

Gender and Irrigation: Its Implications on Sustainable Agriculture Intensification. *The Case of Ntcheu District, Malawi.*

Draft Field Research Report

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Acknowledgements

The author would like to thank the plot holders in the, Kandeu EPA for participating in this research. Great indebtedness is given to the Agriculture Department- Kandeu Office for their technical expertise during the study. The cooperative spirit received from the following village heads: Nyazanyaza, Chona, Kaziputa, Kampanja and Chituku and the Irrigation Management Committee of Kaziputa Irrigation Scheme during the study is recognized. The support given by CGIAR Land, Water and Ecosystems programme, CIAT-Malawi and the International Water Management Institute-Southern Africa in carrying out the base line survey on which this study was anchored, is gratefully acknowledged.

Contents	
Acknowledgements.....	i
Contents	ii
Acronyms	iv
Summary.....	v
List of Tables	vi
List of Figures.....	vii
List of Annexes	viii
1.0 Introduction.....	1
1.1 Theoretical Framework.....	2
1.2 Background	3
1.2.1 Gender influence on Production.....	3
1.2.2 Ownership and access to productive Resources	3
1.2.3 Gender and Leadership.....	4
1.2.4 Control over Income and Expenditure	4
1.2.5 Gender and productive time allocation.....	4
1.2.6 Gender, social change and development	4
1.2.7 Sustainability pathways.....	5
2.0 Methodology	6
2.1.0 Contextualizing Ntcheu District: Most dry but least irrigated	6
2.1.1 Study site.....	7
2.1.2 Site selection	8
2.1.3 Data collection	8
3.0 Case study: Results	9
3.1.1 Farming methods used by gender.....	9
3.1.2 Allocation of resources.....	10
3.1.3 Land resources	10
3.1.4 Access to water resources	13
3.1.5 Access to agro-inputs and human resources.....	15
3.1.3 Gender and irrigation production	16

3.1.4 Challenges to crop production	18
Group membership and Leadership	19
3.1.6 Leadership	19
3.1.7 Women’s roles in irrigation farming.....	21
3.1.8 Time allocation	21
3.1.9 Income and expenditure	24
3.2.0 Asset ownership by gender	28
3.2.1. Strategies used in controlling resources, production and income	28
Discussions	29
Conclusion	31
References.....	31
List of Annexes	35
Annex A (Table 11): Seasonal Calendar	35
Annex B (Table 12) Summary of objectives and methods used.....	37
Pictorial summary.....	38

Acronyms

CGIAR- Consortium of International Agriculture Research Centers

CIAT- International Centre for Tropical Agriculture

FAO- Food and Agriculture Organization of the United Nations

IWMI- International Water Management Institute

UN- United Nations

WLE-Water Land and Ecosystems

EPA- Extension Planning Area

Summary

Efforts have been made to intensify crop production through various technologies including irrigation schemes practices in Southern Africa as in other developing countries, however less focus on have been placed on the extent to which gender relations can hinder or be used as leverage to production. The study finds that gendered spaces manifested in differentiated crop choices and labour investment in selected tasks by men and women indicates that gender gaps still exist in the agriculture arena particularly in irrigation schemes where cultural checks and balances are compromised. More over women in Ntcheu are the landholders and have some degree of control on resources such as land and water however they have limited control over markets--a gap that breaks the empowerment cycle. The gendered division of labour in Kaziputa irrigation scheme shapes the promotion of agriculture intensification activities between the default *summer- land lords* and the *dry season- tenants* (irrigators). The study utilized key informant interviews, focus group discussions and non-obtrusive observation to get an understanding of the different gendered strategies used to increase production in matrilineal communities such as Ntcheu. This paper concludes that intra-household power dynamics catalyse gender differences that are observed in the fields, markets, management and even in resource ownership and control. The paper therefore recommends that irrigation facilitation be practiced consistently with the existing local cultural tenure systems to protect the existing systems which in matrilineal societies support the interests of women.

