THE MOROGORO REGION

In this section, we first draw upon academic literature review to discuss the existing studies on women's decision-making participation and intrahousehold decision-making in the Morogoro Region of Tanzania (section 2.1). Next, we rely on qualitative data that was collected by the researcher in four villages of the Morogoro Region. In section 2.2., we discuss the trend among respondents to describe household relations as harmonious and cooperative, before unpacking some elements of the 'joint' decision-making process in section 2.3.

A methodological note on the qualitative data analysis is in place here. The qualitative data stems from semi-structured interviews with husbands and wives. Spouses were interviewed separately and in private. See chapter 2 (section 2.3.2. on household interviews) for more details on the data collection tool. To analyse the qualitative data, we attributed codes to the transcribed interview data at the level of words, sentences or paragraphs. A first range of codes was drawn from theory and literature, and covered codes such as 'altruistic household head', 'cooperation', 'conflict', 'income pooling', 'collaboration in agriculture', etc. With each interview that was coded, a number of additional codes were added to the coding scheme to encompass useful information, concepts and themes that were not yet covered in the theory-driven codes. Such data-driven codes included 'third person refereeing in case of argument', 'mobility' (of both men and women), 'emphasis on collective effort although individual labour contribution', etc. All interviews were then reviewed based on the complete coding scheme (i.e. both theory-driven and data-driven codes). Finally, Nvivo software facilitated the establishment of trends and patterns. Outlining all data fragments under certain codes provided a clear overview of respondents' statements related to the specific concept or theme. This allowed for detection of patterns within and between codes, insights into the coherence of codes and how different concept are related, as well as understanding of how widespread certain claims or discourses were across the interviewees. For example, this approach unveiled patterns in the different aspects of cooperation and conflict spouses described. Note that respondents' quotes used in this chapter should be considered as illustrative of a certain discourse or a way of talking about household relations, rather than a claim about their factual decision-making behaviour. This is the case because the method of semi-structured interviews posed some restrictions in discussing the very personal topic of intrahousehold relations. Specifically, my position as an outsider – who is from another culture, white, young and female – meant that some respondents found it challenging to openly discuss the intimate subject with me. This was

especially the case for older interviewees and men, who might have had more incentives to paint pictures in line with the foreign researcher's (assumed) expectations. Other respondents, especially the *mamas*, seemed to consider the interview as an opportunity to educate us (i.e. myself and my Tanzanian interpreter who was also young and female) about the reality of marriage and household relations. As both spouses were interviewed in households of married couples, some triangulation and cross-checking of data and statements was possible. The limits of the semi-structured interviewing method mean that the qualitative data and quotes in this chapter should be considered as illustrative of certain viewpoints, but not necessarily as a representation of respondents' household relations on the ground. Further research would benefit from a detailed ethnographic approach to fully understand intrahousehold decision-making and household relations in the study area.

2.1. STUDIES ON WOMEN'S DECISION-MAKING PARTICIPATION

Earlier studies on intrahousehold decision-making in (the Morogoro Region of) Tanzania have focussed on a variety of decision domains. For example, with regard to household decisions, Englert (2008) found that men have a more powerful voice compared to their wives. While husbands may consult other household members, they remain the main decision-maker. Englert found this to be the case in both more matrilineal and patrilineal villages of the Uluguru Mountains. Only in households consisting of younger spouses did she establish a different pattern. Specifically, younger persons more often claimed that there was not *one* main decision-maker in the household, but that household decisions were made jointly by the spouses.

Data from the Tanzanian Demographic and Health Survey or DHS (see United Republic of Tanzania, 2011, DHS data of 2010) also covers various decision-making domains. With regard to *rural* spouses' cash earnings, nearly half of the interviewed wives claim that the decision how they spend their own cash earnings is made jointly by her and her husband. 28% of wives indicate that she decides on her earnings allocation by herself, while 22% indicate their husband is the main decision-maker on this topic. Similarly, half of rural husbands indicate that the spouses decide about the allocation of *his* income jointly. However, nearly 45% of husbands say they decide about their income on their own, while merely 2.7% indicate their wife is the main decision-maker about the husband's income.

Table 19. Main decision-maker according to 6,412 wives interviewed in DHS (2010) (row percentages)

	Mainly wife	Jointly	Mainly husband	Someone else	Total
Wife's health care	15.3	45.0	38.1	1.4	99.8%
Major household purchases	6.9	31.9	57.7	3.2	99.7%
Wife's visit to family	9.1	40.4	48.9	1.3	99.7%

Source: United Republic of Tanzania (2011). Tanzania Demographic and Health Survey 2010. Dar es Salaam: National Bureau of Statistics: page 249.

Other decisions covered in the DHS are presented in table 19. These are decisions about the wife's health care, decisions about major household purchases, and decisions about whether or not the wife can visit her family. While the wife's health care decisions are in most cases (45%) made jointly by the spouses, decisions about major household expenses and the wife visiting her family remain predominantly male decisions. In 57.7% of households, men are the main decision-maker when it comes to major household expenses, and in 48.9% of cases, they decide alone about whether or not the wife can visit her family. This seems to indicate that women's (sole) decision-making power in these domains is relatively low. However, in making decisions jointly with their husbands, wives' voices are likely to be heard.

Literature on the Morogoro Region has also focused on the agricultural decision-making domain. Englert (2008), for example, argues that decisions on which crops to grow and whether or not to sell a plot, lie with the owner of the land (i.e. the person who bought or inherited it). Another study in the Uluguru Mountains (Tchenzema ward) established that agricultural tasks are shared more or less equally between spouses. Some exceptions were the tasks of fertilizer and pesticides application, as well as marketing, which were more often performed by men; while the tasks of processing and storing of harvested crops were mainly done by females. Nevertheless, the study found decision-making on agricultural tasks to be mainly 'joint' in nature. This was specifically the case with regard to resource allocation decisions in agriculture. However, one exception was the decision to hire (farm) labourers, which was made predominantly by men (Mollel and Mtenga, 2000).

To sum up, earlier literature on the region has established an emphasis on joint and – to a lesser extent – male decision-making patterns. Nevertheless, women's voices are exercised through

'joint decision-making' and women are more likely to be the main decision-maker in specific domains, such as how they spend their own income.

2.2. DOMINANT DISCOURSE OF FAMILY HARMONY

During qualitative interviews on intrahousehold decision-making processes, respondents generally sketched a picture of family harmony, complementarity of spouses' tasks and responsibilities, and consequently joint decision-making. This dominant discourse usually involved accounts of spouses working together for family development, and emphasis on a couple's common interests. The following quote captures this well:

> "We like to listen to each other instead of competing because we are happy when we can do something to advance development [of our family], so we have to be on the same path, so we can agree and make decisions in unity." (V 0079 husband)

Furthermore, respondents stressed the husband's responsibility to look for food and money, while the wife's role was considered as informing her husband of the family's needs, such as when food is lacking. This was explained by a woman as follows:

> "Because he [husband] is the one who knows, like to sell the chickens, he makes the decision. For me, my task is to inform him that here something is lacking, and here this is lacking." (S hh016 wife)

Consequently, respondents indicated the wife's role as *helping* or *assisting* the husband in finding food and money. This trend is illustrated well by the following quote:

> "I am the father of the family and the head of my family. Because it is my responsibility as father to provide for my family's needs. Nevertheless my wife helps me, by doing small businesses [selling bread] she gets something for our family." (C 0056 husband)

Some women emphasized that this responsibility of wives was a *key* role within the household:

> "We are helping each other, but the main actor is the mother. ... As mother, you see there is no more food remaining, so I see challenges are growing and tell my companion, what will we do?" (S hh121 wife)[64]

Respondents explained this division of responsibilities through women's more restricted mobility, as they are bound to the home when looking after children and fulfilling domestic duties. Men, on the contrary, are more mobile, are likely to meet a more diverse crowd of people, and to visit various places. Consequently, they are assumed to be more knowledgeable about the ways to find money, food, and jobs. This is captured by the following quotes of two married men and one female divorcee:

> "I, as the father of the house and leader, am carrying all the responsibilities of my family during drought. Because for me it is easy to know where I can start in looking for my family's needs. Compared to my wife, she doesn't know because many times she is here at home [taking care of the children], while I am able to do any job in search of my family's needs." (C 0064-65 husband)

> "It is possible that she [wife] goes looking for activities that are not too far, she goes with the hoe [to plow]. But me, I am always involved as the father." (V 0070 husband)

> "Men know different sources to get money and different ways to get money, compared to women who are most of the time staying at home." (V 0082 woman; divorcee).

These accounts and discourses suggest a naturalization of spouses' roles and responsibilities through ideas of 'natural synergy' and 'complementarity'. In terms of decision-making of climate change adaptation, this typically results in accounts of husbands being responsible for decision-making, i.e. taking the final decision, while wives are the ones advising them, or emphasis on both spouses advising each other. This is reflected in the following quote of a male respondent:

> "In my family, between me and my wife, really, during the period of drought, the one involved in fighting it is the father. Between us advice is growing, we consult each other. It is like when you cross those dangerous areas, you advise each other and tell each

[64] Similarly, some women – especially younger ones – expressed in interviews that they considered both spouses to be heads or leaders of the household, as both took part in gaining a livelihood and looking after the family. However, the majority of male and female respondents indicated the man to be the head of the household.

> other, here we enter a dangerous area, and you confront it all together. ... In my family, I, the head of the family, get to know the ideas that everyone has on the decision. I believe it is our decision. ... My wife, in our family, she is like my secretary, she is the coordinator of everything that has happened and everything that will happen." (S hh016 husband)

Note that in this statement, the respondent seems to suggests his functioning as an 'altruistic household head' and consequently the existence of one single household utility function (cf. unitary household models; Becker, 1981). Presenting the household as one single, harmonious unit was common among (male and female) respondents. Initial statements usually centred around joint decision-making as there was a strong normative inclination towards unity, cooperation and 'advising each other'. However, practice often diverged from this ideal of unity.[65] For example, a considerable number of men certified that they alone should be responsible for household decision-making. In the next section, we therefore ask which different forms 'joint' decision-making can take. Do statements of 'joint' decision-making imply agreement between spouses? How do spouses solve disagreement when it occurs? We consider examples from a range of decision-making topics.

2.3. UNPACKING THE DECISION-MAKING PROCESS

In qualitative in-depth interviews, we asked respondents how they have solved disagreements with their partner on the topic of climate change adaptation. That is, how do spouses come to a solution? Often, respondents mentioned that in a situation of disagreement about the appropriate adaptation practice, they 'advise their partner' and reason with him (or her) to try and make them see the benefits of their proposed strategy. Illustrative is a female respondent who first lengthily emphasized that her husband was the main decision-maker, before moving on to say that:

> "If we have no agreement, I will do what he advises. But if I see that it doesn't bring any benefits to our family, next time I will not take his advice if he comes with the same idea.

[65] The decision-making process varies across households and so do individual woman's and man's degree of intrahousehold decision-making power, i.e. the degree to which they can influence the outcome of decisions and voice their claims. Women's degree of intrahousehold decision-making power has various drivers and we write about this in chapter 7.

> I will advise him to do something different. Like there was a time when he wanted us to farm tomatoes. It is very difficult. So I advised him, let us farm drought-resistant crops like cassava rather than tomatoes." (C 0066 wife)[66]

Similarly, there were many other accounts of wives trying to influence their husbands' opinions about crop choice. Some wives tried to convince their husbands to plant drought-resistant crops (cassava) or fast-maturing (maize) crops, while other wives argued in favour of more commercial crops (in particular sesame and maize).[67] A number of respondents mentioned that in case partners could not reach agreement, they would test which idea has the best outcome, for example by planting both the crops that the wife and those that the husband prefers. Illustrative is the following man's quote:

> "It happened many times like I can decide let me plant these seeds. But she doesn't want to. Okay. Let us plant both seeds in a different plot. Right now, we do not decide. But later, after harvesting, you will know which seed is best." (K 0094 husband)

Furthermore, respondents indicated that in this situation, they would still share the harvest of the farm, and their behaviour thus remained cooperative in nature.

Compared to spouses' clear common interest in their household farm, the advantages of other practices, such as women's engagement in non-farm income activities, are more personal and thus leave more room for different preferences among spouses. Accounts of men supporting their wives' non-farm income earning activities are variable, with some men supporting their wives while others are hesitant about their non-farm involvement. Similarly, among women, preferences are varied, as some women might e.g. face a time burden which influences their (non)interest in non-farm work. However, some women clearly saw advantages in working off-

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[66] Note that this wife is playing an active role in decision-making, yet in her discourse she frames her role as 'advising her husband'.

[67] For example, in a certain household (K 0087), the wife was the main farmer as her husband was ill and could no longer work in the farm. While she emphasized his important role in terms of giving advice about the farm, their disagreements on crop choice turned out in her favour. The wife explained that her husband had wanted to cultivate maize (traditional seeds), while she preferred to sow the fast-maturing variety of maize seeds. In the end, they chose to plant fast-maturing maize seeds and cassava. Being the one who was more mobile and who would actually plant the crops (i.e. implement the decision), this gave the wife more decision-making power. In another household (S HH121) the wife stated that: "With regard to which crops we are growing in our farm, we advise each other. Like in our three acres, 'let us plant one acre of maize and two acres of sesame'. Because sesame is a business crop, so when we get money we may think on what we will do with that money." In this household, it was the wife who stimulated her husband to grow more sesame than maize, and they agreed upon that.

farm, e.g. not having to ask their husbands for money all the time. With regard to household decision-making about this practice, accounts are varied. For example, a woman indicated that at first her husband disagreed about her selling food at Mzumbe University, but that she managed to convince him after 'advising him for a long time' until he agreed (C 0048-51 wife). Another woman in the same subvillage, on the contrary, indicated that it was her husband's idea to sell some assets from their house, and to use this money to set up a small business of selling food at Mzumbe University, which was to be operated by the wife. The wife was hesitant at first, but her husband tried to convince her and in the end she agreed. However, at the time of the interview she had stopped the food business due to pregnancy and child care tasks (C 0055 wife).

Furthermore, consider the example of women's engagement in VICOBA (Village Community Banks), a common way of saving and taking microcredit for small businesses. Although VICOBA are not exclusively female, women do make out the majority of microcredit savers. Members of a VICOBA are stimulated to get involved in non-farm activities, as they need to contribute savings and repay their loan on a weekly basis. Although we do not have figures, we found that many of the women who were engaged in non-farm businesses, were doing this through the support of a VICOBA. One woman explained her involvement in business activities as follows:

> "Because we are in a group of VICOBA. So if you just sit around you do not have the money to contribute to the VICOBA." [This woman is both selling donuts (*maandazi*) and with the support of her husband, producing gravel to sell to builders.] (S hh121 wife)

Women explained that the money that is contributed to the VICOBA is usually coming from the household, rather than from women personally, and that the earnings of the small businesses are used for household needs. That is, the engagement in the VICOBA was sketched as a joint household effort. Respondents argued that for some women it was hard to join the VICOBA since their husbands think the money they contribute to the VICOBA will be stolen, and they therefore had to join the microcredit groups secretly.[68]

We suggest that some women explicitly relied on the dominant discourse of naturalized and complementary gender roles and household harmony, as a way of being allowed to get involved in non-farm income-generating activities. This happens mainly through – female – respondents

[68] This is one of most frequently used arguments not to join a VICOBA, and is due to some national scandals in the past. Nowadays, usually certain mechanisms are in place to prevent theft (e.g. several keys which are held by different persons are required to open the 'box' of savings, or savings are kept in bank accounts).

stressing that their VICOBA membership is a household effort: i.e. even when the business efforts undertaken were clearly the wife's, she would still emphasise that the initial investment was made by the household, and that the benefits return to the household as well.

As indicated in section 2.1 of this chapter, earlier studies on women's decision-making participation in the region have illustrated that there are many decisions that married women cannot decide upon (alone) and for which they have to seek their husband's permission or advice, e.g. to visit relatives or sell a share of harvested crops. This was often framed as joint decision-making, with husband and wife advising each other in 'natural complementarity'. Respondents' tendency to emphasise joint decision-making is in line with findings from Boudet et al. (2012) who argue that "many men genuinely welcome cooperation and shared opinions, but only if they do not affect household balances" (2012: 94). They quote a woman from rural Tanzania who participated in their research and commented on household decision-making about money she had earned:

> "The money can be mine, but the moment I need to do something for the family, I need to have him also decide on [how to use] my money. Sometimes we women do this, not because we think it is right, but simply because you need the family relations to keep going well." (Boudet et al., 2012: 94)

This suggests that the emphasis respondents put on 'advice' and cooperation primarily serves to maintain family harmony and the idea of household cooperation as such. For women in particular, it can be a prerequisite to first 'formally' ask for their husband's advice or approval, before being able to make a (different) decision themselves.

Qualitative interview data also showed evidence of non-cooperative behaviour when spouses have different preferences on adaptation. Some wives indicated that if they cannot come to agreement with their spouse, they refuse to be involved in the implementation of the decision or to provide labour for it. Illustrative are the following quotes by two women, who argued that:

> "It is my husband, the owner of the house, who gives advice on what we will do [during drought]. But it is necessary that we advise each other. But if he comes with an idea without benefits, if he comes with bad advice, I cannot agree with him. I will refuse and leave him with his ideas." (V 0071-72 wife)

> "We decide together because we are a family so we cooperate with each other in making all decisions about our family. And if he judges on a matter and if he refuses to listen to my decision, I will do what I see is right for the benefit of our house... Like, I advised him, let us not farm during the period of drought, because we will make a loss. If he refuses, I will do my business [selling bread], and leave him to decide himself." (C 0057-58 wife)[69]

Other couples indicated to have involved a third person, usually an elder sibling, to find a solution when they could not come to agreement (C 0061 husband; K 0092 wife).

Furthermore, non-cooperative behaviour of a spouse seemed to be considered as a legitimate reason to initiate divorce. Quite some female divorcees who were interviewed indicated that the reason for their divorce was their husbands' 'uselessness' or non-contribution to the household welfare. These women emphasised that their (ex-)husbands were not bringing in any money nor contributing any labour. As illustrated in section 1.3 on divorce regulations and intrahousehold bargaining, divorce is an option that is in practice available to most Tanzanian women and men, and we can thus assume it is an effective inside threat point in the intrahousehold bargaining process. Women indeed initiate divorce when they are convinced they will be better-off outside of their marriage, and rather than only considering being financially better-off, they also value their increased autonomy and decision-making power outside of marriage. This is illustrated by the following quote of a female divorcee who spoke about being the one in charge of her small business and decision-making:

> "It is easier for me because I am living alone and I am free. But at other times it is difficult for me to handle all of my family problems alone, this can also make decisions more difficult. … For other women [married women] it is more difficult because they need to ask permission from their husband if they want to sell anything." (Changarawe, hh.102 female)

While it is unlikely to be the case for all divorcees (especially those lacking resources and a social network to rely upon), several female divorcees described how their financial situation

[69] Note that this suggests that whoever provides labour for the implementation of a decision, has – in practice – a relatively high degree of decision-making power over that decision and whether or not it will be executed. Power thus lies in a person's ability to (not) execute a decision, whether it has been made 'jointly' or by one's spouse.

improved after their divorce. A number of women narrated about their (ex-)husbands hindering development by selling household land without their wives' consent, addiction to alcohol and men's unwillingness to provide labour or money to the household. Therefore, these female divorcees emphasized the importance of getting an official divorce, rather than factual separation. The following divorcee's quote is illustrative in this regard:

> "Not all women understand the importance of getting an official divorce. But it is important. If you just separate, he can just tell you that you need to go. ... "You as you" can go, but you cannot take anything. ... But you are not really free. When your life is better afterwards, he can say that you are still his wife and expect to get things." (Vikenge, int.6 female)

Nevertheless, I would argue that there is a relatively high 'threshold' before a marriage turns non-cooperative, partly due to the strong normative ideas of household harmony and family cooperation, and partly because of the prevalence of household farm plots which makes it hard not to share crop yields (i.e. these have the nature of quasi-public household goods, see also chapter 8). Take the example of the following household: both spouses explained they had separate farms where they each grew their own crops. This was done with the intention of establishing 'who could produce more'. Nevertheless, despite the strong spirit of competition between these spouses, they emphasized the profits or yields of their separate farms were being shared between them. However, whether the couple allocated the profits *equally* or not could not be established.

3. CONCLUSION

In section 1, we argued that there are various legal and regulatory arrangements that influence women's bargaining power across Tanzania. For example, women's access to the key asset of land is ensured by Tanzanian land laws. Nevertheless, on the ground pitfalls limiting women's ownership and control over land remain in place, especially in the case of the inheritance of land. Furthermore, in practice there are many uncertainties about e.g. the division of matrimonial assets a wife can expect upon divorce. Notwithstanding these limitations, significant changes are visible on the ground. Specifically, there seems to be a growing number of parents who want to provide their daughters with a piece of land that they can rely on in case of marital dissolution.

In section 2, we have discussed the tendency among (male and female) respondents to describe the household as a place of unity, harmony and cooperation (cf. unitary approach). At the same time, we have indicated the existence of intrahousehold conflict and disagreement (cf. collective preference approaches such as Sen's cooperative conflict model). This chapter has shown that much variation exists in the types of households in Tanzania in general, and in the Morogoro Region in particular. While cooperation is the normative ideal to many men and women, households and marriages exhibit various degrees of cooperation and non-cooperation, and spouses rely on various mechanisms to deal with intrahousehold disagreement. These mechanisms range from refusing to be part of the implementation of the decision, and 'testing' the ideas of both spouses to find the best outcome, to emphasising the joint interest in and benefits of an idea, and specifically for women relying on a discourse that stresses their role as advisor or assistant of their husband. Consequently, it is not surprising that much variation exists in the degree of wives' decision-making power within the household. In the next chapter(chapter 7) we therefore ask which household-level factors drive wives' intrahousehold decision-making power, specifically with regard to adaptation decisions.

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CHAPTER 7

BARGAINING CLIMATE CHANGE ADAPTATION: DECISION-MAKING POWER IN TANZANIAN FARM HOUSEHOLDS

Note: This chapter is based on a research article that has been submitted for review to *Feminist Economics* by Katrien Van Aelst and Nathalie Holvoet.

1. INTRODUCTION

Climate change impacts are already manifest and major future effects are likely even in case of the most optimistic scenarios of emission reductions. There is increasing empirical evidence that climate change is specifically impacting the livelihood opportunities of the rural poor across developing countries, including small-scale and subsistence farmers. A clear need exists for farmers' adaptation to the increasingly unpredictable weather patterns and extreme weather events that the changing climate is inducing (Intergovernmental Panel on Climate Change, 2014; Morton, 2007). This also means that there is a need to understand how farmers are already adapting to climate change, and how they are making decisions about their adaptation strategies. Understanding this, in turn, implies paying attention to how men and women are deciding about adaptation within the household and who within the household makes adaptation decisions. Notwithstanding some notable exceptions (Guloba, 2014; Twyman, Green, Bernier, Kristjanson et al., 2014), few studies have focused on this nexus of intrahousehold decision-making and climate change adaptation. The aim of this chapter is to bridge the gap between these two separate fields of study by investigating intrahousehold decision-making patterns of climate change adaptation in rural Tanzania.