List of Tables

Table 1: Categorization of participants

Table 2: Farming methods used in Kandeu area

Table 3: Water source use allocation by farmers

Table 4: Access to inputs by gender

Table 5: crop production by gender in Kandeu area

Table 6: Pests and diseases in Ntcheu district

Table 7: Rainfall intensity, food availability and income available by season

Table 8: Labour intensification monthly score by gender

Table 9: Source of income by gender

Table 10: Levels of income by gender

Table 11: Sales and expenditure by gender

List of Figures

Figure 1: Case Study Map of Ntcheu District- Kandeu area

Figure 2: Agriculture Intensification Strategies by gender

Figure 3: Women fetching water from different sources for different uses

Figure 4: Water flowing in a canal and infrastructure dilapidation

Figure 5: Staff recruitment by gender

Figure 6: Irrigation Management Hierarchy

Figure 7: Activity cycle for both rainfed and irrigation plots

Figure 8: Stakeholder mapping

List of Annexes

Annex A: Seasonal Calendar for both rainfed and irrigated plots

Annex B: Summary of objectives and methods

Annex C: Pictorial Summary

1.0 Introduction

Gender relations within irrigation scheme contexts have been used as leverage to increase food production efficiency in the face of population increase where resources are non-multipliable and non-renewable, (FAO, 2011). Whilst there is massive complexity and heterogeneity amongst irrigation schemes, Doss (2001a) provides that gender (socially endorsed roles and identities) regularly shapes farmers' accessibility to labour, inputs, land, markets and control of produce as a result of choices and constraints at household and scheme management levels. Nemarundwe (2005) also highlights the extent to which internal dynamics within institutions in irrigation schemes determine the position of men and women in relation to managing access to and control of resources for agricultural production. Henceforth efforts have been made to reify irrigation schemes in Southern Africa as in other developing countries through the gender lens as a platform to promote food production and livelihoods improvement through sustainable agriculture intensification (Reardon *et al*, 1998). The pivotal role of gender relations in agriculture production is postulated by Jayasekhar *et al* (1992) as reflected in agriculture systems where male decision making roles in irrigation were not always superseding instead there were many cases where redefinition of gender roles exist --women not only contribute labour but also play important roles in decision making regarding crop selection, fertilizer input, insecticides applicants, labour supervision, harvesting and marketing of crops (Carswell, 1987). Such a promotion of gender driven sustainable agriculture intensification comes against a setting where uneven distribution of resources, unpredictable climate conditions and exponential increases in population require that a multifaceted strategy to increase food production upon which vulnerable areas, particularly the dry lands depend.

Despite attempts in Southern Africa to place gender at the centre of irrigation agriculture traditional agriculture system and productivity has changed due to resources dilapidation owing to rapid population growth (Lele and Stone, 1989). Consequently tenurial rights have shifted, irrigation plot holdings have reduced in size and are more patchy, cultivation pushed to delicate boundaries, many households now rent land, and untilled periods have become shorter, following constrained land availability amplifying the gender gap that already existed (Kevane, 2004). While land is a conveyor belt to agriculture production the degree to which men and women have access to and control of land and related resources catalyses the creation of gender gap in agriculture production and poverty reduction (Hopkins, 1973). Farmers in Ntcheu District of Malawi have nonetheless reacted to such encounters by engaging in Sustainable Agriculture Intensification. Conventionally, intensification has aimed to raise production, yields and income per unit area through greater investments of capital (physical inputs) and labour to meet the demands of an exponential population growth and an increased livestock demands (UN Millennium Project, 2005). However, its success is vested in the degree of control by men and women of income expenditure, ownership and control of resources, the degree of inclusion/exclusion in irrigation management activities as well as time allocated for productive activities.

South-central Malawi is a particularly culturally interesting context in which to study gender and its implications on sustainable agricultural intensification. This part of Malawi is largely matrilineal and matrilocal hence men access land through their wives upon marriage and also move to stay at the wife's home when married (Peters, 2010). Nonetheless the system is not matriarchal though women have more influence on land and related resource allocation. Consequently this environment provides a rich setting for studying the dynamics of gender towards increasing food production within drylands areas such as the Chinyanja triangle.

Using a case study approach based on qualitative data collection the study questions the possible implications that gender might have on food production efficiency. It further seeks to determine the possible relationship between gender, asset ownership and income as well as resource control. An examination of the intra-household and institutional interaction between men and women plot holders in scheme and rainfed settings provides the basis of such inquiry. This study is a follow up on the

baseline survey (CGIAR 1.1) done in the Chinyanja triangle under the guidance of the IWMI in conjunction with CIAT-CGIAR Centre in Malawi which aims to improve food security for the rural poor. The Dryland Systems Program is embedded into CGIAR Research Program on Water, Land and Ecosystems (WLE) which collates the resources of 11 CGIAR centres, the Food and Agriculture Organization of the United Nations (FAO) and numerous national, regional and international partners to provide an integrated approach to natural resource management research. WLE promotes a new approach to sustainable intensification in which a healthy functioning ecosystem is seen as a requirement to agricultural development, resilience of food systems and human well-being. This program is led by the International Water Management Institute (IWMI), a member of the CGIAR Consortium and is supported by CGIAR, a global research partnership for a food secure future.

The report continues with a framework that focuses on the degree of empowerment by men and women on the domains of control in irrigation agriculture. This is followed by a background. The case study section then focuses on the strategies employed by men and women in the drylands towards an increased food production. This is followed by section on discussions that provide the coping strategies employed by gender in sustainable agriculture intensification, the conclusion then summarizes the findings.

1.1 Theoretical Framework

To get an understanding of how gender influences production in environmentally fragile areas, it is valuable to define how the empowerment of women is defined within the context of agriculture. This paper narrows degree of investment and control of agriculture means of production and outputs within given domains of control. The paper considers the ability to make choices about how to use and access resources as empowerment. This study is guided by pentagonal combination of domains largely borrowed from Meinzen-Dick *et al*, 2010's idea that control and choice made by men and women translates into empowerment which drives food security within the parameters of the irrigation scheme settings;

The assumption that irrigation schemes are a unitary unit is convenient but individuals within these schemes are aggregated and behave as if they are individuals only under quite restrictive assumptions. The wellbeing of the individuals (men and women) in these schemes is a product of their relations and choice of strategies within given domains of control. The domains include decision making on production factors and income control and expenditure; ownership and access to resources; participation in leadership; allocation of time on agricultural productive tasks. The context within which the interface between the domains of control (which translates into empowerment) and gender relations occur determines the nature of the livelihood strategies utilized. The outcomes are indicative of household poverty reduction, increased food security, improved human nutrition and health and improved management of natural resources come as a result of particular institutional processes. Gender analysis within such contexts (climate change, culture, population growth and resource depletion) enhances an understanding of what farmers perceive as spheres of improved productivity thereby helping to identify the most suitable adaptation strategies.

The degree of empowerment for both men and women is determined by the capacity to control decision making in the key domains of production. The degree of such empowerment is measured by developmental pointers such as assets, income and level of education, level of expertise and is manifested through decrease in poverty at household level, improved food availability and enhanced natural capital. The environment provides a mixed package from which men and women may decide on the most perceived appropriate and economic strategy to improve agriculture productivity.

1.2 Background

1.2.1 Gender influence on Production

When productivity is increased with less impact on the environment and ensuring that the natural resource base on which agriculture depends is sustained and improved for future generations--that disseminates into Sustainable agriculture intensification (Boserup, 2002). A diverse range of agriculture intensification practices have been promoted within irrigation schemes in Southern Africa as a way of intensifying agriculture to curb food deficits typical of the region through conservation agriculture in Southern Africa and other developing regions (Nyamwanza *et al*, 2014). The choice of farming practice is indicative of the degree of gender based division of labour which also determines crop choices and control of produce. For instance, Doss (2002) highlights that gender based crop preferential patterns exist in areas where irrigation institutions determine women's choice of crops by giving them a preference to intensive crops comprising vegetable cultivation for the market, notwithstanding the fact that the decisions regarding the crop choice are taken mainly (if not utterly) by male members. Despite the many roles African women play in Agriculture production they have remained disadvantaged in many respects. Gender matters not only for production but also for food use and resources used to produce the food Meinze-Dick *et al* (2012). With reference to gender patterns of responsibility in agriculture Doss (2002) indicated that women specialize in some production activities and participate with men in others. Consequently there are separate crops, separate fields, separate tasks for same or different crops for both men and women. Plots controlled by women are farmed less intensively than similar plots simultaneously planted with the same crop but controlled by men in the same household. Accordingly the ability by men and women to make decisions over crop farming and livestock management determines the degree of sustainability in terms of production.