Most climate change policies, including Tanzania's (United Republic of Tanzania, 2007, 2012, 2014), seem to rely on implicit assumptions in line with unitary models of the household, where the household is considered as a single consumption and production unit and members are assumed to all have the same preferences or utility functions, or alternatively where one benevolent dictator, usually the household head, altruistically aggregates the household members' individual utility functions (see e.g. Becker, 1981). Climate change policies have therefore considered the household as 'irrelevant' in addressing adaptation, homogenizing (female and male) household members' interests and preferences (see also chapter 3). However, insights from feminist economics, where intrahousehold bargaining has traditionally been an important field of research, have shown that the household is a non-neutral intermediary between individuals and policy-makers (Holvoet, 2005). Different members of the household are likely to possess different kinds of knowledge, insights, and preferences and if policy-makers want to successfully incentivize individuals' behavioural changes in order to achieve policy goals, they require an understanding of the way in which adaptation decisions are constituted within the household. This is where intrahousehold bargaining models come in, which were formed as a critique to the unitary household models (Manser and Brown, 1980). Bargaining models pay attention to the decision-making mechanisms in the household and consider who can make decisions about what. As described in the previous chapter, various kinds of bargaining models exist, among others Cooperative Bargaining Models (McElroy and Horney, 1981) such as the Separate Spheres

Model of Lundberg and Pollak (1993), Noncooperative Collective Preferences Models including the Conjugal Contract Model of Carter and Katz (1997), and Sen's (1990) Cooperative Conflict Model. Each bargaining model conceptualizes bargaining power in a different way and considers different factors of influence in determining decision-making power. If policy-makers aim to stimulate women's power in adaptation decisions, different models are likely to suggest different policy levers to focus on (e.g. employment for women, land rights). Bargaining power in itself is unobservable and various proxies have therefore been suggested in the literature, without any consensus existing on the topic. In what follows, we draw from the literature's theoretical and empirical insights with a special focus on those factors that might be relevant to the Tanzanian context.

A first potential proxy of bargaining power is assets. Owning physical assets, either on her own or jointly with her husband, is expected to improve a woman's options outside of the household and therefore her bargaining power. Land is often an asset of key importance in developing countries and research has found it to be crucial to women's bargaining positions. Agarwal (1994) argues that owning land increases women's intrahousehold bargaining position, and therefore also facilitates the support they can receive from relatives, thus establishing a link between physical and social capital. Also looking at bargaining outcomes, Friedemann-Sánchez (2006) includes social networks as a central type of asset and she emphasizes the entwined nature of different kinds of assets. With urbanization and households' declining dependence on agriculture, physical assets other than land are gaining importance, in particular house ownership (Doss, 2013; Datta, 2006). Jacobs and Kes (2015), analyzing land and house ownership of women in South-Africa and Uganda, find that in particular having their names on *housing* documents improves women's decision-making power. Specifically, it doubles the likelihood that women make decisions with regard to transactions of property. Having their names on a *land* document, however, did not improve women's decision-making power over land in the same way, with the exception of their power over decisions to bequeath land. Next to land and housing, many other types of physical assets might have an influence, including livestock, businesses, savings, agricultural tools and durable consumer goods like televisions and furniture. In Ghana, Doss (2006) established positive associations between households' expenditure on food and education, and women's ownership of farmland, savings and business.

A second proxy of bargaining power is work income or women's employment. While some scholars have nuanced the importance of women's employment as such (see e.g. Rao, 2014 on India), others attach much value to its role in improving women's intrahousehold bargaining power. The latter is the case with for example, the Collective Preference Models, which consider income as an important determinant of bargaining power. Collective Preference Models using divorce as an outside threat point consider *potential* income-earning possibilities outside of the home key, as these directly

improve women's breakdown positions, while models using a non-cooperative equilibrium within the household focus especially on women's *independent* source of income and their control there over, as this determines their welfare level in such a non-cooperative marriage (Fafchamps, Kebede and Quisumbing, 2009). It has been argued that endogeneity issues exist with wage income (McElroy and Horney, 1981) and that using non-wage income can therefore be useful to avoid confounding the effects of work and income. Schultz (1990) for instance found that women's higher unearned incomes went hand in hand with a reduction of their labour supply. Next to providing women with stronger fallback positions, women's employment and earnings also give them a clearer perception of their own wellbeing, as well as an improvement in their perceived contributions to the household (Sen, 1990). Sen's focus on perceived contributions means that working *outside of the home* positively influences women's bargaining power. Other forms of contributions such as investment of time and non-paid labour – in particular care work – are typically less valued (Sen, 1990) within the patriarchal system and do not in the same way increase woman's perceived contributions and the legitimacy of their claims. Income-earning outside of the home thus also indirectly benefits women through these perceptions, rather than only directly through improving their breakdown positions (see also Agarwal, 1997).

Another proxy of bargaining power is human capital. Higher educated women have better outside options and therefore more intrahousehold bargaining power (Doss, 2013). Similarly, Sen (1999) establishes being illiterate as detrimental to women's bargaining power (see also Iversen 2003). Iversen et al. (2006) on the other hand, argue that having similar educational levels is influential in spouses' cooperative behaviour. Drawing from experimental games in Uganda they find that spouses with the *same* educational level contribute more to the common pool and wives allocate more of the pool to their husbands when they have the same educational level. However, the latter was not the case for men's allocation behaviour, which seems to be independent of their wives' socio-economic characteristics.

Another factor that has been discussed in the literature as tightly associated to women's bargaining and decision-making power is their phase in the life cycle, and elements related to that such as age and having children. Iversen et al. (2006) find that age influences both the pooling behaviour and allocation decisions of their experiment participants, although not in the same way. They establish that younger women contribute more to the common pool than older women and that women pool more when their husbands are young. However, when deciding on the allocation of the common pool, women distribute relatively more to their husband when he is older. A second life cycle-element is having children. On the one hand, it is clear that reproductive success is linked to women's status and

power in many societies. Inhorn and van Balen (2002) distinguish the *social power* desire as one frequently cited reason for having children in the Global South, next to social security and social perpetuity desires. Children hold the base for power, especially for women in patrilineal and patriarchal societies where – according to Johnson-Hanks (2006) – their status and respectability is associated with their "monetary, marital and reproductive achievements" (2006: 81). Hollos and Larsen (2008) find that the importance of bearing children holds even in an *urban* Tanzanian context. They argue that even in "an urban, highly-educated, low-fertility population… [m]otherhood continues to be a defining factor in an individual's treatment by others in the community, in her self-respect and in her understanding of what it means to be a woman" (2008: 170). Having children can thus positively affect women's decision-making power since a mother's voice has legitimacy. On the other hand, having young children is likely to aggravate women's labour burden as domestic and care tasks are unlikely to be easily reallocated across the genders. This might especially jeopardize women's voice in decisions related to the so-called productive domain outside of the home.

Other contributions to feminist economics have highlighted the importance of differentiating among various types of decisions as decision-making patterns and related factors of influence may differ between domains of decision-making (Lundberg and Pollak, 1993; Holvoet, 2005). We apply this in this chapter by differentiating among various domains of climate change adaptation decisions, including cash-related, individual, joint and traditionally male and female domains (for operationalisation see Methods section). Beyond our contribution to the literature by investigating the climate change adaptation decision-making domain, which has previously not been studied in detail, this chapter also brings in another theoretical and empirical novelty, namely explicitly distinguishing between actor and partner effects using the Actor-Partner Interdependence Model (APIM). The APIM is a model that is well-known and frequently used in other disciplines but that has not yet been applied in feminist economics. In this research, the APIM model of intrahousehold adaptation decision-making is explained and tested in Tanzania, a country where climate change is high on the agenda.

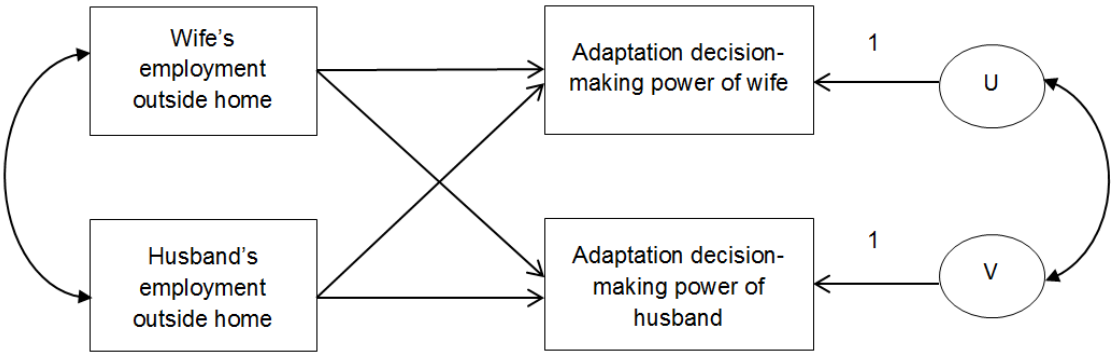
2. ACTOR-PARTNER INTERDEPENDENCE MODEL (APIM)

Most intrahousehold studies do not take the interdependence of spouses' (survey) data into account and consequently lose out on possible insights in terms of effects of men's characteristics on women's outcomes and vice versa. Methods such as pooled regression incorporating data of both spouses or excluding data from one of the spouses, and estimation of separate regression models for each sex are subject to biases when data is nonindependent (Kenny et al., 2006) and these methods are therefore not optimal. The APIM, however, does take the nonindependence of spouses' data into account and can therefore offer more optimal and realistic insights in intrahousehold bargaining and decision-making models. APIM is "a model of dyadic relationships that integrates a conceptual view of interdependence in two-person relationships with the appropriate statistical techniques for measuring and testing it" (Cook and Kenny, 2005: 101). In our case the dyad refers to the household, which is the unit of analysis rather than the individuals that encompass it. A core idea of APIM is that when two persons form a dyad, next to actor effects (i.e. effect of a spouse's own predictor on her or his own outcome) also partner effects exist (i.e. an actor's characteristics or behaviour can predict her or his partner's outcome). Both actor and partner effects can be simultaneously estimated in APIM.

The APIM is increasingly common in the social and in particular the psychological research domain since the 2000s and studies have used it to investigate diverse interdependent and dyadic relations in couples. Examples are the linkages between relationship quality and various other variables such as attitudes towards love (Gana et al., 2013), problematic alcohol use (Rodriguez et al., 2014), depression (Wang et al., 2014), leisure time (Berg et al., 2001), and spirituality (Pereyra et al., 2015). Other studies have focused on spouses' relative health statuses, investigating the effect of family communication patterns (Baiocchi-Wagner and Talley, 2013) and spouses' optimism (Kim et al., 2014). These are just some examples as APIM applications are spreading rapidly, while to the best of our knowledge, it has not been applied in intrahousehold bargaining research. As we believe the model can offer useful contributions to empirical studies of intrahousehold bargaining and decision-making, we develop our own APIM of intrahousehold climate change adaptation decision-making. Consider a simplified example of the APIM in figure 1, where we depict wives' and husbands' employment outside of the home as the sole predictor variables, and the spouses' respective adaptation decision-making powers as the outcome variables. The disturbance terms of the outcome variables (U and V) have paths of 1, forcing the disturbance to be in the same unit as the outcome variable, and the correlation between both disturbances indicates the nonindependence of the dyad members. In APIM-terminology, the path from wife's employment to wife's decision-making power is the wife's actor effect, and the path from husband's employment to husband's decision-making power is the husband's actor effect. The

two intersecting paths represent the partner effects, i.e. the effect of one spouse's characteristics on the other spouse's outcome. The path from wife's employment to husband's decision-making power is called 'partner effect in husbands', while the path from husband's employment to wife's decision-making power is labelled 'partner effect in wives'.

Figure 6. Simplified APIM model



Source: Figure by the author. U and V represent the respective disturbance – error – terms of the two outcome variables (adaptation decision-making of husband and wife).

In this chapter we address the following three research questions. First, we consider actor and partner effects of the spouses' educational levels and of their employment outside of the home and farm. We ask whose education and/or employment drives women's and men's intrahousehold decision-making powers of climate change adaptation strategies. Second, we incorporate the factors of women's physical asset ownership and two of the wife's life cycle elements (age and children) and ask whether these influence the spouses' adaptation decision-making powers. Third, we test whether the drivers of women's and men's adaptation decision-making powers differ across diverse adaptation decision-making domains. Specifically, we compare the impact of the drivers on decision-making power within the traditionally male, female, joint, individual and cash domains. Finally, we consider implications for climate change policy.

3. CONTEXT OF THE STUDY

Our study is based in four Tanzanian villages located in the Morogoro Region and part of the Ngerengere sub-catchment of the Ruvu River Basin. Kiwege and Sinyaulime villages are located in Morogoro Rural District, while Vikenge and Changarawe villages lie within the Mvomero District. We selected the two sets of neighboring villages: the two 'clusters' represent differences in access to infrastructure and the labour market, and in the population's composition of ethnicity, age, and occupation groups. Specifically, the villages in Mvomero District are close to the local Mzumbe University campus. Many students live in these villages which affects both the housing and employment market. Many villagers work at Mzumbe University in informal jobs such as security, washing clothes and preparing food in local restaurants. These kinds of jobs are less frequently available in the villages in Morogoro Rural District, where involvement in casual farm labour was more frequent. The presence of both staff and students from Mzumbe University, and the proximity of Morogoro Town, meant that a wide range of ethnicities and religions are living together in these villages, whereas the population in Morogoro Rural villages is more homogeneous. Moreover, certain parts of the villages in Mvomero District had access to the electricity network, which was not the case in Morogoro Rural and both access to health care as education services was better in the villages of Mvomero District. No direct differences in gender relations were apparent across villages: in none of the villages were cultural norms prohibiting women from or limiting them in partaking in income activities outside of the home. In our sample we found that women's involvement in income-earning activities outside of the home and farm is quite unexceptional. Although men engage more frequently in such non-farm income-generating activities (75 percent of men), 35 percent of women were at the time of the survey also undertaking income activities outside of the home. This is in line with other studies that find Tanzanian women's employment levels to be substantial. Smith (2014: 6) finds that only about 30 percent of Maasai women have *never* been involved in income-generating activities throughout their lives. Linking women's employment to bargaining outcomes, Vyas et al. (2015) find that urban Tanzanian women who work in the informal sector experience less physical conflict within the household. Women's independent access to money improves their fallback positions as husbands know "you can stand on your own" (2015: 52), but also frees women from the need to negotiate money from their husbands, a process that previously often caused conflict within households. However, Vyas et al. do not find evidence that women's informal employment contributes to improving their power over decisions that are traditionally outside of their reach, including sexual decision-making.

In our villages formal land titling is scarce, and independent and joint title deeds held by women relatively exceptional. Englert's study on the region (2008) attributes this to the Luguru people's lack

of awareness about joint land registration on the one hand, and their prioritization of marital harmony on the other (see also chapter 6 on the dominant discourse of family harmony). She argues that women are hesitant to claim their individual land rights since husbands are likely to think their wives are discontent with the marriage and are preparing to leave them. Yet she underscores the importance of land ownership, as she finds that strong decision-making power over land lies with the person who inherited or bought it, be it a man or a woman.

The findings from our study can be extended to other parts of rural Tanzania, especially where socio-economic and gender relations, and climatic challenges are similar. The external validity of our research therefore extends primarily to other areas of the Wami-Ruvu River Basin and the Morogoro Region. In this area, it is uncertain how future climate change effects will manifest itself. A large part of the Morogoro Region has a bimodal rainfall pattern which will possibly face an overall increase in rainfall, especially more concentrated rainfall in shorter time spans. However, it is equally likely that the bimodal rainfall pattern will evolve towards a more unimodal pattern, and that the region will face a decrease in rain. In general it is expected that the region will face warmer and longer dry seasons and that the flow of water in the Ruvu River will diminish (IPCC, 2014; United Republic of Tanzania 2007, 2014; Paavola, 2008). Specifically, farmers will have to adapt to the increasing unpredictability of rainfall across the short (*vuli*) and long (*masika*) rainy seasons, and to both more frequent and severe drought periods, as well as periods of heavy rainfall and floods (see also section 4 of chapter 2, and Van Aelst and Holvoet, 2016).

4. DATA AND METHODS

A combination of quantitative and qualitative methods was used to triangulate data and research findings. Primary data collection was conducted by the researcher and includes questionnaire data, focus group discussions and semi-structured interviews in each of the four villages. Between March and May 2014 we conducted 41 group discussions across the four study villages. In each discussion three to seven farmers participated. Groups were separated into women-only and men-only groups and facilitated in Kiswahili by trained local university graduates. The participants discussed the livelihood challenges that they are facing in their villages – including climatic changes – and the strategies they consider (potentially) useful in coping with and adapting to these livelihood challenges. We specifically drew attention to the conceptualization of *locally* useful and feasible strategies. The findings from discussion groups provided input for the optimization of the survey design to improve construct and internal validity. The questionnaire data which was subsequently collected between July and September 2014, includes a random sample of 686 married or cohabiting respondents.[70] This amounted to a total of 340 couples of which both spouses were interviewed. Questionnaire interviews of spouses took place simultaneously and in private and each was conducted by an interviewer of the same sex as the respondent. The selection of respondents was restricted to those households involved in farming activities and took into account proportional representation across subvillages by estimated population number. Six local enumerators were trained by the researcher to undertake the questionnaire interviews. Respondents were interviewed in Kiswahili and received a small amount of cash[71] as a sign of appreciation of their time spent in the interview, which is in accordance with local research practices.

4.1. STRUCTURAL EQUATION MODELLING

An APIM can be estimated using various methods, including Multi-Level Modeling and Structural Equation Modeling (SEM). We use SEM to estimate our APIM as this method is most appropriate when the dyad consists of distinguishable dyad members (such as spouses in a heterosexual couple, who can be distinguished by their gender) and when the dyad members have significantly different variances in the outcome variable, as is the case for the decision-making index in our study (Kenny et al., 2006). SEM is a statistical approach to testing hypotheses, using Maximum Likelihood Estimation to estimate

[70] Throughout the chapter, we use “spouse” to refer to both married and cohabiting (heterosexual) partners.
[71] 5,000 Tanzanian Shilling, equivalent to 2.3 USD.

multiple regressions simultaneously. The approach consists of four basic phases in the analysis: model specification and identification, estimation, evaluation of fit and model modification, and interpretation (Hoyle, 1995).

In what follows we describe into more detail the operationalisation of first, the outcome variable 'decision-making power' and second, the predictor variables used in the estimation of the SEM models.

4.2. OPERATIONALISATION OF DECISION-MAKING POWER

Wives' and husbands' decision-making powers are the outcome variables in our structural equation models. In the questionnaire, respondents were asked whether they adopted a range of (locally applicable) adaptation strategies. These adaptation strategies were distinguished on the basis of regional literature (e.g. Below et al., 2012; Paavola, 2008) as well as our own group discussions that helped to shed light on locally relevant strategies. Of the 18 adaptation strategies included in this study (see table 20), most deal with agricultural and crop management, while others relate to livelihood diversification and short-term coping such as relying on food support programs.[72]

Concurrently, the questionnaire informed about the respondents' recollection of the intrahousehold decision-making process, i.e. who within the household had had the final say in the *actual* decision to adopt each specific strategy or not. Our decision-making data thus concern actual decisions from everyday life that have been made in each household in the sample. Answer options and their corresponding scores in the index calculation are 'the respondent him- or herself' (+1), 'the respondent's partner' (-1), 'it was a joint decision' (+1 in case of adoption of the strategy; 0 in case of non-adoption)[73], 'someone who is not one of the spouses made the decision' (0), and 'there was no decision made on this subject' (0). The latter category was included to take into account the possibility of norm-following when the decision in question lies outside the bargaining area. Describing the role of social (gender) norms in demarcating what can be bargained about, Agarwal (1997) establishes the 'bargaining area' as the set of decisions that are thought of as viable to change and can therefore be subject to bargaining and negotiation. On the contrary, the 'non-bargaining area' consists of deep-rooted cultural and social practices that are felt to be non-negotiable and hard to imaginable as subject

[72] The survey included a total of 25 adaptation strategies. For the index construction, we selected those practices that were adopted by at least 15 percent of the sample respondents and by a maximum of 85 percent of respondents, to ensure sufficient variability.

[73] During interviews we noticed that in case of non-adoption of the practice women and men differently interpreted the answer categories of 'joint' and 'no decision-making'. Where women tend to respond 'no decision-making', men mostly respond 'joint decision-making'. During in-depth qualitative interviews, it became clear that there was in fact no bargaining process in case of non-adoption of the practice. We therefore chose to attach a score of +1 in case of joint decision-making of an adopted strategy and 0 if joint decision-making of a strategy that was *not* adopted by the respondent.

to change. Put differently, these decisions that are seen as incontestable are equated to 'non-decisions' and people's behaviour with regard to these practices is informed by norm-following rather than by an active and conscious decision-making process. To create a decision-making index, the scores attributed to all 18 strategies are summed up and transformed into a percentage. A higher value of the decision-making index thus reflects a persons' higher intrahousehold decision-making power over the adaptation decisions.

We believe it is useful to distinguish between meaningful areas of decision-making since it is reasonable to assume that different types of decision domains function through different decision-making mechanisms (Holvoet, 2005). Besides a general decision-making index including all 18 strategies, we therefore also constructed a cash-related decision-making index that includes the seven adaptation strategies that require access to or a certain degree of control over cash resources in order to undertake them (see table 20).

Table 20. Strategies included in the general decision-making index (all) and in the cash-related decision-making index (right-hand column)

The 18 strategies under the general decision-making index (1)	*Subset of cash-related decisions (2)*
Drought-resistant crops	Small-scale irrigation
Participate in farmer field schools	Fast-maturing seeds
Vegetable cultivation	Hire casual laborers
Mixed cropping	Hire tractor
Mulching	Manure
Cover crops	Fertilizers
Fallowing	Sell assets to buy food
Work as casual farm laborer	
Non-farm income activities	
Food support	
Looking for wild vegetables	

Source: questionnaire data. For a description of each of the adaptation strategies, see table 5.

Besides the general and cash-related decision-making indices, we created four indices based on the decision-making domains distinguished in table 21 below. These four decision-making domains were distinguished by considering the decision-making data of these practices, as derived from the questionnaire. Although for most practices the largest part of the sample indicates that the decision of the practice was a joint one, much can be learned by looking at the frequencies of the answer

categories 'husband only' and 'wife only'. The frequencies of the latter categories across the 18 adaptation strategies (see table 24 in the appendix to this chapter) provide us with insights into which separate domains of decision-making exist and over which areas men and women impose more sole decision-making power. Strategies where significantly more husbands *and* wives agreed on higher degrees of male *sole* decision-making than female sole decision-making, are considered as part of the 'male decision-making domain' and vice versa for female *sole* decision-making and the 'female decision-making domain'. Note that the distinguished male and female decision-making domains should not be interpreted as *strongly* separated spheres in the sense of Lundberg and Pollak's (1993) *Separate Spheres bargaining model*, but rather as traditionally-grounded male and female responsibilities leaving a stamp on their respective degrees of decision-making power over these subjects. Lundberg and Pollak (1993), on the contrary, describe strongly separate spheres where men and women produce different crops and provide labour for different production stages. This is not applicable to Tanzania's Morogoro Region where household farming plots are common and specialization along gender lines in farming tasks is relatively limited (researcher's field observations; Mollel and Mtenga 2000; Englert 2008). Furthermore, we operationalize strategies to fall under the 'joint decision-making domain' when husbands and wives did not agree on who most frequently solely decided or when similar levels of sole decision-making were attributed to men and women. We argue that in the 'joint decision-making domain', more room for intrahousehold bargaining exists as strong gender imperatives are absent and strong association with either male or female decision-making authority is lacking. Finally, the 'individual decision-making domain' refers to those strategies of respondents' individual time and labour allocation which were solely decided upon by relatively large portions of respondents (i.e. wives and husbands both indicated frequently making these decisions on their own).

Table 21. The four decision-making domains

Male decision-making domain (3)	*Female decision-making domain (4)*	*Joint decision-making domain (5)*	*Individual decision-making domain (6)*
Fast-maturing seeds	Look for wild vegetables	Small-scale irrigation	Participate in farmer field schools
Hire casual labourers	Vegetable cultivation	Drought-resistant crops	Non-farm income activities
Hire tractor	Cover crops	Mulching	Work as casual farm labourer
Manure		Mixed cropping	
Fertilizers		Food support	
Fallowing		Sell assets to buy food	

Source: questionnaire data. See table 24 in appendix for a detailed account of decision-making data per adaptation strategy.

Note that these four domains are constituted as mutually exclusive, but that some overlap exists with the cash-related decision-making index. Specifically, the male and cash decision-making domains have five strategies in common (fast-maturing seeds, hiring casual labourers, hiring a tractor, using manure, and fertilizers), while the cash index also includes the strategies of small-scale irrigation and selling assets to buy food, which fall under the joint decision domain as well. Paired sample t-tests confirm statistically significant differences in the mean index values for wives and husbands for all of the indices (see table 22). The general decision-making index indicates that overall – across all 18 strategies – men's intrahousehold decision-making power with regard to adaptation is significantly higher than wives'. We use each of the six decision-making indices as an outcome variable, running six separate SEM models.

Table 22. t-tests of decision-making indices of husbands and wives

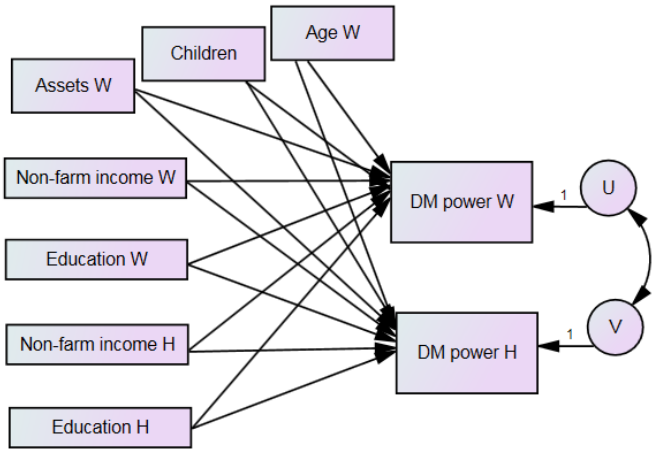
Decision-making index	*Mean husband*	*Mean wife*	*t-test statistic*	*S.E.*
(1) General	44.09	35.81	3.44	2.27
(2) Cash domain	42.39	26.32	6.83	2.36
(3) Male domain	46.78	27.59	7.86	2.48
(4) Female domain	40.51	64.29	-7.43	3.25
(5) Joint domain	41.03	30.28	4.18	2.53
(6) Individual domain	48.37	36.20	4.52	2.53

Source: questionnaire data.

4.3. OPERATIONALISATION OF PREDICTOR VARIABLES

In this section we provide an overview of the factors of influence that we include in our APIM as predictor variables, based on theoretical considerations (see literature review) and qualitative research in the form of group discussions on the local (intrahousehold) context. All factors are visually presented in the SEM specification in figure 2. We operationalise 'working outside of the home' as involvement in those income-generating activities that are performed outside of the house and outside of the farm, i.e. 'non-farm income-earning activities'. It is a dichotomous variable with value 0 if the respondent is *not* and 1 if he or she *is* involved in any non-farm income-earning activity. These activities range from casual non-farm jobs such as cleaning, washing clothes, guarding university facilities, charcoal production; over wage employment; to self-employment like owning a small shop or restaurant or selling bricks. We include both husbands' and wives' involvement in non-farm activities as separate – yet correlated – predictors. Human capital is operationalized as a categorical variable with values 1 to 4 indicating respectively that the respondent lacks formal education, has had some primary education, has completed primary education, and has completed secondary education or higher. Education of both husband and wife are included in the model as separate predictors. Next, 'children' is measured as the number of children under the age of 18 who were at the time of the survey living in the household. Due to multicollinearity issues, we could not include the age of both husband and wife in the model, so we chose to include only women's age, which is measured in years. Finally, we operationalized women's asset ownership by asking wives whether they owned any physical assets in their own name (either land, house, livestock, business). 'Assets wife' is a binary variable coded 1 in case of, and 0 if no asset ownership by women in their own names.

Figure 7. SEM specification (W = wife; H = husband)



Source: author's own model specification. Notes: U is the error term of DM power W and V is the error term of DM power H. Correlations between the predictor variables are not presented in the figure for reasons of clarity.

Thus, our APIM includes four actor and four partner effects. For each dyad member we investigate the effect of *first* his/her own involvement in non-farm activities and *second* his/her own educational level on his/her own decision-making power (i.e. two actor effects for both wives and husbands). The partner effects in the model are the effect of a spouse's involvement in non-farm activities and of her/his educational level on the decision-making power of her/his partner (i.e. two partner effects in wives, and two partner effects in husbands). We model physical assets ownership by the wife, the number of children in the household, and the wife's age to influence both women's and men's decision-making power. The latter are however not called actor or partner effects as there is only one predictor variable which holds identical values for the spouses in each couple.

5. RESULTS: ACTOR AND PARTNER EFFECTS OF SPOUSES' ADAPTATION DECISION-MAKING

In this section we discuss first, the results of the nonindependence test, and second the findings of the SEM-models. We pay specific attention to comparing actor and partner effects across the six models using the different decision-making indices.

5.1. NONINDEPENDENCE TEST

The first step in dyadic data analysis is to test for nonindependence of the dyad members' outcomes. Evidence shows statistically significant small-to-medium sized correlations across the sexes for all decision-making indices.[74] We find *inverse* correlation in the spouses' general, female and joint decision-making indices. The partial Pearson Correlations – i.e. controlling for all predictor variables in our model – equal -0.240 (general index; S.E. 0.057), -0.114 (female index; S.E. 0.055) and -0.165 (joint index; S.E. 0.055). This suggests a tendency of 'compensation' (Kenny et al., 2006: 29) with wives' lower decision-making power associated to husbands' higher decision-making power and vice versa. However, partial Pearson Correlations of the male, individual and cash-related decision-making indices are positive, equaling 0.121 (male index; S.E. 0.056), 0.109 (individual index; S.E. 0.057) and 0.165 (cash index; S.E. 0.056). The correlation coefficients for these three domains thus suggest non-independence through *positive* correlation of the spouses' outcomes. This seems to suggest that e.g. one spouse's cash-related decision-making power does not come at the expense of her/his spouse's cash-related decision-making power and there is thus no evidence of intrahousehold competition for decision-making power within these domains. The smallest correlation coefficient is the one of the individual decision-making domain. This seems to confirm that this is the domain – out of the six – where spouses make their decisions in the most independent fashion. Table 23 shows model output with estimated unstandardized parameters for each of the six models, which were estimated using the Amos software.

[74] Jacob Cohen (1988) considers 0.1 a rather small correlation, 0.3 medium and 0.5 a large correlation.

Table 23. SEM output: actor and partner effects of the six decision-making indices (ML estimation)

		Outcome variable	*(1)*		*(2)*		*(3)*		*(4)*		*(5)*		*(6)*	
			DM general		*DM cash strategies*		*DM male domain*		*DM female domain*		*DM joint domain*		*DM individual domain*	
Predictor variables			*b*	*S.E.*	*b*	*S.E.*	*b*	*S.E.*	*b*	*S.E.*	*b*	*S.E.*	*b*	*S.E.*
Non-farm income W	→ *W*	*Actor*	15.47***	3.74	20.31***	4.77	19.48***	4.88	8.68*	4.58	13.61***	4.33	18.93***	5.05
	→ *H*	*Partner*	-1.27	2.30	5.44*	3.03	6.63**	1.73	-17.05***	5.19	-3.15	2.97	2.95	3.10
Non-farm income H	→ *W*	*Partner*	-4.40	4.19	-11.58**	5.35	-14.00**	5.47	0.58	5.14	-1.94	4.85	-0.94	5.66
	→ *H*	*Actor*	1.42	2.58	-3.01	3.40	-1.25	3.55	-2.51	5.82	-2.69	3.34	23.51***	3.48
Education W	→ *W*	*Actor*	2.16	2.04	5.29**	2.61	5.79**	2.67	-1.13	2.50	0.74	2.37	1.93	2.76
	→ *H*	*Partner*	0.85	1.26	2.18	1.66	1.63	1.73	3.80	2.83	-0.04	1.63	-1.97	1.69
Education H	→ *W*	*Partner*	1.46	2.11	2.03	2.69	5.52**	2.75	1.56	2.58	-1.01	2.44	-1.15	2.84
	→ *H*	*Actor*	1.10	1.29	4.37**	1.71	6.76***	1.78	-2.62	2.92	-1.74	1.68	-0.65	1.75
Assets W	→ *W*		6.89*	3.56	7.74*	4.54	7.68*	4.64	2.55	4.35	12.32***	4.12	3.97	4.80
	→ *H*		1.10	2.18	-1.20	2.88	-1.53	3.01	-6.75	4.93	4.63	2.83	6.38**	2.95
Children	→ *W*		1.04	0.86	0.54	1.09	0.42	1.12	2.20**	1.05	1.13	0.99	0.47	1.15
	→ *H*		0.45	0.52	1.18*	0.69	1.11	0.72	-0.77	1.19	0.58	0.68	0.57	0.71
Age of W	→ *W*		0.38***	0.13	0.55***	0.17	0.60***	0.17	0.23	0.16	0.43**	0.16	0.01	0.18
	→ *H*		-0.03	0.08	0.15	0.11	0.30***	0.11	-0.14	0.19	-0.17	0.11	-0.25**	0.11
Number of observations				340		340		340		340		340		340

*Source: author's calculations based on questoinnaire data. Notes: *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels respectively. Goodness Of Fit statistics:. Chi² = 6; Chi² p-value = 0.41; RMSEA approximates zero at values between 0.005 and 0.009; CFI = 1.*[75]

[75] The Goodness of Fit statistics thus suggest a good model fit of the specified models with the data. An insignificant Chi²-test indicates that the null-hypothesis that the specified model has a good model fit *cannot* be rejected. Alternative measures of goodness-of-fit: a RMSEA-value of 0 and CFI-value of 1 represent perfect model fits.

5.2. NON-FARM INCOME-EARNING ACTIVITIES

With regard to the actor effects of women's income-generating activities on their own decision-making power, empirical evidence shows significant improvements in all decision-making domains if wives engage in non-farm income-earning activities. These results are in line with much of the academic literature – including Sen (1990) –, recognizing women's economic activities outside of the home as a key determinant of bargaining power. However it is contrary to the findings of Vyas et al. (2015) on Tanzania, who found that women's informal employment did not improve their power over decisions traditionally outside of their reach. For indeed, our estimated models reveal differences in magnitude of the unstandardized parameters depending on the decision-making domain used as the outcome variable, and the largest improvements in women's decision-making power are positioned exactly within those domains that are not traditionally considered as female. More specifically, when women shift from non-involvement to involvement in income-earning activities, their decision-making power of cash-related strategies increases by an average of 20.31 percentage points; of the male domain by 19.48, and of the individual domain by 18.93 percentage points. We also observe a somewhat smaller yet substantial rise in women's decision-making power of decisions that are typically considered joint in nature (+13.61), while the smallest increase lies in their decision-making power of the typically female domain (+6.68). Since the cash and male decision-making domain are those areas where sole male decision-making is most frequent, these are also the areas where most room exists for changing decision-making mechanisms in favour of women. In these areas shifts to more female involvement in decision-making are more easily observable, while areas where women are already more intensively involved to start with are less likely to exhibit substantial improvements in bargaining power (e.g. the joint and female domain of decision-making) (see also Holvoet, 2005). The rise in decision-making power of the individual domain can be understood in terms of an increased sense of agency resulting from one's involvement in income-earning activities. This might take various forms: earned income implies opportunities for investment in other types of non-farm activities such as starting a business, but can also mean more choice of (non-)involvement in low paid agricultural work on other people's farms, etc. It seems that with involvement in non-farm activities, women are more likely to exercise – sole or joint – decision-making power over these individual labour and time allocation decisions. The latter effect is also found with regard to husbands' actor effects of their involvement in non-farm activities. While none of the husbands' other actor effects are statistically significant, the SEM output indicates a substantial rise of 23.51 percentage points in men's individual decision-making index stemming from their involvement in income-earning activities. In other domains of decision-making husbands' power to decide is independent of whether or not they are involved in non-farm activities.

Considering the partner effects, we are first of all interested in the effects of husbands' non-farm income-earning activities on their wives' decision-making power (i.e. partner effects in wives). We find that husbands' involvement in non-farm activities does *not* significantly change wives' decision-making power of certain decision-making areas, including the individual, joint and female domains. However, we do find that wives of husbands who are involved in non-farm activities have an on average lower decision-making power of first, typically male domains of decision-making (-14.00 compared to wives of husbands not involved in non-farm activities) and second, cash-related adaptation decisions (-11.58). Considering Sen's conception of *perceived contributions* is helpful in understanding these results. When solely the husband is involved in non-farm work, the wife's perceived contribution to the household welfare is likely to be lower and the legitimacy of her voice in typically male- and cash-related adaptation decisions more contested. However, when both spouses are involved in some form of non-farm activities, the perception of their relative contributions is likely to be more equal. This is reflected in the fact that we can see a net improvement in women's decision-making power when both partners are doing non-farm activities: net positive effects of 8.73 respectively 5.48 remain for cash-related and male domain decisions. So even though the positive effects of women's activities outside the home on their (cash and male domains of) decision-making power are more substantial when they are the sole spouse involved in those non-farm activities, the positive effect is not entirely undone when the husbands' are also involved. Rather the net effect becomes less pronounced.

We also established the existence of statistically significant partner effects in husbands, specifically wives' participation in non-farm activities increases husbands' decision-making power of cash (+5.44) and of the male domain (+6.63). A possible explanation lies in – as Bryceson (1995) points out – the fact that even non-pooled income *in*directly benefits the other household members as it relieves pressure on the pooled income, allowing the pooled resource to be spent more freely. So, independent of whether the wife's income is being pooled or not, the husband might feel more able to make decisions with regard to cash-related adaptation strategies, as the pooled resource becomes less constrained. Related to this is the often implicit association of women's income, or their resource allocation behaviour, to household welfare. The assumption that women's allocation power results in more investments in household welfare, children's education and health have been confirmed (Behrman, 1988; Shelley and Burton, 1998; Duflo, 2003; Whittington et al., 2008; Iversen et al., 2011), rejected (Dito, 2011) and nuanced (Quisumbing and Maluccio, 2003) by numerous studies. Jackson (2013) finds that in Uganda, husbands perceive of their wives as more equitable allocators than themselves as they associate their wives' control over resources with more investments in the household. Based on the experimental games performed, Jackson (2013: 34) states that "women's control was not associated with an expectation of selfish claims, and husbands displayed a willingness to trust wives as allocators". We assume that similar perceptions exist in Tanzania. Qualitative

interviews by the researcher indicate that women spend much of their own income on food and clothes for their children.[76] Similar observations were made by Vyas et al. (2015) who found Tanzanian women in Mbeya to spend most, if not all, of their income on providing for the family and investing in children's education and nutrition. Vyas et al. also mention that most wives 'kept their incomes to themselves' instead of pooling them. This was not something they negotiated about with their husbands, but rather it was what women preferred themselves as it excused them of having to ask money from their husbands, which was often cause of intrahousehold conflict. Thus, the different – more household-oriented – expenditure patterns of wives leads to (at least the perception of) more pooled income, or less strained pooled income when there is no (complete) pooling of the wife's income. As the wife's income contributes to provisioning the household's basic needs, more money remains available for investment in agricultural adaptation options etc. (i.e. male decision-making power over cash-related decisions can increase). Finally, we find that when wives are involved in non-farm activities, their husbands' decision-making power over typically female domains is on average lower (-17.05). This is in line with the previously discussed negative partner effects in wives for typically male domains. These partner effects indicate that involvement in income-earning outside the home can also prompt changes in intrahousehold decision-making power that are conform traditional gender norms. Taking solely actor effects into account would thus lead to an overestimation of the net progressive effects of involvement in activities outside of the home, and create a biased representation by showing only one side of the picture.

5.3. EDUCATIONAL LEVEL

Looking at education, we find actor effects of wife's education for cash (+5.29) and male decision-making domains (+5.79). Each category increase in women's educational attainment is thus accompanied by a rise in e.g. cash-relation decision-making power by 5.29 percentage points. We find that higher educated wives have more decision-making power of those domains that are considered to be traditionally male or require (control over) cash. The analysis furthermore shows that husbands' educational level can also have a positive influence on women's decision-making power, specifically with regard to traditionally male decision-making domains (+5.52). A more educated husband is more likely to stimulate his wife's involvement in decisions considered traditionally male ones.[77] Thus, both wives' and husbands' higher educational attainment significantly improves women's voice in

[76] Although providing the school fees seems to remain a largely male responsibility, and is considered a main indicators of a husband's ability to provide for his children and household (observations and qualitative interviews by the researcher).
[77] In the SEM analysis we controlled for the correlation between the spouses' educational levels.

previously male-dominated decisions and can be considered as important drivers of more gender equal intrahousehold decision-making patterns. Finally, we find that men's educational level also stands in a positive relation to their own decision-making power over cash (+4.37) and typically male domains of decision-making (+6.76). However, we do not find any partner effects in husbands, suggesting that husbands' adaptation decision-making power is not influenced by their wives' educational attainment.

5.4. WIFE'S OWNERSHIP OF ASSETS

When wives own assets in their own name, their decision-making power rises in nearly all decision-making domains, the exception being the traditionally female and individual domains. The rise in decision-making power is especially large (+12.32) in the joint decision-making domain, while also substantial in the traditionally male (+7.68) and cash domains (+7.74). In the 'joint' category, which is mainly constituted of agricultural adaptation decisions, there is more scope for bargaining as there are no strict gender divisions of labour with regard to these strategies in the study area. This leaves more room to diverge from the relatively flexible gender norms in agricultural practice, or put differently, for different bargaining outcomes. Results suggest that through improving their fallback positions, women's individual assets ownership raises their bargaining and decision-making powers over joint (mainly agricultural), traditionally male and cash decisions. Finally, we find that women's individual asset ownership does not influence men's bargaining power, with the exception of the individual decision-making domain (+6.38).

5.5. CHILDREN LIVING IN THE HOUSEHOLD

Since bearing children is of substantial importance to Tanzanian women's social status, it seems reasonable to assume that having more children goes hand in hand with more female decision-making power, also over those decision-making domains where women traditionally have less voice. However, this does not seem to be the case, as the presence of more children in the household solely improves women's power over the female decision-making domain. Each additional child raises her decision-making power of the female domain by 2.20 percentage points. Outside of the traditionally female, there is no evidence that the number of children in the household affects women's decision-making power. This can be explained by the association of reproductive labour to women, and the gendered time use that goes with it. As women's reproductive labour burden increases when there are (more) children in the household, women might become more 'confined' to the female sphere and therefore

possibly lose out on decision-making power of the other domains. In turn, we find that husbands' decision-making power of cash strategies increases by 1.18 with each extra child in the household. The reason is ambiguous but might stem from men's greater feelings of cash-related responsibilities when they have more children to look after, since being able to provide for your children financially – especially with regard to school fees – is an important aspect of Tanzanian men's provider identity, and crucial to their masculinity. Further research on this topic is warranted.

5.6. WIFE'S AGE

Wives' age is positively related to their decision-making power over the cash (+0.55), male (+0.60) and joint (+0.43) decision-making domains. This means that an increase in wives' age by 10 years amounts to an average rise of 6.00 additional percentage points in decision-making power of the male domain. It is not entirely surprising that with age, women's autonomy grows in making decisions outside of the traditionally female domain, and their voice gains more legitimacy. We also find a significant relation of wife's age to husband's decision-making power of the male domain (+0.30) and the individual domain (-0.25). The latter might be related to the increasing difficulty of participating in the labour market with the couple's older age.

6. CONCLUSIONS

In this chapter we have asked which factors drive rural Tanzanian women's and men's climate change adaptation decision-making power at the household level. Our contribution within feminist economics lies primarily in our application of the Actor-Partner Interdependence Model (APIM) to the intrahousehold bargaining question. We have estimated our APIM models using Structural Equation Modelling, calculating actor and partner effects simultaneously. We found that women's income-generating activities outside of the home increase their decision-making power of climate change adaptation strategies. This is in accordance with Sen's (1990) Cooperative Conflict Model and confirms the role of women's (perceived) contributions in improving their decision-making power: perceptions of contributions are typically higher for more visible outside income-generating activities, whereas investments in the form of time and care work are typically less visible and less valued. We have established differences in the magnitude of effects across different decision-making domains. Women's external income activities are associated with large improvements in their power over the cash, male and individual decision-making domains, a considerable improvement in the joint domain and a somewhat smaller improvement in the traditionally female domain. Unlike women's actor effects, we find that husbands' own involvement in non-farm activities does *not* influence their decision-making power, with the exception of improving their power over the individual decision-making domain. Next, we established that women's decision-making power of adaptation strategies is dependent on whether their husbands are involved in external income-earning (i.e. existence of partner effects). We found evidence of a negative compensation effect, particularly in the male and cash decision-making domains. However, when both spouses are working outside the home, the net effect still means an improvement in women's decision-making power of these domains. We also found evidence of partner effects in men: wives' involvement in non-farm activities is associated with husbands' *lower* power over the female decision-making domain, but *higher* power over the cash and male decision-making domains. This might be explained by the perceived decrease of stress on the couples' pooled resources, as woman tend to allocate their incomes in a more household-oriented way. Next to actor and partner effects of outside employment, we also established actor and partner effects in education. We found women's education to have a positive impact on their decision-making power over the cash and male domains, and husbands' education to further improve their wives' decision-making power over the latter area. In turn, husbands' education goes hand in hand with greater power over cash decisions, but their adaptation decision-making power does not depend on their wives' educational level. With regard to the ownership of physical assets by wives, we established positive impacts on especially wives' power over joint decisions and to a lesser extent over male and

cash-related decisions. Husbands with wives owning physical assets are furthermore more likely to exercise power over the individual decision-making domain. While having children in the household improves women's power over traditionally female decisions, this is not the case for the other decision-making domains. And finally, wives' higher age is associated with improvements in their power over the cash, male and joint decision domains. These findings go to show that different decision-making domains function according to different decision-making-mechanisms and that using only a general decision-making index risks masking certain gendered effects. Furthermore, the actor and partner effects of in particular the 'outside employment' predictor variable, showcase the importance of taking into account both sides of the picture to avoid misinforming policy-makers, and we argue that the APIM offers a solid methodological approach to do this.