1.2.2 Ownership and access to productive Resources

The degree of accessibility and ownership of resources by both men and women determines production in irrigation schemes. Zwarteveen (1997a) specified that productivity and income were greater when both men and women controlled irrigation plots in Burkina Faso. Rodgers (2005) also support this by indicating that control of land provides security for credit--criterion for access to other inputs such as services, seeds fertilizer and agro-chemicals. However, study by Cleaver (2000) has shown that men and women negotiate control of resources with men opting for those that gave them some sort of social presence. More so Kevane (2004) argues that women are disadvantaged in both constitutional and customary land tenancy systems even when legislation destined for solidification of women's property rights are endorsed, women often lack the expertise or implementation mechanisms to ensure these rights are maintained. As a result, women have less access to both tangible (land and livestock) and non-tangible (human capital, social capital and decision making power) assets as given by Peters (1984). For example, Cleaver (2000) provides that Ethiopian female headed households have much smaller asset base than male headed households hence relative food deficiency bears heavily on women. Bernal (1988) also showed that access to irrigation plots alone was not satisfactory for improving women's output. To that effect Hallman (2000) contends that women farmers with equal access to productive resources and inputs are as efficient as male farmers or even more and increasing the resources that women control has been shown to advance the nutritional health and educational products of their children and the sustainability of agricultural production.

Even in these irrigation schemes women are not a homogenous group Doss (2011) carried out a comparative study on women's land ownership and observed that it differs significantly across countries; in Ecuador 51 in every 100 of land owners were women, Ghana 36 out of 100 and Karnataka 20 in every 100. A study by Mabane (1997) indicated that the Korekore women of the Zambezi valley in Zimbabwe have better access to benefits from natural resources management programmes as compared with women from the Vadoma marginal group.

1.2.3 Gender and Leadership

Community leadership engagement by both men and women influence resource distribution and accessibility. For instance, in rural Hakra in Pakistan, Hamid (2004) reveals that communities have been divided into different sects based on class, caste and gender the powerful and more influential (men) get more benefits of the resources while the women and the poor people in general are marginalized. The World Bank (2006) also indicates that even when quota systems are introduced to ensure that women are involved in irrigation management that may not always be successful unless poor women are targeted specifically; instead wives of wealthy farmers who do not necessarily understand the issues others face are included. Women sometimes lack necessary skills and confidence to be members of the management team as van der Molen (2001) indicates; women participate less in the activities of irrigation farming in Sri Lanka and felt that it was not their duty to participate actively in consultations but that of the male counterparts. For example, Thumba (2012), in Malawi women recipients in the land acquirement process did not highly participate in drawing the sketch land use plan because they depend on their male counterparts. However, Zwarteveen and Neupane (1996) shows that women in Nepal get their irrigation needs accommodated even when they are largely excluded from irrigation leadership, a situation which hardly discourages them from accessing irrigation services. Frequently, their non-involvement allows them to take more water than allowed and less labour for maintenance without being punished since the committee has difficulty enforcing rules on the constitutionally excluded (women).

1.2.4 Control over Income and Expenditure

Control over income and expenditures by men and women is shaped by the amount of net income generated per unit input (Alkire *et al*, 2012) and this can be attributed to availability to fair and efficient markets besides shifting from low value to high value produce. Consequently the accessibility of off-farm opportunities (occasionally less for women) influences the amount of income generated and its ultimate control per household (Alkire *et al*, 2012). Koopman (1993) indicates that women cultivate their own land, make decisions and control over earnings basically for subsistence crops while men are in control of the cash crops and animals. Although women make substantial contribution to agricultural production, failure to value their work limits women's bargaining power in income transactions, the allocation of household resources, and a wider community decision making. Contrary, Pitcher (1996) postulates that matrilineity gives women increased control over the income from their plots while men avoid investing in land when their tenure is insecure such as in cases when the wife's brother may force the husband to leave.

1.2.5 Gender and productive time allocation

Generally women engage in farming activities daily. Division of labour between men and women and gender specific crop choices may partly govern women and men's preference for timing and timelines of water provisions as indicated by Zwarteveen (1997). A study by Jones (1983) in Cameroon irrigation project shows that women tried to minimise their time spend in newly irrigated rice crop controlled by their husbands in favour of their exclusively controlled sorghum production. Bastidas (1999) showed that a substantial amount of women participate more in field activities mainly during peak seasons when labour is limited and extra help is needed, others worked in the fields after finishing with household chores. Kusum and Zwarteveen (1994) showed that in Nicaragua there was a marked difference in the time women and men were eager and able to start irrigating their field; women favoured to start later because of domestic duties which they had to perform early in the morning. Irrigation at night was challenging for women because of social norms which prevent them to go out at night some women would send a relative or be escorted (World Bank, 2006). Moreover Kusum and Zwarteveen (1994) provides that in such schemes, married women allocated less labour to their own lower yield plots of sorghum than did independent women (mostly widows) who cultivated both crops on their own.