Our contribution to the climate change literature lies in the incorporation of the intrahousehold gender perspective. This issue has so far not been comprehensively dealt with in the literature, while there are some notable examples of related research investigating gender dynamics in adaptation behaviour in households or couples (see e.g. Twyman et al., 2014; Guloba, 2014). The importance of women's participation in climate change policies and negotiations has received wide support, but efforts to ensure this participation have largely been confined to the level of the state, formal institutions and community. Less attention has been paid to women's local-level lived experiences of climate change adaptation, and to the decision-making unit closest to their everyday adaptation practices: the household. Our study has therefore established that for rural women in the Morogoro Region of Tanzania the most influential drivers of their intrahousehold decision-making power of adaptation strategies are working outside of the home, especially when their husbands are not; attaining higher educational levels, and being married to husbands who have attained higher educational levels; owning physical assets in their own names; and life cycle elements, particularly being older grants women more voice and decision-making power. Climate change policies should facilitate the development of these drivers to ensure women's full participation in household-level decision-making of climate change adaptation.

In the next chapter, chapter 8, we ask whether wives' degree of intrahousehold adaptation decision-making power influences their households' adaptation behaviour. That is, while decision-making power served as an outcome variable in this chapter, chapter 8 considers it as an independent or predictor variable. Drawing on questionnaire data of 343 married (or cohabiting) women, we ask if household adaptation choices differ with wives' participation in adaptation decision-making.

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APPENDIX

Table 24. Decision-making data for each adaptation strategy (row percentages)

	Final decision-maker according to wives				*Final decision-maker according to husbands*			
Adaptation strategy	*Husband only*	*Wife only*	*Joint*	*No decision*	*Husband only*	*Wife only*	*Joint*	*No decision*
Irrigation	8.8	13.3	15.3	62.5	5.0	1.5	22.4	71.2
Drought-resistant crops	10.6	11.8	61.2	16.5	5.0	1.8	64.3	28.9
Fast maturing seeds	12.4	8.0	66.4	13.3	7.4	1.5	66.2	24.4
Farmer field schools	6.3	13.8	7.8	72.1	8.5	0.9	10.9	79.7
Hire casual laborer	12.8	6.6	32.8	47.8	15.3	1.2	44.1	39.4
Hire tractor	13.3	4.1	36.1	46.4	10.9	0.9	43.5	44.7
Mulching	10.1	13.6	15.4	60.8	6.8	0.0	31.5	61.2
Cover crops	10.1	19.8	57.4	12.7	5.9	6.8	73.5	13.2
Manure	11.8	5.6	19.1	63.5	8.8	0.0	18.0	73.2
Fertilizers	12.4	5.0	22.1	60.5	9.2	0.6	20.7	69.2
Fallowing	8.3	6.5	21.3	63.9	9.4	0.6	32.2	57.8
Mixed cropping	10.7	15.4	43.5	30.5	7.1	1.5	61.2	29.4
Vegetable gardening	7.1	26.8	22.4	43.8	4.7	9.4	34.1	51.8
Non-farm income-earning	9.0	35.5	21.4	34.0	34.5	0.0	45.4	20.1
Food support	8.5	12.1	11.5	67.9	5.3	0.6	12.7	81.4
Selling asset to buy food	10.0	10.0	19.2	60.8	8.8	0.3	22.1	68.8
Working as casual laborer	6.2	31.5	18.7	43.6	17.8	0.3	29.3	52.7
Wild vegetables	1.2	73.2	12.1	13.6	11.5	19.2	27.1	41.9

Source: analysis based on questionnaire data.

CHAPTER 8

CLIMATE CHANGE ADAPTATION BY SMALL-SCALE FARMERS IN THE MOROGORO REGION OF TANZANIA: WIVES' DECISION-MAKING PARTICIPATION

Note: This chapter is based on an article that has been submitted for review to *Climate & Development* by Katrien Van Aelst and Nathalie Holvoet.

1. INTRODUCTION

In this chapter, we address the question of whether and how wives' intrahousehold decision-making participation is related to farm households' adaptation behaviour. Specifically, we ask whether and how wives' participation in household adaptation decisions is correlated to the (agricultural) adaptation strategies that are (or are not) adopted in their households. If wives have more voice in adaptation decisions, will their households adopt different adaptation strategies? We investigate this relationship between intrahousehold decision-making and adaptation for 18 specific adaptation practices, ranging from agricultural practices to coping strategies and non-farm income-earning activities.

This study relies on a cross-reading of different streams of literature: first, literature on agricultural technology adoption, and second, literature on intrahousehold bargaining. Firstly, the agricultural technology adoption literature has focused mainly on extrahousehold factors as determinants of adoption. One key determinant discussed in the literature is the barrier of access to material resources, in other words, there often is a wealth effect making innovations and technologies – such as fertilizers, and improved seeds – more easily available to those who have better access to material resources (Ling and Manfred, 2016). Similarly, studies have emphasized high transaction costs (Minten et al., 2013) and credit constraints (Binswanger and Sillers, 1983; Croppenstedt et al., 2003) as a barrier in adopting or purchasing farm inputs. Other studies established the role of formal education (Croppenstedt et al., 2003) and agriculture-specific education through farmer field schools and extension services (Kaliba et al. 2000), highlighting the importance of human capital and access to knowledge. Other pivotal factors are access to networks or social capital (Beyene and Kassie, 2015; Lambert et al., 2014; Pamuk et al., 2014; Ramirez, 2013). Furthermore, all of these elements interact and may differ throughout the process of technology adoption. For example, Lambert et al. (2014) found that in the Democratic Republic of Congo, farmers' awareness of fertilizers was determined by their educational level as well as their social capital. However, their decision to try out fertilizers for the first time was influenced by the availability of extension services, while *continued* adoption depended primarily on capital constraints (Lambert et al., 2014). Moreover, there are some studies that have focused on gendered adoption of agricultural technologies and innovations. For example, Doss and Morris (2011) found that the gendered adoption of improved seeds and fertilizers was caused by gendered differences in access to the required inputs, such as land, labour, and extension services.

Secondly, within the intrahousehold literature, studies have shown the importance of the intrahousehold dimension in various domains. In particular, studies have investigated the influence of the decision-making actor within the household (decision-making mechanism) on outcomes such as the household's expenditure pattern. In some studies, wife's income is used as a proxy of her intrahousehold decision-making power. In this regard, Gummerson and Schneider (2013) find that in South Africa, higher income shares by wives are correlated to higher shares of household expenditure on food, and less expenditures on alcohol. In a similar vein, Phipps and Burton (1998) found that when wives' incomes increase, households spend more on child care, while they do not find husbands' incomes to be associated to higher child care expenditures. Studies on health outcomes[78] have established, for example, that compared to husbands, wives are more likely to allocate (hypothetical) vaccines to daughters (Whittington et al., 2008 on Thailand). Lampietti (1999) found that Ethiopian husbands and wives have different preferences with regard to the decision to purchase a (hypothetical) vaccine, but do not have different preferences for bednets. Lampietti suggest this difference might be due to the fact that bednets are a *quasi-public household good*, as more than one household member can use the bednet. Vaccines, on the other hand, are a private good that has to be allocated to one specific household member. Lampietti hereby suggests that spouses are more likely to have the same preferences when it comes to quasi-public household goods, since no choice has to be made about who specifically to allocate the good to.

The intrahousehold bargaining strand of research has shown that intrahousehold decision-making is influential in a range of outcomes, ranging from budget allocations, to children's education and health outcomes. We want to look at the role of intrahousehold decision-making in determining outcomes in households' climate change adaptation behaviour in Tanzania. It is reasonable to assume the existence of intrahousehold effects, as men and women (and thus spouses) experience climate change differently, through gendered perceptions of climate change and gendered access to information about climate change, weather forecasts and agricultural information in general (see e.g. Twyman et al., 2014; Mnimbo et al., 2016; Goh, 2012; Quisumbing et al., 2011; and see also chapter 4 of this PhD thesis on (gendered) lived experiences of climate change). Furthermore, research has shown that the impacts of climate change on men and women are different (see e.g. Denton, 2002), and that adoption rates of adaptation strategies and practices vary between the sexes (Twyman et al., 2014; Huynh and Resurreccion, 2014; Guloba, 2014). The latter is also the case in our study villages, as we have indicated in chapter 5 and 7 (see also Van Aelst and Holvoet, 2016). Moreover, benefits and costs that are

[78] See also Richards et al. (2013) for literature review of studies that investigate the relationship between intrahousehold decision-making, women's bargaining power and outcomes in child health.

associated with adaptation strategies are also likely to be gendered, e.g. in terms of labour and time investments, financial impact, etc. Husbands and wives' preferences with regard to the adoption of climate change adaptation practices are therefore likely to be different in some regards. To date, a range of studies have looked at adaptation through a gender lens, but few studies have investigated the specific *intrahousehold* factors that play a role with regard to adaptation behaviour (see e.g. Ngigi et al., 2016 for an exception). Nevertheless, we also draw upon a significant number of studies that have indicated the importance of intrahousehold decision-making in related fields such as natural resources management (Doss and Meinzen-Dick, 2015), the uptake of agricultural innovations (Mutenje et al., 2016; Singh et al., 1986), and irrigation (Lecoutere and Jassogne, 2016).

This chapter investigates the relationship between women's intrahousehold decision-making participation on climate change adaptation, and their adoption of adaptation practices. Presenting an example from Tanzania, the study starts with a description of the study area and the main climatic challenges faced in the region (section 2). Section 3 presents the methodology and operationalization of the variables. This is followed by the findings section (section 4) which first outlines the descriptive statistics and then provides an analysis of the relationship between wives' voice and households' adaptation strategies. Section 5 offers some conclusions.

2. STUDY AREA AND METHODOLOGY

2.1. STUDY AREA

This study covers four villages in the Morogoro Region of Tanzania: two in Morogoro Rural District (Sinyaulime and Kiwege) and two in Mvomero District (Changarawe and Vikenge). Within each district, the selected villages are highly comparable. However, some differences exist between the villages in the different districts. For example, the villages in Mvomero District are close to Mzumbe University and many students are living in the villages (especially in Changarawe). This also creates quite some opportunities for casual employment for local villagers, e.g. catering, maintenance, and security work. In all villages, however, the majority of the population relies on subsistence farming.
In Changarawe and Vikenge at least part of the village is connected to the electricity network. These villages also have better access to health care services (at least two health facilities) and education (3 primary schools and 2 secondary schools). In Kiwege and Sinyaulime, distances to school are much greater, as there is only one primary school in Kiwege and one school building (that is not in use) in Sinyaulime. A secondary school can be found in the neighbouring village Ngerengere. Health facility are also more sparse, as there is only one health centre in Kiwege, and a small hospital in neighbouring Ngerengere.

Climatic challenges that the area is facing are increasing unpredictability of already highly variable rainfall and uncertain effects of future climate change. The area has a bimodal rainfall pattern, and is faced with more concentrated rainfall in shorter time spans. Some climate change projections mention the possibility of a transformation towards a unimodal rainfall pattern and less rainfall. Overall, the area is facing a warmer and longer dry season (especially July-September) and a decreasing flow of the Ruvu River (IPCC, 2014; United Republic of Tanzania, 2007, 2014; Paavola, 2008).

2.2. METHODOLOGY

Data collection was conducted by the researcher, and included both a questionnaire and qualitative interviews on intrahousehold decision-making with regard to climate change adaptation. Data and research findings are triangulated through combining these mixed methods. The questionnaire data were collected between July and September 2014 from a total sample of 844 respondents, of which 343 are married women. These 343 married (or cohabiting) women form the subsample that we investigate in this chapter. We took a random sample of households involved in farming activities, and

considered proportional representation of all subvillages by estimated population number to ensure spatial representation. Six local enumerators were trained by the researcher and carried out the questionnaire interviews in Kiswahili. Qualitative interviews were carried out by the researcher and a translator. In each village about 8 households were purposively selected (Devers and Frankel, 2000) out of those households who participate in the questionnaire. The semi-structured interviews were performed with both spouses of these households individually, and dealt with the subject of their adaptation strategies and intrahousehold decision-making process on climate change adaptation and livelihood strategies.

Our research findings can be expected to hold for other rural parts of Tanzania that face similar climatic conditions, as well as similar socio-economic and gender relations. In particular, this means other parts of the Wami-Ruvu River Basin and the Morogoro Region.

In this chapter, we investigate the subsample of married and cohabiting women that were questioned in the quantitative survey. Via logistic regression analysis, we estimate 18 regression models in which each time one adaptation strategy serves as the dependent variable. Logistic regression model assumptions were confirmed to hold, and multicollinearity tests were unproblematic. The continuous variable 'age' violated the assumption of linearity for some adaptation strategies, and in this case a categorical variable was used. A typical problem in logistic regression analysis is empty cells (i.e. very few or no observations in certain categories of a categorical variable), causing inflated standard errors and odds ratios. This was a problem in some of the logistic regression models, and we chose to either present the inflated estimates when they did not inflate R^2, as the rest of the parameters are not affected; or leave out the explanatory variable that posed the problem of empty cells, when there was evidence of the variable inflating R^2, and in this case we just mention the importance of the variable in the text.

2.2.1. OPERATIONALISATION OF INDEPENDENT VARIABLES

The dependent variable, in each regression analysis, is operationalised as the adoption of a specific adaptation practice and has value 0 in case of non-adoption of the practice and value 1 in case of adoption. The 18 adaptation practices in this study were selected after literature review on the region (e.g. Below et al., 2012; Paavola, 2008) and after a first phase of primary data collection in the form of group discussions with separate groups of male and female farmers. See table 27 for an overview of the 18 adaptation practices and their respective adoption rates (descriptive statistics in findings section).

Descriptive statistics of the independent variables are presented in table 25. Independent variables are based on both theoretical considerations and insights from qualitative, exploratory research in the villages on the factors that influence adaptation in the local context. For example, the importance of knowledge or human capital has been operationalized via the variable 'educational level'. The majority of women in the sample have finished primary education (59.5%), while 30.3% has not had any formal education, and 7% started but did not finish primary education. Only a minority of 3.2% has achieved secondary education or a higher level. We also included a measure of spouses' similarity in educational level, and find that the majority of spouses has the same educational level (56.4%), while 31.9% of wives have a husband that is higher educated than themselves. Furthermore, research has indicated that technology and agricultural adoption depends on a farmer's access to resources (Ling and Manfred, 2016; Binswanger and Sillers, 1983; Croppenstedt et al., 2003). The household's relative resources and welfare are proxied by various variables, including 'type of access to farm land', 'ownership of transport means', and 'degree of farming involvement'. Table 25 indicates that the majority of married women in the sample live in a household that owns land (63.6%), while 15.2% of women live in a household that only has access to farm land through renting. Furthermore, 18.1% of households both own and rent land, while 3.2% of households depend on farm land that they do not own nor rent, i.e. they are allowed to use the land for free, but only periodically. In most of the cases this relates to farm land owned by the military or village government. Ownership of transport means is a relative measure of the household's welfare. About half of women (50.6%) live in a household that owns a bike, 37.2% of wives live in a household that does not own any means of transport (i.e. least well-off households), while 12.2% lives in a household that owns a motorcycle or car (i.e. most well-off households in the sample). With regard to their degree of farming involvement, a majority of 88.6% of women indicate to live in household that depends on farming for subsistence, meaning that they sell less than 50% of their harvest. Smaller groups of households sell more than 50% of their harvest (conceptualised as 'commercial farmers', 8.7%), while 2.6% of the sample respondents indicate that farming is not the household's main activity. Furthermore, we included socio-economic and demographic control variables, such as age, religion, and ethnic group. About half of wives belong to the Luguru ethnic group, which originally inhabited the area (54.1%) and more than half of interviewees are Muslim (67.1%). The average age of wives in the sample is 41.32 years. The categorical variable of age shows that the majority of respondents are aged between 26 and 45 years.

Table 25. Descriptive statistics of categorical independent variables (frequency and percentage of married women in each category)

	Village	*Means of transport ownership*	*Land access*	*Educational level*	*Educational difference spouses*	*Occupation (farm involvement)*	*Ethnic group*	*Religion*	*Age*
Changarawe	75 (21.9%)								
Vikenge	85 (24.8%)								
Kiwege	98 (28.6%)								
Sinyaulime	85 (24.8%)								
No transport ownership		125 (37.2)							
Household owns bike		170 (50.6)							
Household owns moto or bike		41 (12.2)							
Household owns land			218 (63.6)						
Household rents land			52 (15.2)						
Household owns and rents land			62 (18.1)						
Free use of land (army)			11 (3.2)						
No education				104 (30.3)					
Some primary education				24 (7.0)					
Primary education finished				204 (59.5)					
Secondary education or higher				11 (3.2)					
Spouses have same educational level					189 (56.4)				
Wife higher educational level					39 (11.6)				
Husband higher educational level					107 (31.9)				
Subsistence farming						304 (88.6)			
Commercial farming (sell more than 50% of harvest)						30 (8.7)			
Main income activity is not farming						9 (2.6)			
Luguru ethnicity							185 (54.1)		
Non-Luguru ethnicity							157 (45.9)		
Muslim								230 (67.1)	
Non-Muslim								113 (32.9)	
15-25									52 (15.2)
26-35									96 (28.1)
36-45									85 (24.9)
46-55									43 (12.6)
56-65									35 (10.2)
66+									31 (9.1)
Total (valid n)	343	336	343	343	335	343	342	343	342

Source: based on questionnaire data (subsample of 343 married or cohabiting women)

2.2.2. INDEPENDENT VARIABLE: DECISION-MAKING INDEX

Respondents were asked about who of the spouses made the decision to adopt, or not to adopt, each of the 18 adaptation practices. The decision-making variables are thus reflections of wives' recollection of the past decision-making process. So as to avoid social desirable answering, the questionnaire asked about concrete decisions that were made in the household, namely the actual, past decision that was made to e.g. (not) use fast-maturing seeds, (not) plant drought-resistant crops, (not) irrigate the field, etc.

The decision-making index itself was constructed by attributing a score to each of the 18 practices. The household scored +1 for each additional decision in which the wife was involved: that is, if the wife said the decision to (not) adopt practice x was made by herself, or by herself and her partner jointly. A score of -1 was attributed to the household when the husband had made the decision to (not) adopt the practice on his own. When indicated that 'someone else' made the decision, or that no decision was made, the household scored 0. The category of 'no decision' takes into account the possibility that the decision lies outside of the bargaining area (Agarwal, 1997) and is considered as something that is not negotiated or decided about. Consequently, respondents will usually follow what is considered as 'normative', rather than undertaking an active decision-making process. That is, these decisions are in fact 'non-decisions'.

The 18 scores were summed up (to arrive to the decision-making score) and finally transformed into a percentage (the decision-making index). The decision-making index takes values between -100 and +100. Within our sample, the mean value of decision-making index was 65 (out of 100), with a minimum value of -89 and a maximum value of +100. It is important to remember that a higher value of the decision-making index reflects wife's higher voice over or participation in the 18 adaptation decisions. More voice (or participation) does not necessarily mean that the wife makes the adaptation decisions on her own, but could also mean that she makes the decisions jointly with her spouse (see also findings section, descriptive statistics of decision-making).

A categorical version of the decision-making index was also constructed, based on the decision-making score which ranges from -18 to +18. A score between -18 and -1 should be considered as 'considerable male voice in decision-making', i.e. the husband is the main decision-maker when it comes to adaptation. A score between 0 and 9 should be considered as 'little decision-making participation by the wife'; while a score between 10-14 indicates a 'considerable degree of female decision-making participation' or female voice. Finally, we consider a score between 15 and 18 as a 'high degree of female decision-making participation' (see descriptive statistics

in table 26). Overall, women's (joint) participation in household adaptation decisions thus seems substantial.

Table 26. Adaptation decision-making within the household (categorical variable)

Categories of categorical adaptation DM variable	*Frequency*	*Percentage*
High degree of female DM participation [15 ; 18]	117	37.1
Considerable degree of female DM participation [10 ; 14]	125	39.7
Little DM participation by wife [0 ; 9]	53	16.8
Considerable male voice in DM [-18 ; -1]	20	6.3
Total	315	100

Source: questionnaire data

3. FINDINGS

3.1. DESCRIPTIVE STATISTICS

Table 27 presents each of the dependent variables and the adoption rates among the married women in the sample. Practices that are frequently adopted are fast-maturing seeds (85% of married women in the sample), cover crops (84.6%), planting drought-resistant crops such as cassava (76.5%), looking for wild vegetables and fruits (81.1%), and mixed cropping (61.8%). The remainder of practices are adopted by less than half of wives. For example, working as a casual farm labourer (33.2%), engagement in non-farm income-earning activities (34.3%), vegetable cultivation (37.9%), hiring casual labourers to work on the household's farm (43.0%) and hiring a tractor to do soil tillage (45.6%). The practices that are less frequently adopted are reliance on food support (15.9%), participation in farmer field schools (16.2%), mulching (20.2%), small-scale irrigation (21.5%), application of manure (25.0%) and fertilizers (25.7%), selling assets to buy food (26.8%) and fallowing (26.9%).

Table 27. Adoption rates per practice according to wives

	Adoption rate wives	
Adaptation practice	*%*	*n*
Drought-resistant crops	76.5	262
Participate in farmer field schools	16.2	55
Vegetable cultivation	37.9	129
Mixed cropping	61.8	212
Mulching	20.2	69
Cover crops	84.6	289
Fallowing	26.9	93
Work as casual farm labourer	33.2	113
Non-farm income activities	34.3	117
Food support	15.9	54
Look for wild vegetables	81.1	278
Small-scale irrigation	21.5	73
Fast-maturing seeds	85.0	291
Hire casual labourers	43.0	147
Hire tractor	45.6	156
Manure	25.0	86
Fertilizers	25.7	90
Sell assets to buy food	26.8	92

Source: based on questionnaire data (subsample of married or cohabiting women).

Descriptive statistics of decision-making data are presented in table 28. For each adaptation practice, we present who is the person in the household who made the final decision to adopt (or not to adopt) the practice. Frequencies show that certain practices are more likely to be perceived as a 'non-decision', i.e. something that the spouses themselves do *not* decide upon. This is the case for participation in farmer field schools, application of manure and agricultural techniques such as mulching, as well as reliance on food support. Furthermore, the (non)adoption of certain practices seems to be more likely to be decided by wives, e.g. collecting wild vegetables and fruits, starting vegetable cultivation, wife's involvement in non-farm income-earning activities and her employment as a casual farm labourer. On the other hand, some practices are typically decided by a bigger proportion of husbands only. This is the case for fast-maturing seeds, hiring casual labourers, hiring tractor, and applying manure and fertilizers.

However, the adoption of the majority of the practices seems to be decided upon jointly by the spouses. The quantitative data in table 28 thus indicate that joint decision-making is the most frequent decision-making mechanism. Consequently, high scores on the decision-making index are likely to be due to a considerable degree of joint decision-making, rather than sole female decision-making.

Table 28. Decision-making process of adaptation decisions (according to wives)

	Decision-maker (according to wives)								
	Wife only		*Husband only*		*Joint*		*No decision*		
Adaptation strategy	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*Total n*
Drought-resistant crops	12.5	43	10.5	36	**72.3**	248	4.7	16	343
Participate in farmer field schools	14.2	48	6.2	21	32.0	108	**47.5**	160	337
Vegetable cultivation	**27.4**	94	7.0	24	**51.6**	177	14.0	48	343
Mixed cropping	16.1	55	10.6	36	**66.0**	225	7.3	25	341
Mulching	14.4	49	10.0	34	48.2	164	**27.4**	93	340
Cover crops	20.2	69	10.0	34	**63.3**	216	6.2	21	340
Fallowing	7.3	25	8.2	28	**67.7**	231	16.7	57	341
Work as casual farm labourer	**31.8**	108	6.2	21	48.5	165	13.5	46	340
Non-farm income activities	**36.1**	122	8.9	30	42.3	143	12.7	43	338
Food support	12.8	44	8.5	29	**54.8**	188	**23.9**	82	343
Look for wild vegetables	**73.4**	251	1.2	4	15.8	54	9.6	33	342
Small-scale irrigation	14.0	48	8.7	30	**57.3**	196	19.9	68	342
Fast-maturing seeds	8.5	29	**12.3**	42	**73.4**	251	5.8	20	342
Hire casual labourers	7.4	25	**12.7**	43	**64.5**	218	15.4	52	338
Hire tractor	5.0	17	**13.2**	45	**66.9**	228	15.0	51	341
Manure	6.4	22	**11.7**	40	**57.7**	198	**24.2**	83	343
Fertilizers	5.8	20	**12.3**	42	**64.9**	222	17.0	58	342
Sell assets to buy food	11.1	38	9.9	34	**64.1**	220	14.9	51	343

Source: based on questionnaire data (subsample of married or cohabiting women)

3.2. WIVES' VOICE AND HOUSEHOLDS' ADAPTATION STRATEGIES

Logistic regression results are presented in the tables 30 to 35 in appendix. Out of the 18 adaptation practices, we found evidence that the adoption of three adaptation practices are significantly correlated to women's intrahousehold decision-making power. These three adaptation practices are wife's non-farm income-earning activities, the planting of drought-

resistant crops; and the use of cover crops.[79] These three practices and their relation to wives' intrahousehold decision-making participation are described into more detail in section 3.2.2. First, we analyse why some of the adaptation practices are *not* significantly related to women's intrahousehold decision-making participation (section 3.2.1.).

3.2.1. ADAPTATION OUTCOMES INDEPENDENT OF WIVES' INTRAHOUSEHOLD DECISION-MAKING PARTICIPATION

We could not establish a significant relationship between women's degree of intrahousehold decision-making participation and their (non)adoption of 13 adaptation practices. That is, for these adaptation outcomes we could not reject the null hypothesis that the coefficient is equal to zero. This implies that other factors than the intrahousehold decision-making process determine whether or not the household will adopt the practice or not. This might be because a) it are practices for which husband and wife have fairly similar preferences, e.g. because it are decisions they agree will benefit the household, or b) because they simply do not have a large array of options to choose from and the bargaining set is thus narrow. The former can be understood by investigating farming practices as producing quasi-public household goods, while the latter is related to coping and the pivotal role of access to resources in determining (non)adoption. Both are described in more detail below.

Family farming as the production of quasi-public household goods

Many of the practices we investigated are farm practices. In the research area (Morogoro Region), farms are typically operated at the household level: that is, a household has one or several plots of farm land where all household members contribute (some degree of) farm labour, and the fruits of the household plot belong to the household, rather than to an individual. Consequently, most respondents relied on a strong dominant discourse of household harmony, that usually involved accounts of spouses working together for family development, and emphasis on a couple's common interests (as described in chapter 6). For example, one male respondent in Vikenge stated that:

[79] Note that there is also some indication of a positive correlation between the intrahousehold decision-making index and the adoption of the practices of mixed cropping and selling assets (including livestock) to buy food. However, the model fit for the practice 'selling assets' is weak, suggesting that none of the household-level explanatory variables sufficiently explain why households are (not) relying on the selling of assets as a strategy. The model for 'mixed cropping' shows poor explanatory power and model fit. Therefore, we should be cautious about interpretation of the significant correlation in these two models.

> "We like to listen to each other instead of competing because we are happy when we can do something to advance development [of our family], so we have to be on the same path, so we can agree and make decisions in unity." (V 0079 husband)

In accordance with this dominant discourse, and given couples' common interest in optimizing farm practices and output to improve livelihood outcomes and household resilience in the face of climate change, it is not hard to grasp that under these circumstances a couple would have similar preferences for practices that are expected to lead to just that. These farm practices and the resulting benefits could be considered as quasi-public household goods: it is relatively difficult to exclude household members from the benefits of the practices, as household resilience will trickle down to all household members (although possibly to different degrees, as we have learned from the literature on intrahousehold inequality and unequal resources allocation, see e.g. Gummerson and Schneider, 2013; Phipps and Burton, 1998). However, it is likely that household members will all benefit to some degree, and therefore have an incentive for cooperation in advancement of farm practices, e.g. through using fast-maturing seeds, irrigating, or applying manure.

Furthermore, qualitative evidence suggests that even when spouses are in disagreement on the topic of farm practices, they can usually relatively easily reach a solution. E.g. by both planting the crop of their choice and comparing returns. Indeed, some respondents mentioned that in case partners could not reach an agreement, they test which idea has the best outcome, for example by planting both the crops that the wife and those that the husband prefers. A man in Kiwege stated that:

> "It happened many times, like, I can decide "let me plant these seeds". But she [wife] doesn't want to. Okay. Let us plant both seeds in a different plot. Right now, we do not decide. But later, after harvesting, you will know which seed is best." (K 0094 husband)

A female respondent (K 0096 wife) indicated a similar process, when in case of disagreement, they would divide their farm and both plant the crops that they prefer (wife herself preferred cassava). But, she emphasized that they would still share the harvest of the farm, so their behaviour remained cooperative in nature.

Narrow bargaining set and coping strategies

We argue that farmers in the study area are facing a *narrow bargaining set*. This means that the possible outcomes of their decision are structured by circumstances outside of the household. Farmers simply do not have many adaptation options to choose from, and several factors influence whether or not they can actually make the decision to adopt a practice or not. Agreement among spouses is therefore more likely, and intrahousehold bargaining consequently less influential in determining the outcome.

In our study area, couples do not have a lot of different adaptation alternatives to bargain about. However, in areas where there are more different adaptation options and/or livelihood strategies available, intrahousehold decision-making is likely to become a more influential factor in affecting adaptation outcomes. Interesting pathways for further research would therefore be to compare areas where farmers possess different ranges of adaptation options or opportunity sets. Spouses' narrow bargaining set is especially reflected in farmers' adoption of 'coping' (rather than adaptation) strategies, and in the pivotal role of access to resources in determining adoption outcomes.

Coping practices are undertaken as a way of alleviating current vulnerabilities to the changing climate (and other livelihood challenges), rather than proactively adapting to it in an effort to prevent negative impacts, or than improving the household's adaptive capacity in the face of climate change. Coping generally is curative and points towards a lack of choice: it is something farmers are forced into doing out of poverty or vulnerability. In qualitative interviews, three practices were frequently referred to as coping strategies: looking for wild vegetables and fruits in the bush, reliance on food support, and working as casual farm labourers on other people's plots.[80] For example, one woman stated the following about her household's situation during the last drought they faced:

> "Our condition [during the last drought] was bad, but not so much that it pushed us to go find *wild fruits* to eat or to sleep without eating." (S hh016 wife)

[80] These three coping practices are also incorporated in the quantitative analysis and are therefore mentioned here. However, during qualitative interviews many other coping strategies were discussed. These ranged from digging traditional wells, to prostitution, and being forced to eat grain chaff which would normally be fed to livestock.

Similarly, *food support* was not considered as a reliable strategy. Government food support is infrequent (maximum twice a year), and usually targets a subgroup of the elderly and sick who cannot work (see also chapter 5 or Van Aelst and Holvoet, 2016). Furthermore, all respondents emphasized that the amount of food support was negligible and would sustain a household for only a couple of days. Furthermore, *working as a casual farm labourer* was referred to as something poor farmers are forced into due to circumstances, but not something they would be likely to actively choose for. One woman stated that:

> "I do casual farm labour because I have no other way of life. I have to do it so that we can survive the conditions of life, because I am supporting my mother who is also living in this village with my four grandchildren." (C 0052 wife)

Quantitative evidence (based on the 18 logistic regressions) seems to confirm that these three practices are a way of coping, rather than adapting, as their adoption is negatively associated to proxies of higher levels of household welfare (or access to resources). We have used three proxies of welfare/access to resources: 'means of transport owned by the household', 'land ownership' and 'degree of farming involvement'. We find that when households are better off (i.e. own a bike, or even motorcycle or car; own, rather than rent land; and are less reliant on agriculture for subsistence), they are less likely to adopt the practices of 'looking for wild vegetables and fruits', 'working as a casual farm labourer', and 'relying on food support' (i.e. negative correlation; first column of table 29). On the other end of the spectrum are those practices that households chose to adopt when they are better off (more clearly *adaptation* practices), such as using a tractor, irrigating, etc. (third column of the table). This is what has been labelled as a 'wealth effect' in the literature (see e.g. Ling and Manfred, 2016). While practices in between – along the continuum, or in the middle in table 29 – show no clear correlation between relative household welfare and adoption.

Table 29. A coping-adaptation continuum: practices (non-)correlated to household's welfare

Coping		*Adaptation*
Negative correlation between relative welfare and adoption	*No clear correlation between relative welfare and adoption*	*Positive correlation between relative welfare and adoption*
Work as casual labourer	Manure	Farmer field schools
Food support	Fast-maturing seeds	Non-farm income-earning
Wild vegetables	Drought-resistant crops	Tractor
	Mulching	Irrigation
	Fertilizers	Fallowing
	Mixed cropping	Vegetable cultivation
	Selling assets (incl. livestock)	Hire casual farm labourers
		Cover crops

Source: based on logistic regression outcomes (subsample of married or cohabiting women)

Indeed, the three 'welfare' proxies seem to be relatively influential in determining the (non)adoption of adaptation practices. Looking at the logistic regression results, we find that respondents are more likely to participate in farmer field schools if their household owns a bike (4.4 times as likely compared to those household not owning a means of transport) or owns a motorcycle or car (3.2 times). Similarly, those owning a bike are 2.5 times as likely to use a tractor, more than 2 times as likely to irrigate their farms, and 3.1 times as likely to cultivate vegetables. When a household owns a motorcycle or car, they are more than 3 times as likely to hire casual farm labourers to work on the land. On the contrary, those owning a motorcycle or car are 82.7% less likely to work as a casual farm labourer. Investigating the effect of land ownership, we find that compared to those owning land (reference category), those who rent land are 74.5% less likely to be engaged in farmer field schools, 68.8% less likely to plant drought-resistant crops, while being 3.6 times more likely to work as casual farm labourers, and 8.9 times more likely to rely on food support. Respondents' degree of farming involvement shows us that households that are selling more than half of their harvest are more likely to do fallowing (3.7 times as likely) compared to subsistence farmers. In our sample, none of those household who

do not rely on farming as their primary source of livelihood, are reliant on food support, while all of the (11) households that rely on military or government farm land, indicate to go and look for wild vegetables and fruits in the bush.

3.2.2. ADAPTATION OUTCOMES DEPENDENT ON WIVES' INTRAHOUSEHOLD DECISION-MAKING PARTICIPATION

Wife's non-farm income-earning activities[81]

To further investigate the nature of the correlation of women's intrahousehold decision-making participation and the likelihood of their engagement in non-farm income-earning activities we first interpret the regression parameters. In terms of decision-making score (ranging from -18 to +18), the odds ratio is 1.059, meaning that an increase of the independent variable by one unit – or when the wife participates in one additional adaptation decision – she is 5.9% more likely to choose engagement in non-farm activities. This means that compared to a wife who is not involved in any of the adaptation decisions, a wife who is involved in all adaptation decisions is 2.8 times more likely to choose some form of non-farm income-earning activity. Looking at the categorical version of the decision-making variable, we find a significant difference between 'considerable male voice in decision-making' and the reference category 'high degree of female decision-making participation'. Namely, in households where men are more likely to decide on adaptation decisions on their own, wives are 93.8% less likely to be involved in non-farm income-earning activities (odds ratio of 0.062), compared to when the wife is (jointly) involved in all or nearly all adaptation decisions. Furthermore, regression results indicate that wives who are involved in (nearly) all adaptation decisions are 55.4% more likely to work outside of the home than wives with a 'considerable degree of female decision-making participation'.

We argue that while farm practices are in our study villages more of a quasi-public household good, this is less the case for spouses' non-farm income-earning efforts. Spouses' personal earnings have a clearer 'private' character, although most households would pool their resources and a dominant discourse of cooperation remains pronounced. However, there are also some households who indicated that they do not pool their resources, and even when they do, spouses' separate contributions to the pool or to household welfare are more visible when

[81] See also Eriksen et al. (2005) on spouses' non-farm income-earning activities and livelihood diversification as an adaptation strategy in Tanzania.

stemming from activities outside of the home and farm (see also chapter 7 of this PhD thesis). Therefore, spouses are more likely to have different preferences with regard to women's involvement in non-farm activities. As indicated above, we find that women who have more adaptation decision-making power are more likely to work outside of the home. However, note that the two are correlated, and we cannot make claims about causality in cross-sectional research. (See also chapter 7 that finds a correlation between wives' non-farm activities and asset ownership, and their degree of intrahousehold decision-making power over adaptation.) Longitudinal research is required to offer more detailed insights into the issue of causality.

Nevertheless, a diversity of preferences exist among both women and men. For example, in the qualitative interviews some women indicated they preferred paid employment or self-employment, while others did not, arguing it adds to their domestic (and agricultural) work burden. Accounts are thus varied: one woman in Changarawe indicated that at first her husband disagreed about her selling food at Mzumbe University, but that she managed to convince him after 'advising him for a long time' until he agreed (C 0048-51 wife). Another woman in the same village, on the contrary, indicated that it was her husband's idea to sell household assets and invest the money in a small food business at Mzumbe University, which was to be operated by the wife. The wife was hesitant at first, but her husband tried to convince her and in the end she agreed. However, at the time of the interview she had stopped the food business due to pregnancy and child care tasks (C 0055 wife). Furthermore, some women indicated they preferred earning their own money, as it gave them the benefit of not having to ask their husbands for money or approval, and therefore prevented sources of conflict within the household (see also Vyas, Mbwambo and Heise, 2015). As one participant explained:

> "Doing small businesses is successful for us. We get some small money and pay for small expenses. Like clothes, doing my hair, the children's school uniforms. I don't have to ask my husband for money anymore." (FG 7F Ki)

Planting cover crops and drought-resistant crops

With regard to cover crops, parameters for the decision-making scores indicate that with each additional decision in which the wife participates, the household is 6.1% more likely to plant cover crops (odds ratio of 1.061). That is, compared to a household where the wife does not participate in any adaptation decision, households where the wife participates in all decisions are 2.9 times as likely to plant cover crops. The categorical variable shows significant differences between the reference category of 'high degree of female decision-making participation' and

the category 'little decision-making participation by wife', with women in the latter category 81.7% less likely to plant cover crops (odds ratio of 0.183).

Considering drought-resistant crops, we find that with each additional adaptation practice in which the wife participates, the household is 5.7% more likely to plant drought-resistant crops (odds ratio of 1.057). So when women have a say in all adaptation decisions, compared to no say at all, their household is 2.7 times as likely to plant drought-resistant crops such as cassava, millet and sorghum. The categorical decision-making variable shows that especially households where the husband makes more decisions about (non)adoption of adaptation strategies, are less likely to plant drought-resistant crops (78.8% less likely, odds ratio of 0.212), compared to the reference category of women who participate in all or nearly all adaptation decisions. Crops like cassava are a typical household food security crop, rather than a cash crop. Research has established that farmers in the Morogoro Region plant more cassava in years following a low maize harvest, which illustrates the insurance function of planting cassava in times when food availability is not secure (Paavola, 2008). A potential explanation is therefore that women might possess different preferences in terms of degree or way of risk-spreading, in this case by planting crops that will still yield even if there is no or little rain. Related to this, women's reproductive roles and responsibility for household food security (Doss, 2001; Beuchelt and Badstue, 2013) might induce their preference for drought-resistant crops. However, more research is needed to fully comprehend (climate change) risk perceptions and risk preferences by gender (see e.g. Doss, McPeak and Barrett, 2008).

4. CONCLUSIONS

Drawing on intrahousehold bargaining literature, this paper has contributed to the academic literature on agricultural technology adoption and climate change adaptation. We estimated factors influencing the adoption of 18 household and individual-level adaptation practices. Next to key determinants such as material resources, education and village, we provided empirical evidence for the role of intrahousehold decision-making participation by wives. This chapter illustrates that in the case of the Morogoro Region, Tanzania, extrahousehold factors seem to be the main determinants of whether or not households will adopt agricultural adaptation practices. These factors range from households' access to resources such as land and transport means, their dependence on farming as a primary source of livelihood, socio-economic variables, to the village in which farmers live. The latter might be related to factors such as access to natural resources and farm land, infrastructure, access to water (for e.g. irrigation), access to extension services and agricultural inputs such as improved seeds and fertilizers. Nevertheless, we find that some adaptation practices are used more frequently in households where the wife is more involved in adaptation decision-making. This was the case specifically for women's engagement in non-farm income-earning activities, the use of cover crops, and the switching to drought-resistant crops. This suggests the existence of gendered preferences with regard to these practices and the significant role of women's decision-making power herein. We argue that Tanzanian smallholder farmers' adaptation options are limited and their intrahousehold bargaining set therefore narrow. This is specifically the case for coping strategies such as relying on food support, looking for wild vegetables in the bush and working as a casual labourer. Moreover, spouses often tend to agree on agricultural practices in households' common farm plots. We argue this is the case because farm yields are quasi-public household goods and cooperation is therefore more likely and beneficial to all parties. Furthermore, qualitative evidence indicates that spouses' disagreement on farm practices is relatively easily resolved. Hence, the degree of wives' intrahousehold decision-making participation is found to be unrelated to many of these (agricultural and coping) practices. Further research is required to completely untangle the relationship between household decision-making processes and adaptation. We suggest it would be useful to focus on areas where the bargaining set is larger, so that more variation in bargaining is visible, as well as to allow for the distinction between sole female and joint decision-making. Furthermore, longitudinal and qualitative research could provide more insights into the direction of causalities.

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Table 30. Logistic regression results (farmer field schools, non-farm activities, and working as casual farm labourer)

	Farmer field schools			Non-farm activities			Work as casual farm labourer		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	-5.907 (1.442)	0.003	0.000	-2.790 (0.920)	0.061	0.002	-0.895 (0.878)	0.409	0.308
DM index	0.009 (0.006)	1.009	0.152	0.010 (0.005)	1.010	0.028	-0.002 (0.004)	0.998	0.680
Village			0.405			0.802			0.177
Changarawe (ref)									
Vikenge	1.078 (0.734)	2.939	0.142	0.381 (0.432)	1.463	0.378	0.159 (0.427)	1.173	0.709
Kiwege	1.175 (0.797)	3.237	0.141	0.089 (0.521)	1.093	0.864	0.712 (0.526)	2.037	0.176
Sinyaulime	0.810 (0.776)	2.249	0.296	0.253 (0.491)	1.287	0.607	-0.157 (0.485)	0.855	0.747
Occupation			0.380			0.004			0.042
Subsistence (ref)									
Commercial	-0.989 (0.713)	0.372	0.165	-1.864 (0.700)	0.155	0.008	1.214 (0.531)	3.366	0.022
Main not farming	-0.010 (1.188)	0.990	0.993	1.715 (0.904)	5.558	0.058	-1.149 (1.128)	0.317	0.308
Transport means			0.009			0.265			0.013
No (ref)									
Bike	1.482 (0.485)	4.403	0.002	0.517 (0.322)	1.677	0.109	-0.453 (0.303)	0.636	0.135
Moto or car	1.165 (0.655)	3.205	0.076	0.202 (0.483)	1.223	0.677	-1.753 (0.612)	0.173	0.004
Education			0.726			0.073			0.401
No educ (ref)									
Some primary	-0.565 (1.181)	0.569	0.633	1.525 (0.596)	4.595	0.010	-0.240 (0.593)	0.786	0.685
Primary finished	-0.040 (0.618)	0.961	0.949	0.689 (0.475)	1.991	0.147	-0.341 (0.465)	0.711	0.463
Secondary or +	1.038 (1.227)	2.823	0.398	0.820 (0.963)	2.272	0.394	-2.097 (1.228)	0.123	0.088
Educ diff Same (ref)			0.178			0.244			0.062
Wife higher	0.146 (0.560)	1.158	0.794	-0.806 (0.485)	0.447	0.097	1.047 (0.451)	2.849	0.020
Husb higher	-1.032 (0.568)	0.356	0.069	-0.002 (0.413)	0.998	0.996	-0.051 (0.417)	0.951	0.903
Land Own land			0.143			0.100			0.032
Rent land	-1.367 (0.767)	0.255	0.075	-0.823 (0.465)	0.439	0.077	1.280 (0.449)	3.597	0.004
Own and rent	-1.317 (0.676)	0.268	0.052	0.312 (0.409)	1.366	0.446	0.366 (0.420)	1.442	0.383
Free use	-0.550 (1.162)	0.577	0.636	-0.501 (0.861)	0.606	0.561	-0.300 (0.869)	0.741	0.730
Ethnicity Luguru ref	0.423 (0.383)	1.526	0.269	0.289 (0.298)	1.335	0.332	0.190 (0.299)	1.210	0.524
Religion (non-muslim ref)	0.546 (0.471)	1.727	0.246	-0.160 (0.326)	0.852	0.625	-0.136 (0.322)	0.873	0.673
Age 15-25			0.239			0.030			0.097
26-35	2.110 (0.845)	8.248	0.013	0.820 (0.473)	2.270	0.083	0.350 (0.453)	1.419	0.440
36-45	2.065 (0.866)	7.889	0.017	1.057 (0.485)	2.878	0.029	0.595 (0.469)	1.813	0.204
46-55	1.891 (0.967)	6.626	0.050	0.416 (0.583)	1.517	0.475	0.445 (0.569)	1.560	0.434
56-65	1.693 (1.134)	5.435	0.135	-1.244 (0.949)	0.288	0.190	0.263 (0.678)	1.300	0.698
66+	1.835 (1.125)	6.265	0.103	0.261 (0.739)	1.298	0.724	-1.918 (0.923)	0.147	0.038
Model statistics	R^2 Nagelkerke: 0.305			R^2 Nagelkerke: 0.249			R^2 Nagelkerke: 0.227		
	-2 Log Likelihood: 213.069			-2 Log Likelihood: 323.397			-2 Log Likelihood:327.680		
	Chi^2 model: 60.462 ***	N = 300		Chi^2 model: 59.321 ***	N = 301		Chi^2 model:53.627 ***	N = 301	