1.2.6 Gender, social change and development

Historically women and men often worked in distinct spatial arenas, carrying out diverse tasks, described as complementary by Muchena, (1979). In some areas men and women work jointly in agriculture production Mandala, (1990). However, Oboler (1985) argues that males and females may assume the roles of the other gender in certain situations; this fluidity has been facilitated by factors

such as accessibility to education and gender sensitive policies. Thus Barth (1964) indicates that when two groups meet one may accept minority status (encapsulate) and use the position to develop new patterns of change, actors change identity when there are rewards/sanctions attached--identity can be circumstantially changed. For instance, Hodgson and McCurdy (2001) provides that as a result of male labour migration in Tanzania women have reconfigured their position in marriage by constructing a more self-reliant female identity through adherence to cash crops and changing subsistence into commercial farming.

However in the face of possible gender identity change, lineage patterns are still being used to justify transfer of land from generation to the other and at the core of lineage is gender which consequently affects men and women differently, as given by Pretty (2002) who further indicated that land may be a matter of safety, symbolism and status besides being necessary for food production. Even in the face of changing policy Rao (2013) postulates that where resources distribution methods are standardised; varying degrees of decentralization and other forms of diversity such as (ethnic, religious and geographic) continue being obstacles of change and maintains the status quo. Thus Kishindo (2006) unveils the blind spots on policy where it seems not to challenge customary practices and laws governing marriage, divorce, property rights and inheritance. Peters (2010) counters this argument by postulating that though land rights under customary law are insubstantial, in matrilineal-matrilocal areas such as Malawi daughters inherit their matrilineage land while sons temporarily use their wives' land.

Scholars such as Mandala (1990) and Ntara (1973) adds to this by indicating that lineage patterns determine the position of women in society at any time. In matrilineal societies such as central Malawi, Northern Zambia and Zimbabwe-Zambezi valley women have imperative roles as socio-political leaders, spiritual facilitator's village heads, war leaders or even clan leaders (Ntara, 1973). Matrilineal lineage patterns have however persisted in areas where agriculture commodities are solely for family consumption with no material or social gains for men. Contrary, in patriarchal societies males constantly use bride wealth as an instrument of control; to control women in marriage. Currently cultural attitudes towards cattle have seen marriages shifting from integrated production unit to a male controlled unit of wealth control using livestock (cattle) and land as symbols of wealth hence the exchange of cattle for wives underpinned kinship relations and political power (Huffman, 1998).

1.2.7 Sustainability pathways

There are two faces of sustainable agriculture intensification namely, Capital-led and Labour-led intensification which influence gender spaces in irrigation schemes. Capital-led intensification encompass physical, infrastructural and natural elements of production which entails substantial use of non-labour variable inputs such as land conservation infrastructure, organic inputs and chemical inputs and planting of perennials as long term capital security (Diao, 2010). For instance, in Burkina Faso, Udry (1995) shows that productivity per unit of land on female managed plots was lower than male managed plots from the same household since fertilizer was intensively applied on men's plots. Carswell (1997) indicated that this method is sustainable and productive in fragile resource-poor areas. Nonetheless, the introduction of innovative varieties of agriculture crops and livestock through sustainable intensification have turned intrusive, scattering yonder their intended range, fragmenting agriculture landscapes and displacing native species (Mathews and Brand, 2004).

Labour-led intensification is characteristic of labour provision by the farmers onto a given unit of land. It involves cropping, weeding and harvesting and has not been sustainable in Southern Africa in the absence of (policy-led) capital intensification (Lele and Stone, 1989). With respect to human capital (Labour led intensification), African women have less access to agriculture extension and hired labour needed for profitable labour intensive cultivation than their male equivalents hence they provide the bulk of the agriculture labour which World Bank and IFPRI (2010) exemplifies as planting, weeding, post-harvest processing and food preparation. More so, Bernal (1988) indicated that Sudanese widows from selected irrigation land failed to use their plots effectively because they faced great difficulty in hiring labour and gaining agriculture extension advice and inputs. Merrey and Baviskar (1997) also highlighted that women performed majority of the tasks in the rice production. Furthermore, in Malawi,

Saito (1991) indicates that women performed 50-70% of all agriculture work. Nonetheless increasing women labour does not change gender power relations (Abdelali-Martini and Dey de Pryck, 2014).