Table 31: Logistic regression results (manure, fast-maturing seeds, and tractors)

	Manure			Fast-maturing seeds			Tractor		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	0.302 (1.073)	1.353	0.778	-0.412 (1.054)	0.662	0.696	-1.370 (0.913)	0.254	0.133
DM index	0.006 (0.005)	1.006	0.283	0.002 (0.006)	1.002	0.740	0.000 (0.004)	1.000	0.980
Village			0.000			0.061			0.000
Changarawe (ref)									
Vikenge	-1.729 (0.435)	0.177	0.000	1.275 (0.646)	3.580	0.048	0.378 (0.418)	1.460	0.366
Kiwege	-4.821 (0.905)	0.008	0.000	1.428 (0.677)	4.172	0.035	-3.279 (0.627)	0.038	0.000
Sinyaulime	-2.791 (0.553)	0.061	0.000	0.486 (0.610)	1.625	0.426	-0.371 (0.464)	0.690	0.424
Occupation			0.377			0.294			0.395
Subsistence (ref)									
Commercial	0.421 (0.593)	1.524	0.477	-0.938 (0.659)	0.391	0.154	-0.016 (0.562)	0.984	0.977
Main not farming	1.174 (0.942)	3.236	0.213	-0.679 (0.940)	0.507	0.470	1.469 (1.079)	4.344	0.173
Transport means No (ref)			0.531	-0.526 (0.476)		0.404			0.019
Bike	0.362 (0.402)	1.436	0.369	0.410 (0.416)	1.507	0.324	0.919 (0.329)	2.506	0.005
Moto or car	0.556 (0.552)	1.743	0.315	-0.298 (0.606)	0.742	0.623	0.336 (0.500)	1.399	0.501
Education			0.846			0.811			0.156
No educ (ref)									
Some primary	0.483 (0.669)	1.621	0.470	0.648 (0.891)	1.911	0.467	0.808 (0.629)	2.244	0.199
Primary finished	0.377 (0.582)	1.459	0.517	0.489 (0.616)	1.631	0.428	0.531 (0.474)	1.700	0.262
Secondary or +	0.696 (1.007)	2.006	0.490	0.921 (1.445)	2.513	0.524	2.356 (1.122)	10.545	0.036
Educ diff Same (ref)			0.767			0.494			0.489
Wife higher	0.068 (0.597)	1.071	0.909	-0.252 (0.579)	0.777	0.664	-0.583 (0.492)	0.558	0.236
Husb higher	0.336 (0.463)	1.400	0.467	0.545 (0.525)	1.725	0.299	-0.013 (0.404)	0.987	0.974
Land Own land			0.876			0.266			0.922
Rent land	-0.204 (0.502)	0.816	0.685	0.571 (0.667)	1.770	0.392	-0.285 (0.445)	0.752	0.523
Own and rent	0.111 (0.458)	1.117	0.809	0.468 (0.611)	1.596	0.444	-0.163 (0.414)	0.850	0.694
Free use	-0.677 (1.204)	0.508	0.574	-1.175 (0.765)	0.309	0.125	0.266 (0.786)	0.766	0.735
Ethnicity Luguru ref	-0.376 (0.382)	0.687	0.325	0.214 (0.403)	0.591	0.596	0.171 (0.320)	1.187	0.592
Religion (non-muslim ref)	0.301 (0.382)	1.351	0.431	-0.526 (0.476)	1.238	0.269	0.276 (0.337)	1.318	0.413
Age 15-25			0.614			0.015			0.335
26-35	-0.567 (0.601)	0.567	0.346	1.473 (0.567)	4.363	0.009	0.643 (0.519)	1.903	0.216
36-45	-0.985 (0.657)	0.373	0.134	1.461 (0.595)	4.309	0.014	1.183 (0.541)	3.263	0.029
46-55	-0.754 (0.739)	0.471	0.308	0.556 (0.674)	1.744	0.409	1.165 (0.622)	3.205	0.061
56-65	-0.102 (0.855)	0.903	0.905	2.832 (1.194)	16.981	0.018	1.028 (0.711)	2.796	0.148
66+	-0.527 (0.926)	0.591	0.570	0.220 (0.784)	1.246	0.779	0.950 (0.778)	2.585	0.222
Model statistics	R^2 Nagelkerke: 0.434			R^2 Nagelkerke: 0.198			R^2 Nagelkerke: 0.424		
	-2 Log Likelihood: 231.951			-2 Log Likelihood: 208.265			-2 Log Likelihood: 300.846		
	Chi^2 model: 103.801 ***	N = 301		Chi^2 model: 35.014 *	N = 301		Chi^2 model: 114.962 ***	N = 301	

Table 32: Logistic regression results (irrigation, fallowing, and vegetable cultivation)

	Irrigation			Fallowing			Vegetable cultivation		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	-2.799 (1.188)	0.061	0.018	-2.947 (1.095)	0.053	0.007	-2.885 (1.034)	0.056	0.005
DM index	-0.003 (0.004)	0.997	0.431	0.000 (0.004)	1.000	0.996	0.001 (0.004)	1.001	0.767
Village			0.000			0.041			0.000
Changarawe (ref)									
Vikenge	-0.124 (0.454)	0.883	0.785	-0.486 (0.534)	0.615	0.362	1.089 (0.408)	2.971	0.008
Kiwege	-1.742 (0.688)	0.175	0.011	0.978 (0.555)	2.658	0.078	-0.841 (0.538)	0.431	0.118
Sinyaulime	0.579 (0.516)	1.782	0.263	0.621 (0.534)	1.860	0.245	0.812 (0.474)	2.252	0.086
Occupation			0.276			0.025			0.909
Subsistence (ref)									
Commercial	0.779 (0.537)	2.179	0.147	1.317 (0.485)	3.732	0.007	0.200 (0.494)	1.221	0.686
Main not farming	-0.678 (1.110)	0.508	0.541	0.317 (0.947)	1.373	0.738	0.155 (0.809)	1.168	0.848
Transport means			0.042			0.823			0.001
No (ref)									
Bike	0.875 (0.361)	2.398	0.015	0.198 (0.327)	1.219	0.545	1.126 (0.314)	3.084	0.000
Moto or car	0.918 (0.538)	2.504	0.088	0.191 (0.494)	1.211	0.699	0.425 (0.483)	1.529	0.379
Education			0.311			0.326			0.052
No educ (ref)									
Some primary	-0.274 (0.755)	0.760	0.717	0.907 (0.628)	2.476	0.149	1.098 (0.599)	2.999	0.067
Primary finished	0.637 (0.513)	1.891	0.214	0.760 (0.480)	2.138	0.113	0.629 (0.451)	1.879	0.163
Secondary or +	-0.699 (1.273)	0.497	0.583	0.991 (1.019)	2.694	0.331	-1.510 (1.235)	0.221	0.221
Educ diff			0.610			0.310			0.535
Same (ref)									
Wife higher	0.227 (0.492)	1.254	0.645	-0.501 (0.496)	0.606	0.313	0.428 (0.442)	1.535	0.333
Husb higher	-0.354 (0.438)	0.702	0.420	0.418 (0.412)	1.520	0.310	-0.163 (0.384)	0.849	0.670
Land			0.200			0.160			0.105
Own land									
Rent land	0.060 (0.510)	1.061	0.907	-1.452 (0.681)	0.234	0.033	-0.029 (0.437)	0.971	0.947
Own and rent	0.845 (0.435)	2.329	0.052	-0.207 (0.451)	0.813	0.646	0.787 (0.402)	2.198	0.050
Free use	-0.160 (0.884)	0.852	0.856	0.468 (0.766)	1.596	0.542	-0.918 (0.906)	0.399	0.311
Ethnicity Luguru ref	0.186 (0.343)	1.205	0.586	0.832 (0.316)	2.298	0.008	0.385 (0.297)	1.470	0.194
Religion (non-muslim ref)	0.356 (0.360)	1.428	0.322	0.285 (0.366)	1.330	0.436	0.354 (0.320)	1.425	0.269
Age	0.009 (0.014)	1.009	0.505	0.002 (0.012)	1.002	0.862	0.006 (0.012)	1.006	0.624
Model statistics	R^2 Nagelkerke: 0.215			R^2 Nagelkerke: 0.197			R^2 Nagelkerke: 0.262		
	-2 Log Likelihood: 266.497			-2 Log Likelihood: 299. 121			-2 Log Likelihood: 330.306		
	Chi^2 model: 44.986 ***			Chi^2 model: 43.196 ***			Chi^2 model: 63.782 ***		
	N = 301			N = 301			N = 301		

Table 33: Logistic regression results (drought-resistant crops, hiring casual farm labourers and mulching)

	Drought-resistant crops			Hire casual farm labourers			Mulching		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	1.859 (0.929)	6.418	0.045	-1.407 (0.9398)	0.245	0.134	-4.185 (1.236)	0.015	0.001
DM index	0.010 (0.004)	1.010	0.013	0.003 (0.004)	1.003	0.446	0.005 (0.005)	1.005	0.377
Village						0.315			0.007
Changarawe (ref)									
Vikenge				-0.165 (0.385)	0.848	0.668	-0.477 (0.546)	0.621	0.382
Kiwege				-0.773 (0.473)	0.461	0.102	0.724 (0.616)	2.064	0.240
Sinyaulime				-0.217 (0.438)	0.805	0.620	1.344 (0.547)	3.835	0.014
Occupation			0.527			0.475			0.964
Subsistence (ref)									
Commercial	-0.351 (0.525)	0.704	0.503	0.571 (0.486)	1.769	0.240	0.128 (0.617)	1.136	0.836
Main not farming	-0.774 (0.808)	0.461	0.338	0.297 (0.800)	1.346	0.710	-0.193 (1.161)	0.824	0.868
Transport means			0.558			0.039			0.026
No (ref)									
Bike	0.337 (0.323)	1.400	0.297	0.353 (0.281)	1.423	0.209	1.033 (0.384)	2.809	0.007
Moto or car	0.313 (0.523)	1.367	0.550	1.122 (0.444)	3.071	0.012	0.553 (0.597)	1.738	0.355
Education			0.720			0.170			0.530
No educ (ref)									
Some primary	-0.306 (0.593)	0.737	0.606	0.063 (0.548)	1.065	0.908	0.926 (0.641)	2.523	0.149
Primary finished	-0.406 (0.482)	0.666	0.399	0.901 (0.433)	2.462	0.037	0.391 (0.515)	1.479	0.447
Secondary or +	-0.994 (0.920)	0.370	0.280	1.292 (0.881)	3.639	0.142	0.746 (1.265)	2.108	0.556
Educ diff			0.237			0.274			0.108
Same (ref)									
Wife higher	-0.571 (0.473)	0.565	0.227	0.010 (0.415)	1.010	0.981	-1.156 (0.691)	0.315	0.095
Husb higher	-0.580 (0.411)	0.560	0.158	0.601 (0.377)	1.824	0.111	0.465 (0.449)	1.592	0.300
Land			0.004			0.022			0.096
Own land									
Rent land	-1.165 (0.420)	0.312	0.006	-0.217 (0.411)	0.805	0.597	1.061 (0.518)	2.888	0.041
Own and rent	-1.130 (0.378)	0.323	0.003	0.987 (0.387)	2.683	0.011	0.181 (0.511)	1.199	0.722
Free use	-1.413 (0.779)	0.243	0.070	0.280 (0.700)	1.323	0.689	1.250 (0.765)	3.489	0.103
Ethnicity Luguru ref	-0.989 (0.321)	0.372	0.002	-0.076 (0.276)	0.927	0.784	0.363 (0.335)	1.438	0.278
Religion (non-muslim ref)	0.667 (0.325)	1.949	0.040	-0.035 (0.297)	0.965	0.905	0.093 (0.384)	1.098	0.808
Age	-0.004 (0.012)	0.996	0.745	0.001 (0.011)	1.001	0.923	0.008 (0.014)	1.008	0.562
Model statistics	R^2 Nagelkerke: 0.201			R^2 Nagelkerke: 0.170			R^2 Nagelkerke: 0.176		
	-2 Log Likelihood: 281.330			-2 Log Likelihood: 371.817			-2 Log Likelihood: 262.524		
	Chi^2 model: 42.758 ***			Chi^2 model: 40.898 ***			Chi^2 model: 35.361 *		
	N = 301			N = 301			N = 301		

Table 34: Logistic regression results (cover crops, fertilizers and mixed cropping)

	Cover crops			Fertilizers			Mixed cropping		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	3.189 (1.165)	24.186	0.006	-1.054 (1.171)	0.348	0.368	0.626 (0.426)	1.871	0.142
DM index	0.011 (0.005)	1.011	0.022	0.001 (0.005)	1.001	0.803	0.007 (0.003)	1.007	0.059
Village						0.000			0.017
Changarawe (ref)									
Vikenge				-0.179 (0.385)	0.836	0.643	-0.875 (0.356)	0.417	0.014
Kiwege				-2.369 (0.633)	0.094	0.000	0.001 (0.355)	1.001	0.997
Sinyaulime				-1.988 (0.551)	0.137	0.000	-0.012 (0.365)	0.988	0.974
Occupation			0.807			0.309			
Subsistence (ref)									
Commercial	-0.008 (0.634)	0.992	0.990	0.725 (0.563)	2.064	0.198			
Main not farming	0.764 (1.169)	2.147	0.514	0.789 (0.866)	2.202	0.362			
Transport means			0.012			0.658			
No (ref)									
Bike	1.162 (0.402)	3.196	0.004	0.094 (0.350)	1.098	0.789			
Moto or car	0.105 (0.550)	1.110	0.849	-0.382 (0.530)	0.683	0.472			
Education			0.071			0.046			0.200
No educ (ref)									
Some primary	-0.696 (0.714)	0.499	0.330	1.516 (0.638)	4.556	0.017	-0.983 (0.506)	0.374	0.052
Primary finished	-1.426 (0.595)	0.240	0.017	0.399 (0.522)	1.490	0.445	-0.422 (0.274)	0.656	0.124
Secondary or +	-2.256 (1.028)	0.105	0.028	1.945 (1.035)	6.996	0.060	-0.102 (0.759)	0.903	0.893
Educ diff			0.190			0.408			
Same (ref)									
Wife higher	0.457 (0.628)	1.579	0.467	-0.800 (0.598)	0.449	0.181			
Husb higher	-0.719 (0.470)	0.487	0.126	-0.099 (0.424)	0.906	0.815			
Land			0.000			0.516			
Own land									
Rent land	-0.730 (0.530)	0.482	0.168	0.273 (0.471)	1.314	0.562			
Own and rent	-1.829 (0.433)	0.161	0.000	0.618 (0.416)	1.855	0.138			
Free use	-1.581 (0.893)	0.206	0.077	-0.046 (1.162)	0.955	0.968			
Ethnicity Luguru ref	-0.714 (0.383)	0.490	0.062	0.476 (0.357)	1.609	0.182			
Religion (non-muslim ref)	0.475 (0.382)	1.608	0.214	-0.075 (0.351)	1.001	0.831			
Age	-0.016 (0.015)	0.984	0.289	0.001 (0.014)	1.001	0.955			
Model statistics	R^2 Nagelkerke: 0.262			R^2 Nagelkerke: 0.378			R^2 Nagelkerke: 0.073		
	-2 Log Likelihood: 211.313			-2 Log Likelihood: 256.647			-2 Log Likelihood: 400.264		
	Chi^2 model: 49.488 ***			Chi^2 model: 89.872 ***			Chi^2 model: 17.404 *		
	N = 301			N = 301			N = 315		

Table 35: Logistic regression results (food support, selling assets to buy food and wild vegetables)

	Food support			Selling assets			Wild vegetables		
	B (S.E.)	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**	**B (S.E.)**	**Exp(B)**	**Sig.**
Constant	-6.273 (1.501)	0.002	0.000	-1.987 (0.526)	0.137	0.000	-1.471 (1.252)	0.230	0.240
DM index	0.001 (0.006)	1.001	0.803	0.010 (0.005)	1.010	0.033	-0.001 (0.005)	0.999	0.783
Village			0.036			0.548			0.000
Changarawe (ref)									
Vikenge	0.880 (0.578)	2.411	0.128	0.413 (0.405)	1.511	0.308	0.891 (0.435)	2.437	0.041
Kiwege	2.017 (0.717)	7.517	0.005	0.447 (0.398)	1.563	0.262	2.608 (0.692)	13.573	0.000
Sinyaulime	1.735 (0.663)	5.668	0.009	0.577 (0.407)	1.781	0.156	2.242 (0.613)	9.412	0.000
Occupation			0.993						0.258
Subsistence (ref)									
Commercial	-0.082 (0.694)	0.921	0.906				1.061 (0.843)	2.888	0.208
Main not farming	-18.810 (13655.006)	0.000	0.999				-0.903 (0.892)	0.405	0.311
Transport means			0.329						0.900
No (ref)									
Bike	-0.440 (0.371)	0.644	0.235				0.093 (0.391)	1.097	0.812
Moto or car	-0.936 (0.817)	0.392	0.252				0.0269 (0.595)	1.309	0.651
Education			0.636			0.362			0.054
No educ (ref)									
Some primary	-0.942 (0.898)	0.390	0.294	0.486 (0.515)	1.626	0.345	-1.416 (0.668)	0.243	0.034
Primary finished	0.272 (0.575)	1.313	0.636	-0.196 (0.288)	0.822	0.497	-0.095 (0.594)	0.909	0.872
Secondary or +	0.664 (1.301)	1.943	0.610	-1.192 (1.093)	0.304	0.276	1.800 (1.377)	6.050	0.191
Educ diff			0.914						0.676
Same (ref)									
Wife higher	-0.234 (0.636)	0.792	0.713				-0.493 (0.571)	0.611	0.388
Husb higher	0.090 (0.492)	1.094	0.854				0.000 (0.490)	1.000	0.999
Land			0.005						0.259
Own land									
Rent land	2.185 (0.613)	8.894	0.000				0.586 (0.519)	1.798	0.259
Own and rent	1.334 (0.559)	3.797	0.017				-0.435 (0.461)	0.647	0.345
Free use	0.887 (0.888)	2.428	0.318				19.399 (12039.892)	265951553	0.999
Ethnicity Luguru ref	0.888 (0.400)	2.430	0.026				0.886 (0.404)	2.426	0.028
Religion (non-muslim ref)	0.092 (0.431)	1.097	0.831				0.837 (0.378)	2.310	0.027
Age	0.048 (0.016)	1.049	0.003				0.024 (0.016)	1.024	0.140
Model statistics	R^2 Nagelkerke: 0.196			R^2 Nagelkerke: 0.045			R^2 Nagelkerke: 0.347		
	-2 Log Likelihood: 218.228			-2 Log Likelihood: 352.802			-2 Log Likelihood: 214.141		
	Chi^2 model: 35.722 *			Chi^2 model: 9.893 (p-value 0.195)			Chi^2 model: 72.110 ***		
	N = 301			N = 314			N = 301		

CONCLUSION

In this concluding chapter, we first present a summary of the research findings per chapter, and then sketch the study's contributions to the academic literature. Next, we move on to the study's policy recommendations, and finally we consider some avenues for further research.

1. SUMMARY OF RESEARCH FINDINGS

Chapter 2 presented the study's mixed methods approach and offered a description of the research phases and each of the data collection tools and analysis methods used throughout. Next, the chapter provided details on the four study villages in the Morogoro Region. A brief comparison of socio-economic and demographic data across the villages showed the distinction between the two semi-urban villages in Mvomero District on the one hand, and the two rural villages in Morogoro Rural District on the other. This distinction was visible in terms of infrastructure (e.g. water access, electricity network, education and health facilities), diversity and composition of the population (e.g. many ethnicities, religions and socio-economic classes present in the villages in Mvomero District as university students and staff are living here), and access to markets, employment opportunities and natural resources. In terms of climate change manifestations, literature showed much uncertainty in future impacts, with the region facing potentially more or less rainfall. Based on a trend analysis of Tanzania Meteorological Data, we argued that locally, a significant increasing trend in minimum and maximum temperatures was visible (from 1971 to 2013). The increase of maximum temperatures was especially pronounced during the dry season. In term of rainfall, we found that Morogoro Town (proxy for villages in Mvomero District) experienced a significant decreasing rainfall trend in July (1971-2013), while Ngerengere (proxy for villages in Morogoro Rural District) experienced a significant decreasing trend in May (1986-2005). We argued that there is evidence of ongoing rainfall variability in the region. Next, we recognized the existence of multiple livelihood stressors that are interrelated to climate change and that can reinforce each other. In the four study villages, these livelihood stressors were, next to drought and unpredictable rainfall: poor farming tools and lack of access to agricultural inputs; crop and livestock diseases; destruction of farms and crops by wild animals and cattle; lack of customers for businesses; lack of clean water; and insufficient health and education facilities. Finally, chapter 2 finished by offering some comments in terms of the researcher's positionality and its effects on the study, as well as some of the study's limitations. The latter included the role of local leaders and the researcher's reliance on interpretation and translation.

Chapter 3 offered a brief policy analysis of Tanzania's climate change documents. First, we found that climate change plans and strategies such as the NAPA and NCCS are not integrated in Tanzania's national policies. This means that climate change plans are not enforceable as they have no legislative power. This exposed the challenge of climate change mainstreaming throughout (sectoral) policies. We illustrated that Tanzania's climate change documents framed climate change decision-making and adaptation as a purely technical and therefore 'neutral' issue (cf. system resilience approach). However, we argued that such apolitical framing actually serves to reinforce the status quo and hinders transformational thinking of climate change adaptation. Chapter 3 furthermore exposed some implementation challenges. While climate change plans are designed at the national level, implementation is supposed to happen at the local government level. However, local governments lack resources and expertise to implement the top-down policies. Moreover, ambiguity in the institutional framework, such as overlapping responsibilities, hinder the implementation process. On the ground, this is reflected in farmers' lack of trust that the government will take up the responsibility of climate change adaptation in the near future (as indicated in group discussions in the study villages). The framing of gender in adaptation plans was largely restricted to 'soft' sectors and women's reproductive roles (for example water fetching). Even though two gender mainstreaming documents exist with regard to climate change adaptation, their sector-specific recommendations are not taken into account. We furthermore established that (some) climate change policy documents mention gender in the diagnosis and priority-setting phase of the policy process, but all of these documents subsequently ignore gender in the planning, budgeting and M&E phase. This policy evaporation has meant that there are no concrete actions, measures and indicators proposed with regard to gender and climate change. The chapter furthermore found that policy documents homogenise women and men. Women are either presented as vulnerable and passive victims, or as 'active agents of change' who are instrumental to overcoming negative climate change impacts and can help improve the community's resilience to climate change. In terms of gender and development terminology, we therefore argued that policy documents are stuck in a Welfare (pre-WID) and Women in Development (WID efficiency and anti-poverty) approach.