Women have varying degrees of control over their own labour and employ diverse bargaining skills to negotiate the use of that labour. A study by Gunchinma *et al* (2011) on women's actual and potential participation in Water Users Association in Uzbekistan showed that factors such as Soviet inheritance, traditional patriarchal Uzbek values and social economic evolution challenges resulted in women increasingly constituting the bulk of low paid labour force in agriculture (ADB, 2005). Contrary, the assumption that women would be willing to provide labour without compensation under patriarchal system almost led to the collapse of irrigation in Gambia, Carney (1988) provides that these women did not do so since they lacked appropriate compensation.

Scholars such as Malapit *et al* (2014) focused on women empowerment using the gender empowerment in Agriculture Index and observed that in Sub Saharan Africa particularly Malawi women's empowerment score is at 0.84 which is substantially high, however the survey depicted that overall women were twice as disempowered as men especially when it comes to workload, access to land and decisions on credit and public speaking. Similarly FAO (2011) showed that women's independence in farming and the degree to which they exercise their farming rights is largely compromised even when they have land rights under customary law. For instance, Abdelali-Martini and Dey De (2014) also provides that in rural Syria the occurrence of more female agriculture labourers has not contributed to any changes in gender power relations such that women continue to deliver unpaid labour and participate in traditional tasks.

This paper seeks to provide an understanding of the relationship between gender and sustainable agriculture intensification. By using a case study approach as a window to explore contextualized gender relations within irrigation scheme settings the study examines the gender dynamics in theoretically given domains of resource use, access and control in the drylands areas where increased agriculture production is fundamental. It entails to unveil the possible determinants of intensification within the context of gender power struggles that exist between men and women at household level and irrigation scheme systems. The incorporation of data from rainfed system provides an "object background effect" that projects a clear picture of gender related scheme relations that determine poverty alleviation.

2.0 Methodology

2.1.0 Contextualizing Ntcheu District: Most dry but least irrigated

Ntcheu District is located at the south- Central Region of Malawi. It borders with Mozambique to the west, Dedza District to the north, Neno to the south, Balaka to the southeast and Mangochi to the northeast. The district is composed of seven Extension Planning Areas namely: Bilira, Manjawira, Nsipe, Njolomole, Kandeu, Tsangano and Sharpevale. The district has 159,027 farming households. Fig 1 below shows an overview picture on the location of the EPAs in the district.