Chapter 4 addressed farmers' lived experiences of climate change. The first part of the chapter focused on how farmers, through living their lives, understand and prioritize climate change. The chapter argued that as farmers face circumstances of high rainfall unpredictability, they perceive climate change adaptation as a game of trial and error. Small-scale farmers in practice possess few adaptation options (see also chapter 8). We showed that farmers' prioritization of

climate change depends on the one hand, on the centrality they attribute to agriculture (and their recognition of the vulnerability of a peasant society, where there is no food without rainfall), and on the other hand, on their beliefs in god as bringer of rain. The latter refers to farmers' understanding that the climate and rainfall are out of their control, and that humans are mere recipients of common natural resources such as rain. While traditional rainmaking rituals are no longer practiced, they remain pivotal in farmers' collective histories, invariably reminding of a time when the climate was considered as more 'manageable' and the individual burden of choice (i.e. the wager or game of trial and error) was relieved by a chief or elders (see Stroeken, 2012). In the second part of the chapter, we illustrated the gendered nature of lived experiences of climate change and how these mediate people's reaction upon the climate change challenge. We showed that men in the study villages have become increasingly involved in domestic water fetching activities, a traditionally female task. Men claimed that this change in division of labour had been forced upon them by harsh conditions and circumstances such as drought, male unemployment and high female labour burdens. However, we also found that men actively redefine the task in terms of public sphere activities, in particular through the use of bicycles (which implies a very different embodied experience of water fetching for men and women), and association to the cash economy through water vending activities. We asked if climate change can influence gender relations, and argued that gender norms are continuously challenged and adapted in everyday life (see e.g. Overa, 2007). Through everyday practices, men and women discursively (re)produce gender subjectivities (Butler, 1990) and at the same time negotiate these subjectivities through subversive act and speech (Foucault, 1978). This means that what is considered as gender-appropriate behaviour can change in response to societal, political, economic and environmental context. We therefore argued that as men's water fetching activities are redefined through association with the cash economy, technology (bicycles), the public sphere and masculinity, this offers an opportunity for the persistence of this changed division of labour, precisely because it draws upon naturalized gender roles (see also Carr, 2008). On the other hand, this same redefinition of water fetching activities by men also means that there has been no structural revaluation of women's work (which remains linked to the domestic and reproductive sphere) nor a restructuring of gendered power relations.

Chapter 5 argued that access to adaptation strategies is structured by intersections of gender and marital status and focused on the different adaptation pathways of (various types of) female-headed households and male-headed households. In this way, the chapter illustrated the importance of adopting an intersectional gaze in gender and climate change policy and

practice to prevent overgeneralisation and simplifying of complex local realities. Specifically, we compared adopted adaptation strategies across categories of married, widowed, divorced and never-married women and men; and this for two areas of adaptation in particular, namely livelihood diversification and agricultural water management. We found that divorced and married women are less likely to rely on irrigation compared to married men, and that female divorcees and widows are less likely to practice farming in valley land compared to married women. Next, it was established that except for widowers, all men are more likely to engage in income-earning outside of the farm compared to married women. Among women, we found that only female divorcees are more likely than married women to engage in income-earning activities outside of the farm. Finally, all men are more likely to get involved in casual farm work on other peoples' farms compared to married women. Based on these findings, we developed a typology to illustrate that (categories of) women and men may be disadvantaged in one adaptation area, but experience easier access to other adaptation fields. Throughout the chapter, we pinpointed various drivers of this unequal adaptation access. For example, one factor is land ownership. Land is a relational asset and women often have to secure their land access through their husbands or a male relative. Divorced women and widows consequently often lack (secure) land access. Another factor is education, as those who have attained lower educational levels, such as widows, find it harder to engage in non-farm income-earning activities. Similarly, a farmer's commercial-mindedness determines if she/he is able to sell many crops, and consequently if she/he can invest more in farming, for example in the form of irrigation. Furthermore, we have argued that widows and the elderly are entitled to food support from both the government and their relatives. This coping strategy was less open to other groups. Female divorcees' engagement in income-earning activities was frequent, but often less profitable than men's. One reason is that divorced women have less capital to invest and cannot rely on financial support and labour contributions from husbands. However, female divorcees also indicated that they were more autonomous in their decision-making compared to married women, which encouraged their independent business activities. We furthermore established that while a woman's marital status is a pivotal factor in determining her access to adaptation strategies, this was less the case for men. Married men's adaptation position does not typically worsen when they leave their marriage, and in this sense married men seem to have a stronger fallback position compared to married women (see also chapter 6). In married couples, we moreover found a risk spreading strategy of livelihood diversification at the household level, through specialisation by individual household members. In practice this meant that wives were often the ones engaging in agriculture, while husbands were doing non-farm

activities. We argued that in such cases, wives risk becoming more dependent on their husbands and possess lower fallback positions and intrahousehold bargaining powers.

In chapter 6 we started zooming in on the households of married couples in particular. Chapter 6 first offered an overview of factors and legislation influencing spouses' bargaining power in Tanzania. These are extrahousehold factors that are virtually the same for all Tanzanian women, despite potential differences in implementation and enforcement across the country. Compared to other African countries, Tanzania has progressive commitments to gender equality enshrined in its statutory laws (Dancer, 2015). One example is the country's family law, which includes provisions such as the equal division of matrimonial assets upon divorce, at least when the 'joint effort' in acquiring these assets can be established. Furthermore, spousal consent is required when selling or mortgaging matrimonial assets. With regard to custody of children women seem less well protected, and they often risk losing custody, especially when their children are somewhat older (e.g. over 7 years of age). Furthermore, in practice few alimony payments are made. Looking at the country's land laws, we found that women and men have equal right to acquiring land. Furthermore, when spouses do not explicitly demand that one person is registered as the owner of land, a joint title should be issued. Crucially, the Land Acts state that customary law cannot apply when it discriminates against women's land rights. However, the Land Acts do not apply to inherited land, and the country's inheritance laws in practice follow customary law in which women's rights are less secure (especially in patrilineal systems). In our villages, we found evidence that both male and female children inherit land. However, specific arrangements depend on the family and household under investigation. With regard to spouses' employment opportunities, we found that women are less often employed as wage labourer and typically earn less than men in any kind of employment or income-earning activity. While Tanzania possesses progressive statutory laws, many pitfalls remain on the ground that hinder this gender equality commitment. One example is the gender bias in formal institutions such as courts, which becomes visible in the inherently conservative way in which courts rule in land conflicts between spouses. Moreover, many Tanzanians are not sufficiently aware of their rights and therefore find it hard to claim them. In the second part of chapter 6, we unpacked respondents' discourses of the household decision-making process and argued that both women and men rely on a strong dominant discourse of household harmony and cooperation. Specifically, respondents indicated the complementarity of spouses' responsibilities and naturalised the synergy between husband and wife. Furthermore, wives' role was typically framed as one of assisting and helping their husband. This was justified through women's more restricted mobility (due to childcare and domestic roles) which made wives (to be perceived as)

less knowledgeable about the ways of life, and therefore dependent on their husbands' knowledge and advice. We found that most respondents indicated joint decision-making (i.e. both spouses advising each other), while others emphasised that the husband was the one responsible for making the final decision, and the wife could advise him on the direction the decision should take. However, we also found evidence of non-cooperative behaviour in couples. We established that couples deal with disagreement in various ways, for example by testing which decision has the best outcome, convincing one's spouse by painting a picture of future benefits, refusing to implement a decision one does not agree with, and involving a third person to help solve the argument. Furthermore, we found that for women to be able to make decisions, a prerequisite was for them to emphasise the joint nature of decisions and activities (such as income-earning activities through VICOBA groups), as well as their husbands' role as decision-maker (e.g. by explicitly asking for their husband's opinion). This, to maintain the idea(l) of household cooperation and – by not threatening husbands' authority – ensuring family harmony.

Chapter 7 argued that using an Actor-Partner Interdependence Model (APIM) improves our understanding of intrahousehold decision-making patterns of climate change adaptation. That is, when dealing with interdependent respondents (or dyads) such as spouses, we can gain a more complete picture by simultaneously addressing actor effects (i.e. effect of persons' characteristics on their own outcomes) and partner effects (i.e. the effects of spouses' characteristics on each other's outcomes). Not taking into account partner effects risks under - or overestimating effects and thus getting biased results. Furthermore, drawing upon earlier studies (see e.g. chapter 6) that have shown that women's and men's voice and decision-making power tend to depend on the type of decision under investigation, we distinguished between various adaptation decision-making domains. Specifically, next to a general decision-making index, we distinguished five additional (partly overlapping) indices: i.e. those containing the cash-related decisions, traditionally male decisions, traditionally female decisions, traditionally joint decisions (primarily agricultural), and individual-level decisions (primarily labour allocation). We showed that the drivers indeed differ across decision-making domains and argued that in the cash and traditionally male decision-making domains most room exists for changing decision-making mechanisms in favour of women. First, we found that a crucial factor in determining spouses' adaptation decision-making power is their respective income-earning activities outside of the home and farm. Wives' non-farm income activities are associated with more female adaptation decision-making power, and this is especially pronounced in the traditionally male and cash decision-making domains, as well as when their husbands are not

engaged in non-farm income activities. We revealed the existence of negative partner effects in wives (for the male and cash decision-making domain): i.e. husbands' involvement in non-farm income activities reduces their wives' decision-making power in the cash and traditionally male adaptation domains. Nevertheless, when both spouses engage in income activities, the net effects on wives' decision-making power remains positive. Drawing upon the notion of perceived contributions (Sen, 1990), we argued that wives' income activities not only improve their actual fallback position, but also contribute to the perception that they significantly contribute to the household's welfare, which improves wives' bargaining power within the household. Next, we found that husbands have positive actor effects for the individual decision-making domain, but not for other decision-making areas, and we revealed positive partner effects in husbands with regard to the cash and male decision-making domain. A potential explanation of the latter might be that as women's expenditure is (assumed to be) more household-oriented, it (is perceived to) relieve(s) stress from the spouses' pooled income. Next, we turned to education as a driver of decision-making power and found that both spouses' educational attainment positively affects wives' decision-making power. Husbands' actor effects are also positive, but we could not establish the existence of partner effects in husbands: i.e. husbands' decision-making power is independent of their wives' educational level. Furthermore, wives' asset ownership improves their own decision-making power within the male, cash and joint decision-making domains, whereas it hardly influences their husbands' decision-making power. We also found female actor effects with regard to the number of children in the household, although only for the traditionally female decision-making domain. Having more children in the household thus did not improve wives' decision-making power outside of the traditionally female domain. Wives' age, on the other hand, was positively associated to their decision-making power outside of the traditionally female domain. Chapter 7 thus argued that to ensure women's full participation in climate change decision-making, the stimulation of specific household level drivers is important.

Chapter 8 investigated the effect of wives' degree of adaptation decision-making power on their households' adaptation behaviour. We considered 18 household -and individual-level adaptation practices, ranging from agricultural actions to coping strategies and livelihood diversification; and showed that joint decision-making is the most frequently reported decision-making mechanism across all practices. We developed an index representing women's decision-making participation across the 18 adaptation decisions, and explained that high scores indicate either joint decision-making by the spouses or sole female decision-making. Low index scores, on the other hand, indicate that the husband is the sole decision-maker or that the spouses did

not actively make a decision, i.e. norm following informed the decision to (not)adopt adaptation practices. The decision-making index was used as an independent variable in logistic regression analysis. We found that extrahousehold and household-level factors are important determinants of households' adaptation behaviour. Furthermore, empirical evidence indicated that wives' degree of involvement in adaptation decision-making does influence their household's adoption of three adaptation strategies. First, when wives are more involved in adaptation decision-making, they are more likely to choose to engage in non-farm income-earning activities to diversify livelihoods. The second and third practice relate to households' planting cover crops and drought-resistant crops when wives participate more in adaptation decision-making. A potential explanation of women's preferences for drought-resistant crops lies in their traditional responsibility for household food security, and consequently, their risk spreading preferences in this regard. For the other 15 practices, we could not offer conclusive evidence that the degree of female decision-making participation played a role in determining the households' adaptation outcome. We argued that there are various reasons for this. First, farmers in the study villages possess relatively few adaptation options. Consequently, spouses are likely to have the same or rather similar preferences in terms of adaptation choices, and the intrahousehold bargaining set is expected to be relatively narrow. In such situations, intrahousehold bargaining is a relatively uninfluential factor in determining outcomes. We illustrated this by developing a coping-adaptation continuum, which showed that coping practices (such as working as a casual farm labourer, relying on food support and looking for wild vegetables and fruits in the bush) are actions that people are forced into out of poverty. Coping strategies are short-term and curative responses to climate stress, but do not structurally contribute to diminishing farmers' vulnerability to climate change. In (poorer) households that are forced into short-term coping, it is not surprising that there remains little scope for differing preferences between spouses and, consequently, for an intrahousehold bargaining process to influence decisions. This is also visible with regard to family farming, which entails producing yields that have characteristics of quasi-public household goods, and because of which spouses have strong common interests in improving their family farm. This is not the case for spouses' own income gained from non-farm activities, which have a more private character.

2. CONTRIBUTIONS TO THE LITERATURE

This PhD thesis has contributed to knowledge-building in various academic fields, specifically the climate change literature, and feminist economics.

First, the study contributed to the climate change literature by offering a nuanced gender analysis of local-level climate change adaptation in four Tanzanian study villages. We illustrated that lived experiences of climate change are gendered, and that in tandem with other societal changes, climate change can have an impact on the gender division of labour (if not on gender relations and structures). Next, this study has added a critical understanding to the gender and climate change literature by emphasizing that, in order to adequately capture and understand farmers' differentiated needs and capacities, we need to look beyond simple gender dichotomies. The research moved beyond homogenizing women and men, and beyond comparing female-headed households with male-headed ones (see e.g. Bhattarai et al., 2015; Huynh and Resurrección, 2014). Rather, we recognized the diverse positions and adaptation pathways of different types of female-headed households. Feminist scholars such as Crenshaw (1989) have argued in favour of a differentiated gender approach, simultaneously studying the interplay of gender and other social categories (e.g. class, age and marital status). Using an intersectionality perspective can help climate scholars understand the drivers of unequal access to adaptation strategies.

Second, we also contributed to the climate change literature by incorporating an intrahousehold gender perspective. The household, a gendered decision-making institution, has not yet been comprehensively dealt with in the climate change literature. Nevertheless, the intrahousehold bargaining literature has shown that the household is not a neutral unit, and that men and women within the household can be differently positioned to deal with climate change and to build adaptive capacity. In chapter 6 we have contributed to the understanding of which factors influence the intrahousehold bargaining process and spouses' bargaining powers within the Tanzanian household. In chapter 7 we illustrated a number of factors determining spouses' intrahousehold decision-making power of climate change adaptation. Furthermore, we showed that spouses' adaptation decision-making power is determined in a different way depending on the adaptation domain in question. For example, wives' voice over traditionally female adaptation decisions is determined by different factors than their voice over cash-related decisions. While a woman's degree of decision-making power over the former (i.e. traditionally female decisions) is influenced by the number of children present in the household and the wife's (non)engagement in non-farm income-earning activities, her decision-making power over

the latter (i.e. cash-related practices) is determined by both spouses' (non)engagement in non-farm income-earning activities, the wife's educational level, her ownership of assets and her age. In chapter 8 we contributed to literature on climate change, and on agricultural technology adoption, by illustrating the role that intrahousehold decision-making participation plays in households' adaptation behaviour. We showed that when husbands and wives have different preferences, and when the wife has scope to influence the outcome of the decision (i.e. she has considerable bargaining power or intrahousehold decision-making power), her voice can lead to the adoption of different adaptation strategies by the household (compared to when she would not have had a voice in the adaptation decision). In our study villages, households where the wife was more involved in adaptation decision-making, were more likely to plant cover crops and drought-resistant crops, and to diversify their incomes through female engagement in non-farm activities. This goes to show that intrahousehold factors should not be overlooked as they can (partially) explain households' adaptation behaviour. In addition, the research findings can also be relevant to other disciplines and to other fields within development studies. In particular, other disciplines might find it useful to consider and understand the role the household plays as a mediating decision-making unit (for example mediating policy incentives, technology adoption, information dissemination, risk spreading, etc.).

Third, the study contributed to the field of feminist economics in various ways. A key methodological novelty that the research offers is the application of the APIM approach (Actor-Partner Interdependence Model) to the intrahousehold bargaining question. The APIM is an approach that is well-known and frequently used in other disciplines but that has not yet been applied in feminist economics. In chapter 7 in particular, we argued that when studying interdependent respondents, such as household members, analysis benefits from taking into account both actor effects (i.e. effect of one's characteristics on one's own outcome) and partner effects (i.e. effects of spouses' characteristics on each other's outcomes). We have illustrated that taking into account solely actor effects risks overestimating the progressive effects of wives' non-farm income-earning activities (as negative partner effects in wives were revealed, i.e. when husbands worked outside of the farm their wives' decision-making power over the cash-related and traditionally-male decision-making domains was negatively influenced). Furthermore, the effect of education would have been underestimated when disregarding partner effects, as both wives' own higher educational attainment as well as their husbands' improved wives' decision-making power over the traditionally male domain. Ignoring partner effects thus implies showing only one side of the picture and therefore potentially leads to biased results and misinforming policy-makers. Next, we contributed to the intrahousehold bargaining literature by investigating the *climate adaptation* decision-making domain, a

decision-making area that has previously not been studied in detail within feminist economics. The field of feminist economics can furthermore benefit from the study's insights with regard to gender and intersectionality in determining access to adaptation strategies (chapter 5) and with regard to men's involvement in domestic water fetching (chapter 4). In chapter 4, we illustrated changes in division of labour in the reproductive sphere, and explained how men actively redefine the task of water fetching as a public sphere activity, in particular through association with technology (bicycles), the cash economy and masculinity. Finally, the study contributed to the literature by adopting an interdisciplinary approach and by using mixed methods to study the topic of intrahousehold bargaining. Combining a range of qualitative and quantitative methods enabled the generation of a comprehensive understanding of the complex social phenomenon of intrahousehold adaptation decision-making, with quantitative methods uncovering associations and qualitative research shedding light on processes.

3. POLICY RECOMMENDATIONS

A first policy recommendation relates to the fact that adaptation policies, actions and interventions should pay sufficient attention to the local level. On the one hand, climate change impacts and manifestations are felt at the local level and can differ widely even within one country, region or district. On the other hand, climate change cannot be considered in isolation from societal changes and other livelihood challenges farmers face. It is therefore crucial to understand local interpretations and prioritizations of climate change, and of climate change adaptation, in order to prevent inefficient, ineffective and unjust policy formulation and implementation on the ground (see also Becken et al., 2013). Many climate change scholars, including Paavola (2008) and Eriksen et al. (2005), have argued that adaptation policy interventions cannot follow a 'one-size-fits-all' approach or model. Rather, policy interventions need to offer a set of complementary adaptation measures. A local level focus is crucial to ensure farmers can access sensible adaptation options, and to improve their livelihood security and reduce their vulnerability to adverse climate change impacts.

However, such a local level approach requires decent funding and training at the local government level. This is currently not the case as local government authorities are made responsible for implementation of adaptation interventions designed at the national level, without receiving additional funding, training or staff (as discussed in chapter 3; see also Smucker et al., 2015; Shemdoe et al., 2015). As adaptation plans are currently not customised to specific local settings, LGAs lack handles or specific guidelines on how to deal with climate change impacts in their local ecosystems and communities. This requires better cooperation and coordination across the different governance levels, as well as more resources and training for implementing agencies. Moreover, the development of two-way information streams is key. Next to the top-down approach, a participatory bottom-up approach should be stimulated as well. This should happen throughout the policy cycle: i.e. in subsequently the needs assessment, the identification of policy priorities, the actual implementation phase, and in monitoring and evaluation activities. Farmers' local level and agricultural knowledge is highly valuable and this knowledge should be fed back to policy-makers. Interaction between the local, implementation level and policy-makers should thus be facilitated. Although this concern of two-way information streams is not limited to the topic of climate change adaptation, it is of particular relevance here because of the locality of climate change.

Second, and related to the former, is the fact that current climate change policy documents do not recognize the political and social equity dimensions of climate change (adaptation). In chapter 3 we illustrated that Tanzania's climate change policy choices are influenced by the natural sciences and therefore framed as purely technical decisions. However, through this apolitical framing, the country actually supports the status quo and hinders transformative forms of adaptation that address the underlying drivers of social inequity (Pelling, 2011; Smucker et al., 2015). Policy documents currently do not consider how unequal power relations and unequal access to resources are shaping farmers' adaptation options. This is in keeping with Tanzania's development policies that follow a similar tendency. Consequently, many adaptation interventions do not even target small-scale farmers, but rather focus on system resilience and investments in large-scale commercial farming. Furthermore, areas that are typically vulnerable to climate change, such as semi-arid areas, are not considered as suitable for such large-scale investments. We consider such policy directions as problematic and argue in favour of climate change adaptation policies that recognize and address unequal power relations to avoid reinforcing existing inequalities and marginalizing vulnerable groups.

In this regard, chapter 5 illustrates the importance of improving women's access to and control over land. Land is a key asset to agricultural livelihoods and has in recent decades been subject to growing commercialization making it an increasingly crucial condition for access to credit. We have shown that it is also a critical asset for accessing adaptation strategies such as agricultural water management. While many female household heads would benefit from easier *access* to and ownership of land, married women would benefit from increased *control* over land. The latter can be achieved by enforcing already existing land regulations, in particular laws with regard to automatic joint land titling and obligated spousal consent when selling or mortgaging land.

The Ministry of Community Development, Gender and Children should take up a more active role in mainstreaming gender in climate change and related sectoral policies. The Ministry should promote the inclusion and implementation of its *National Guidelines for Mainstreaming Gender into Climate Change related Policies, Plans and Strategies*, and transparently cooperate with other ministries to achieve this goal (in particular the Division of Environment of the Vice President's Office). The Ministry's *National Guidelines* offer a key entry-point to recognising the role of unequal power relations in shaping (female and male) farmers' adaptation pathways.

Third, and related to the former, throughout its legislative framework Tanzania has proven itself a progressive force for the advancement of gender equality in the country (see chapter 6). This is for example the case in its Land Acts. However, achieving more gender equitable outcomes

depends upon actual implementation and enforcement of these progressive policies. Policy-makers should therefore ensure that statutory courts are accessible to everyone by addressing pitfalls and hindrances, such as the gender bias in courts and the population's lack of awareness about their rights.

Fourth, policy makers need to invest in awareness-raising with regard to climate change adaptation, in particular among smallholder farmers. How can small-scale farmers deal with climate change impacts? Which adaptation options are available to them? We suggest that this awareness-raising exercise will be most efficient and effective through expansion of farmer field schools and agricultural extension services, also to remote rural areas. When at the local-level, farmers can learn about new agricultural methods through experimental education they can witness through their own eyes (at farmer field schools), and when stimulating low-cost and easily accessible agricultural solutions, the uptake of adaptation practices is likely to be most successful. For example, educating farmers about the use and production of manure can free them from having to buy (expensive) inorganic fertilizers. In this regard, particular attention should be paid to organic agriculture solutions. It is important that initiatives such as farmer field schools do not remain limited to those who are already confident about their adaptive capacity, are relatively well-off, or better connected to extension officers. Rather, such efforts should be directed at farmers who need more encouragement and are more adverse to considering new methods, and this through safe ways of experimentation (i.e. that will not risk their livelihood security). At the same time, policy-makers should stimulate and facilitate a reversed information stream: i.e. farmers' knowledge (on local opportunities and constraints) should be fed back to policy-makers. Farmers usually have better insights into what works (locally) and what does not, and policy-makers should invest in the collection of this information and take it into account in the design of policies and interventions.

We also argue in favour of improvements to (agricultural) infrastructure, and of the facilitation of non-farm employment so that farmers can engage in risk spreading strategies through livelihood diversification. However, it is important to note that the challenge is not just the uptake of innovations and adaptation practices. Rather, there also is a need to tackle the underlying causes of small-scale farmers' vulnerability by addressing unequal power relations and poverty reduction through e.g. the provision of a safety net. Rather than an either-or-story, both policy approaches are needed to enable sustainable change (see also Kristjanson et al., 2012). A vulnerability-reduction climate change policy needs to "focus attention to deep-rooted inequalities in acquiring basic needs and entitlements, such as land, educational, political enfranchisement, employment, housing and market opportunities" (Eakin et al., 2009: 215). This

implies that next to stimulating the uptake of agricultural innovations, policies should focus on reducing vulnerabilities by addressing its (social, economic and political) causes. In this regard, it is important to successfully mainstreaming climate change concerns throughout development policies and projects, tackling issues of access and power.

This brings us to the fifth policy recommendation: preventing the dichotomisation and homogenisation of women and men, as this downplays the complexity of gender dimensions of climate change adaptation. We argue in favour of an intersectionality approach, so as to avoid ineffective policy targeting and the marginalization of certain categories of women and men. In chapter 5, we have illustrated that a simplified, dichotomized idea of gender masks how intersections of gender and marital status structure individual farmers' access to adaptation strategies. It would thus be unwise to assume homogeneity of 'women' and 'men' as these categories consist of individuals with varying degrees of access to adaptation strategies, and policy initiatives are unlikely to be successful if they do not recognize this. Categories such as 'female-headed households' should also be recognized as diverse, since divorced, widowed and never-married women (and men) possess quite different adaptation pathways. The adaptation typology presented in chapter 5 can be helpful in broadening policy-makers' understanding of the differential needs and vulnerabilities of different categories of women and men, and can consequently be a useful instrument in policy targeting.

We warn against an overly narrow version of gender mainstreaming, and argue that gender mainstreaming should not become a technocratic exercise (see also Arora-Jonsson, 2014). As seen in chapter 3, Tanzania's adaptation policy documents do currently not (sufficiently) build upon the two existing climate change and gender mainstreaming documents. Nevertheless, these provide (especially when combined) a rather rich engagement with gender and adaptation, and offer both sector-specific proposals for interventions and organizational implementation guidelines. Their implementation should thus be promoted, in particular by the Ministry of Community Development, Gender and Children.

Furthermore, we argued in chapter 3 that while current climate change plans and strategies might recognise gender issues in the diagnosis and priority-setting phase, they ignore gender in later phases of the policy process (in particular the budgeting and M&E phases). Policy-makers should guard against such policy evaporation and ensure the gender-responsiveness of the entire policy process. In particular, they should translate gender concerns into concrete actions, measures and indicators, as well as allocate specific budgets to gender goals.

Sixth, if Tanzania indeed aims to improve gender equity in the country, it should seize the opportunity that climate change can pose, to bring about changes in gender division of labour (and gender relations). We have argued in chapter 4 and 6 that gender norms are continuously challenged and adapted in everyday life, although change may be slow and require 'hiding' behind formal discourses of traditional norms, male authority and household harmony. As such, it is crucial that climate change policy documents do not frame gender and adaptation as two unrelated concepts (as we found is currently the case, see chapter 3). Rather, climate change plans and strategies should recognize the interrelation between gender and adaptation, and consider using climate change as an entry point to improve gender equality. In chapter 4 we therefore argued that in order to support the changed division of labour in domestic water fetching (as observed in the study villages), policy-makers could: first, improve women's access to and ownership of bicycles; and second, raise awareness about the diversity of gender roles and tasks. The latter is crucial as gender norms (such as the idea that bicycles are for men and productive use only) might prevent women from actually using bicycles. Awareness raising might take the form of promoting images of women riding bikes, and men fetching water or looking after children. One entry point for such a facilitation of gender change might be to draw upon the existing diversity of gender roles and norms across the country, and showing gender equitable examples from/to other regions.

Furthermore, we recommend more investments in water infrastructure, especially in rural and remote areas. It is clear that not only more water points are required, but that especially their functionality is insufficient and should be monitored more promptly, and (timely and durable) reparations and maintenance should be ensured. Moreover, improving the equality of *access* to water should be a policy priority so as to prevent the discrimination of marginalized and vulnerable groups (e.g. single-headed female households, poor farmers, the landless, pastoralists and minority groups).

Seven, we argue that policy-makers should facilitate and encourage adaptation decision-making participation by women at all levels. There has been attention to the representation and participation of women in climate decision-making at various levels: international, national, formal institutions, and local communities. Ngigi et al. (2016) have put forward the challenge of "how to address the rigid informal institutions and norms that hinder women's full participation in decision-making" (2016: 23)? We acknowledge the importance of informal institutions and the focus of this study therefore was the decision-making unit of the household, i.e. the decision-making unit that is closest to people's everyday adaptation practices and lived experiences of climate change. If policy-makers aim to stimulate women's power in adaptation

decision-making within the household, chapter 7 suggests three main policy levers. First, facilitating wives' employment opportunities outside of the home and farm (especially when their husbands are not involved in non-farm income-earning activities). Second, facilitating the independent ownership of assets by wives. And third, stimulating education (both of wives and their husbands). Climate change policies should facilitate the development of these drivers to ensure women's full participation in household-level decision-making of climate change adaptation.

4. AVENUES FOR FURTHER RESEARCH

In this final section of the PhD thesis, we suggest some avenues for further research. First, it did not lie within the scope of this PhD study to investigate if small-scale farmers' preferred and/or adopted adaptation strategies are indeed improving their resilience to climate change. That is, in this research (and chapter 5 and 8 in particular) the outcome level was farmers' and individuals' adoption of a range of adaptation practices and strategies that were distinguished based on academic literature review and primary qualitative data collection (in particular facilitated group discussions). Future research could take the analysis a step further by investigating whether farmers' preferred adaptation practices, or the adaptation strategies they choose to adopt, are indeed contributing to better outcomes in terms of their livelihood security and climate change resilience (e.g. improved agricultural yields, higher incomes, more risk spreading, etc.). It is crucial that such research considers outcomes at both the household-level and at the level of individual household members. I.e. further research should pay attention to intrahousehold dynamics and consider the possibility of unequal intrahousehold allocation of benefits and costs.

Second, it is worth recognising that intrahousehold relations range broader than the dyad of the spouses. In this study, the majority of respondents emphasised that the conjugal unit was the major decision-making unit for adaptation decisions. For example, only few respondents indicated that someone who is not the husband or wife decided about whether or not a practice was adopted by the household. (However, the existence of 'another decision-maker' was more frequently mentioned by female-headed households, and it would be interesting for further research to look into this.) In Tanzania and other Sub-Saharan African countries, the extended family remains pivotal as a social and economic safety net, and we suggest that future research should ask which role the extended family plays in influencing (nuclear) household's decision-making processes. Such research could take the form of either in-depth qualitative research, or quantitative research that in particular considers how multiple household or family members can be included in economic and statistical modelling. Particular attention should be paid to the role of spouses' parents and paternal and/or maternal uncles.

Next, further research could compare the results of this PhD study to a (similar) context in which farmers possess a broader range of adaptation options and opportunity sets. When more adaptation options are available, the bargaining set is likely to be broader and consequently, more variation in intrahousehold bargaining will be visible across sample households. It would be particularly interesting to compare if in such a context intrahousehold bargaining indeed

gains importance, and whether and how wives find opportunities to influence adaptation decisions.

Fourth, longitudinal and qualitative research can provide more comprehensive insights into the directions of influence at play. Longitudinal research would be particularly useful in investigating the causality of spouses' decision-making power (or decision-making participation) and their adaptation behaviour.

Fifth, we recommend further research on climate change risk perceptions and risk preferences of Tanzanian women and men, and wives and husbands. Such insights would improve our understanding of adaptation preferences across the sexes. However, it is crucial that such research adopts an intersectionality perspective, as it is likely that risk preferences differ depending on women and men's social situation and status (e.g. individuals possess different entitlements based on their marital status), their livelihood strategies and options, etc. It is thus key that future research does not make blind generalisations about complex social and gender relations.

Furthermore, future policy analysis would benefit from interviews with policy-makers and implementers to gain in-depth insights into the reasons behind certain climate change (adaptation) framings. Such interviews could provide information with regard to *why* gender concerns are barely incorporated in climate change policy documents; whether and *how* the Ministry of Community Development, Gender and Children is trying to get gender on the climate change agenda; and whether and how the Gender Ministry is cooperating – or lacking cooperation – with the Division of Environment of the Vice-President's Office.

A seventh avenue for further research relates to the role of, in particular the Luguru's, matrilineal heritage. For example, what is the role of a matri/patrilineal heritage in (facilitating or hindering) shifts in gender division of labour, such as in domestic water fetching? Are men (and women) who are brought up in a (more) matrilineal system more likely to welcome such changes in gendered division of labour? Do men in matrilineal systems redefine their water fetching tasks in a different way compared to men in patrilineal systems? In a similar vein, further research could explore the role of village-level diversity in ethnic groups, religions and lineage systems, and the influence of such diversity on trends in division of labour and transformation of gender roles.

Finally, future research could draw upon our methodology by applying an Actor-Partner Interdependence Model (APIM) to intrahousehold bargaining and decision-making questions. Future investigation into household relations should take into account how both actor and partner effects shape spouses' outcomes, such as their decision-making powers. The APIM can also be applied outside of the climate change decision-making domain, to for example

employment decisions, decisions to seek (maternal) health care support, and women's ability to make strategic life choices (Kabeer, 1999).

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SAMENVATTING (SUMMARY IN DUTCH)

Deze doctoraatsstudie omvat een genuanceerde genderanalyse van klimaatadaptatie in vier rurale dorpen in de Morogoro regio van Tanzania. De studie bestudeert hoe kleinschalige landbouwers zich trachten aan te passen aan klimaatverandering, en de rol die gender hierin speelt. Doorheen de hoofdstukken verschuift de focus van het onderzoek geleidelijk van een bredere genderanalyse van klimaatverandering naar beslissingsprocessen rond adaptatie in het huishouden. Hiernaast tracht het onderzoek steeds aandacht te schenken aan intersectionaliteit (kruispuntdenken) of de verschillende manieren waarop sociale categorieën zoals gender, klasse en etniciteit elkaar versterken en samen structuren van uitsluiting vormen.

De studie gebruikt gemengde methoden *(mixed methods)* en combineert kwalitatieve en kwantitatieve databronnen en onderzoeksmethoden. Kwalitatieve data zijn afkomstig van groepsdiscussies, semi-gestructureerde (huishoud)interviews, *change stories* en participatieve methoden zoals *pair-wise ranking* en observatie. Kwantitatieve data werden verzameld door middel van 844 enquêtes en verwerkt via statistische analyse. Zowel kwantitatieve als kwalitatieve data tonen aan dat boeren worden geconfronteerd met verscheidene lokale gevolgen van klimaatverandering. Specifiek gaat het om temperatuurstijging, een hogere variatie en onvoorspelbaarheid van neerslag, een daling van de neerslag in bepaalde maanden en meer (destructieve) neerslag op korte termijn, wat leidt tot overstromingen. Deze veranderingen in het klimaat vormen een uitdaging voor kleinschalige boeren die afhankelijk zijn van neerslag en nauwelijks aan irrigatie doen. Hiernaast is het belangrijk om te begrijpen dat klimaatverandering voor boeren geen geïsoleerde uitdaging is, maar samenvalt met en versterkt wordt door andere uitdagingen zoals ontbossing, erosie, het gebrek aan geavanceerde landbouwtechnieken en *inputs*, het gebrek aan infrastructuur, de vernieling van velden door vee en wilde dieren, het gebrek aan mogelijkheden om inkomen te vergaren buiten de landbouw, en als gevolg hiervan voedselonzekerheid.

Het eerste, inleidende, hoofdstuk brengt de literatuur rond gender, klimaatadaptatie en het huishouden samen en licht de onderzoeksopzet uitgebreid toe. Na een gedetailleerde uiteenzetting van de gebruikte methodologie en een beschrijving van de studiedorpen in hoofdstuk 2, biedt hoofdstuk 3 een beleidsanalyse van het klimaatbeleid van Tanzania. In deze beleidsanalyse bekijk ik hoe klimaatadaptatie en gender gekaderd worden in de nationale beleidsdocumenten, -plannen, en -strategieën. Ik beargumenteer dat een technische en

neutrale kadering van klimaatadaptatie de status quo ondersteunt en transformationeel denken over klimaatadaptatie in de weg staat. Het hoofdstuk bespreekt de uitdaging van het *mainstreamen* van klimaatadaptatie in sectoraal beleid, alsook moeilijkheden in implementatie zoals het gebrek aan middelen op het lokale beleidsniveau. Genderanalyse wordt in de klimaatdocumenten beperkt tot de 'zachte' sectoren (zoals gezondheidszorg en water) en tot de reproductieve taken van de vrouw. Hoewel twee ministeries documenten rond gender *mainstreaming* hebben uitgewerkt, houden andere klimaatplannen geen rekening met de aanbevelingen. Beleidsaandacht voor gender is beperkt tot diagnose en prioriteitsbepaling, en is totaal afwezig in budgettering en monitoring en evaluatie. Hierdoor worden beleidsplannen niet vertaald in concrete acties, maatstaven en indicatoren rond gender en klimaatadaptatie. Bovendien worden vrouwen beschouwd als ofwel kwetsbare en passieve slachtoffers, ofwel als actieve *agents of change* die met hun onaangeboord potentieel de kwetsbaarheid van de gemeenschap kunnen remediëren. In termen van de literatuur rond gender en ontwikkeling, blijven de Tanzaniaanse beleidsplannen daardoor hangen in een welzijnsaanpak enerzijds, en een efficiëntieaanpak anderzijds. Aandacht voor machtsrelaties tussen (categorieën van) mannen en vrouwen ontbreekt volkomen.

Hoofdstuk 4 onderzoekt de *lived experiences* van klimaatverandering en beargumenteert dat boeren adaptatie beschouwen als een loterij of een *game of trial and error*. De prioriteit die boeren toekennen aan klimaatadaptatie hangt enerzijds samen met de centrale rol van landbouw in een agrarische samenleving, en anderzijds met het geloof dat god de brenger van regen is. Dit laatste wijst erop dat boeren klimaat en regen beschouwen als verschijnselen waarover ze geen controle hebben. Verwijzing naar traditionele regenrituelen herinnert respondenten aan een tijd waarin het klimaat als beheersbaarder werd gezien, aangezien individuele verantwoordelijkheden werden gedeeld door het collectief. Het tweede deel van hoofdstuk 4 kijkt naar de manier waarop *lived experiences* van klimaatverandering verschillen voor mannen en vrouwen. Mannen in de vier studiedorpen participeren steeds vaker in de watervoorziening voor huishoudelijk gebruik, een traditioneel vrouwelijke taak. Hoewel mannen benadrukken dat deze nieuwe arbeidsverdeling aan hen wordt opgedrongen door de omstandigheden (droogte, grote werklast van vrouwen, werkloosheid van mannen), argumenteert dit hoofdstuk dat zij deze taak actief herdefiniëren binnen de publieke ruimte. Dit doen zij specifiek door het gebruik van fietsen bij de watervoorziening, en door het verkopen van water en dus het genereren van inkomensactiviteiten. Het hoofdstuk besluit dat mannen zich bij de herdefiniëring van watervoorziening beroepen op traditionele genderrollen, waardoor de nieuwe taakverdeling enerzijds meer kans heeft om te blijven bestaan, maar

anderzijds geen structurele verandering betekent van de machtsrelaties tussen mannen en vrouwen.

Kruispuntdenken brengt een betekenisvolle bijdrage aan het debat rond klimaatverandering en genderrelaties, een discipline waarin 'vrouwen' en 'mannen' vaak nog beschouwd worden als homogene categorieën. In hoofdstuk 5 differentieer ik daarom groepen van mannen en vrouwen naar burgerlijke staat (getrouwd, gescheiden, ongehuwd, weduwe/weduwnaar), en analyseer ik hoe de toegang tot adaptatiestrategieën gestructureerd wordt door intersecties van gender en huwelijksstatus. Uit logistische regressieanalyse blijkt dat sommige categorieën van vrouwen benadeeld zijn in hun toegang tot bepaalde adaptatiestrategieën, maar dat zij tegelijkertijd betere toegang hebben tot andere strategieën. Meer specifiek laat de studie zien dat, in vergelijking met getrouwde vrouwen, gescheiden vrouwen en weduwen minder kansen hebben om aan landbouw te doen in valleien, waar meer water voorradig is voor irrigatie en de grond vruchtbaarder is. Een andere bevinding is dat alle categorieën van mannen, in vergelijking met getrouwde vrouwen meer kans hebben om een inkomen te verwerven buiten de landbouwsector. Onder vrouwen zijn het gescheiden vrouwen die de meeste kans hebben om op deze manier een inkomen te verdienen. Hoofdstuk 5 bespreekt verder de drijvende krachten die deze ongelijke toegang tot adaptatie kunnen verklaren. Een belangrijk element hierin is de toegang tot en controle over land. Land is een relationeel product en de toegang van vrouwen tot land komt vaak tot stand via hun echtgenoot of een mannelijk familielid. Het zijn daarom voornamelijk gescheiden vrouwen en weduwen die een beperkte toegang tot land hebben. Daarnaast speelt ook scholing een rol: weduwen bezitten vaker een lagere opleidingsgraad en ondervinden daarom moeilijkheden om een inkomen te verdienen buiten hun landbouwactiviteiten. Weduwen en weduwnaars hebben echter vaker recht op voedselsteun van de overheid en familieleden, en dit vormt voor hen een belangrijke overlevingsstrategie.

Hoofdstukken 6 tot en met 8 kijken nadrukkelijk naar intrahuishoudelijke relaties door te focussen op getrouwde en samenwonende koppels. Het inleidende hoofdstuk 6 geeft informatie over het theoretische luik van dit deel van de doctoraatsthesis. Het bespreekt de economische literatuur rond 'intrahuishoudelijk onderhandelen' (*intrahousehold bargaining*), en plaatst deze naast de legislatieve context van Tanzania. Ik toon aan welke Tanzaniaanse wetten invloed hebben op de beslissingsmacht van mannen en vrouwen. Specifiek bespreek ik wetgeving rond het huwelijk en echtscheiding, het bezit van land, erfrecht en betaalde arbeid. Het laatste deel van hoofdstuk 6 baseert zich op semi-gestructureerde interviews en groepsdiscussies, en poogt inzicht te verschaffen in het discours dat mannen en vrouwen gebruiken wanneer zij over

huishoudelijke relaties praten. Hierbij valt op dat respondenten in hun betoog (initieel) veel belang hechten aan begrippen zoals samenwerking, harmonie en complementariteit binnen het huishouden. De rol van vrouwen wordt typisch gekaderd als het assisteren van hun echtgenoot, die instaat voor het financiële welzijn van het gezin. Vrouwen staan dan weer in voor de zorg voor de kinderen en de boerderij, wat hun mobiliteit sterk beperkt. Niettemin doorprikten sommige respondenten dit ideaalbeeld en gaven zij inzicht in hoe koppels omgaan met conflict en onenigheid in het huishouden.

In hoofdstuk 7 introduceer ik het *Actor-Partner Interdependence Model* als methode om intrahuishoudelijke beslissingspatronen rond klimaatadaptatie te analyseren. Dit model houdt rekening met de onafhankelijkheid van de antwoorden van echtgenoten door zowel actor- als partnereffecten te schatten. De methode schat dus zowel het effect van de eigen karakteristieken van de echtgenoten op hun eigen uitkomsten (actor effect) als op de uitkomsten van de partner (partner effect). Bovendien maak ik in hoofdstuk 7 een onderscheid tussen verschillende beslissingsdomeinen binnenin het klimaatadaptatiedomein. De beslissingsmacht van echtgenoten hangt immers af van de specifieke beslissing waarover zij onderhandelen. Daarom wordt een onderscheid gemaakt tussen adaptatiebeslissingen die a) cash vereisen, b) traditioneel meer mannelijk en c) meer vrouwelijk zijn, d) traditioneel bij het huishouden liggen, en e) meer individuele beslissingen omvatten rond de allocatie van arbeid. Hoofdstuk 7 besluit dat vrouwen meer beslissingsmacht hebben wanneer zij buitenshuis een inkomen verdienen. Wanneer hun echtgenoten (ook) buitenshuis werken wordt de macht van vrouwen over beslissingen die cash vereisen of traditioneel meer mannelijk zijn kleiner. Als verklaring wijs ik op Amartya Sen's notie van 'gepercipieerde bijdragen' (*perceived contributions*): de tewerkstelling van vrouwen buiten het huishouden verhoogt niet enkel hun vangnet (*fallback position*), maar stimuleert ook de perceptie dat zij significant bijdragen aan het welzijn van het gezin. Hierdoor wordt de beslissingsmacht van de vrouw binnen het huishouden verhoogd. Verder bekijk ik in het hoofdstuk de effecten van scholing, leeftijd, aantal kinderen en de eigendommen van vrouwen op beslissingsmacht. Het hoofdstuk toont zo aan welke huishoudelijke drijfveren belangrijk zijn in het stimuleren van participatie van vrouwen in klimaatadaptatiebeslissingen.

Hoofdstuk 8 spitst zich toe op het effect van adaptatiebeslissingsmacht van de vrouw op de gehanteerde adaptatiestrategieën van het huishouden. In totaal worden 18 adaptatiestrategieën onderzocht via logistische regressie. Zowel kwalitatieve als kwantitatieve data tonen aan dat gezamenlijke beslissingen van de echtgenoten het meest frequent

voorkomen. Het hoofdstuk besluit dat vrouwen die een grotere beslissingsmacht hebben over adaptatie, meer kans hebben om buitenshuis te werken, gewassen te planten die beter bestand zijn tegen droogte, alsook gewassen die de fertiliteit van de bodem bevorderen en de groei van onkruid tegengaan. Verder beargumenteer ik in het hoofdstuk dat de klimaatadaptatie-opties van kleinschalige boeren beperkt zijn, en dat het telen van landbouwgewassen gezien moet worden als de productie van quasi-publieke huishoudgoederen. Als gevolg hiervan hebben echtgenoten vaak dezelfde ideeën en voorkeuren rond adaptie. Aan de hand van een overlevings-adaptatie continuüm toon ik aan dat boeren door armoede en gebrek aan middelen in korte termijn overlevingsstrategieën worden gedwongen. Voorbeelden van zulke strategieën zijn afhankelijkheid van voedselsteun, het zoeken van wilde vruchten en groenten, en als arbeider werken op boerderijen. Deze strategieën dragen niet structureel bij aan het versterken van de capaciteit van boeren om zich aan te passen aan het veranderende klimaat.

Het finale hoofdstuk besluit met een samenvatting van de voorgaande hoofdstukken, een overzicht van de bijdragen aan de academische literatuur, beleidsaanbevelingen op basis van de studieresultaten, en pistes voor toekomstig onderzoek.