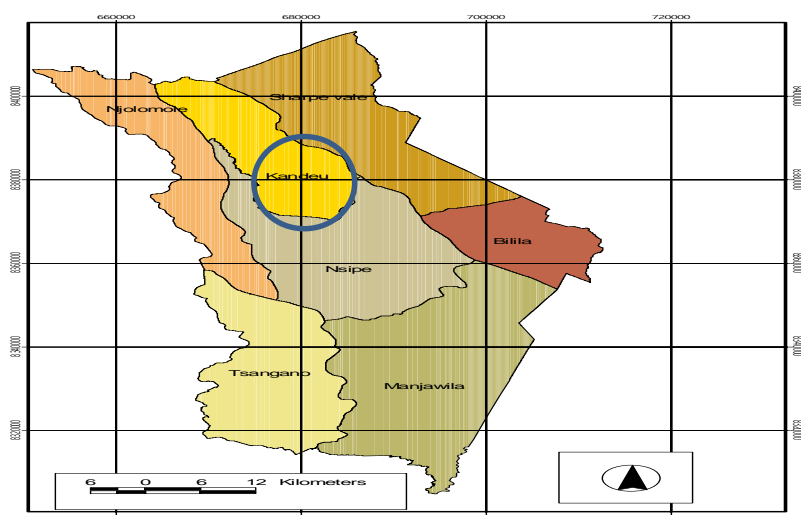


Figure 1: Case study map of Ntcheu District-Kandeu area

The population density of South-Central Malawi is at 155 to 184 people per km². The area is densely populated: 159,027 households within total land of 250,140 hectares while 185,255 hectares is under farming. Thus land resources for agriculture production is a huge challenge. Poverty level in this area ranges between 70% and 90% which is substantially high. An estimation of 52% of Malawians' income is below poverty line with the majority on less than 1 USD a day (UNDP, 2008). According to UNDP (2008) statistics Malawi is one of the six poorest countries in the world. The area has a large rural population that depends mainly on agriculture. At regional level Malawi has adopted the Comprehensive African Agriculture Development Programme (CAADP); a strategy to put agriculture on sustainable path through the principle of sustainable land and water management, increased productivity and improved access to markets and resource control. Farmers in Malawi endure long distance walks to access markets. Current estimates are similar to the SRT2 sites: 22% of households in the rural areas take less than three hours to travel to the nearest market, 38% spend between three and eight hours; 17% take between 8 and 12 hours; and 23% of the population takes more than 12 hours to get to the market. Thus ensuring that food production is enough is vital in order to achieve the nutritional and livelihood security. A study carried out by Carswell (1997) endorses that intensifying irrigation agriculture can contribute substantially to food security, poverty alleviation and welfare enhancement through improved livelihood strategies. In Malawi matrilineal societies form 67% of the population. Men and women's access to resources is largely funnelled by ethnic group traditions, family and kinships. Real control of land and related resources is vested in the maternal uncle who paradoxically uses his wife's land. Inheritance is passed from mothers to daughters on assumption that the son will move to the wife's village.

2.1.1 Study site

The study site is known as Kaziputa irrigation scheme located in Kandeu area, Ntcheu district of Malawi. Funded by Japanese Tobacco International Company, the scheme draws its water from Livulezi River, uphill, through a gravity fed system that utilizes canals as water channelling mechanisms to the irrigated plots. This site falls within the Chinyanja Triangle within the confines of Central-Southern Malawi. It is well known for its unfavourable farming conditions and unreliable rainfall. Temperatures range between 14°C to 32°C. Its annual precipitation ranges from 600mm to 1200mm and runs from December to April. The extreme climatic events which are a recurrent phenomenon in the area, affect a large part of the country's agriculture and the economy. The scheme comprises of 75 irrigators whose principal source of livelihood is agriculture. Most farmers cultivate less than one hectare of land—predominantly small holder. The area is suitable for drought resistant crops such as millet, sorghum and irrigated rice. Nonetheless, maize is the commonly grown crop characterized by subsistence and commercial production in a setting where there is no evidence of advanced land and

labour markets and has low yields. The area is the least irrigated in Southern Africa despite such dryness and the ecosystem has limited potential for rain fed agriculture.

2.1.2 Site selection

This site was selected due to the fact that a base line survey has been done in the same area by IWMI in conjunction CIAT-CGIAR centre in Malawi where the approach was largely using quantitative. Subsequently intra-household micro-dynamics were not well captured such dynamics lie within the interest of this paper. The irrigation scheme is also well established and gender power relations can be examined with minimum extraneous variables. This study also intends to use qualitative methods to determine the degree at which resources are controlled by gender where power relations between men and women cannot be quantified but can be understood through qualitative methods.

2.1.3 Data collection

Research was conducted within Ntcheu district of Malawi in the Kandeu extension planning area. The methodological tools used were qualitative data collection including; key informant interviews with community leaders, agriculture extension workers, village heads and representatives from the irrigation management committees and clubs. Questions focused on gathering data on the facts on gender and resource access and control. Interviews were also conducted with irrigators and non-irrigators to get understanding of the different strategies used by male and female farmers to increase food production. In order to gather group experiences of both men and women 5 focus group discussions with group membership ranging from 5-13 members were held (*see Table 1 below*). Three of them had a combination of both males and females divided into; irrigation managers; village heads; irrigators and non-irrigators. The other two had homozygous representation of both gender from the irrigators. All interviews and focus group discussions were conducted in the local language, *Chinyanja*, with controlled interpretation. The approach was as well participatory; participants had to contribute towards the drawing of gender apportioned agriculture seasonal calendars and the interviewer had to engage non-obtrusive observation during community events to observe the gender power relations involved in community leadership and group membership. All participants were asked for their consent to participate before the commencement of the study and were guaranteed of their confidentiality through the use of pseudonyms. Table 1 below presents the participant categorization outline for the study.

Key Informant Interviews	Date	Place
EPA-level		
Agriculture extension officer 1	20 October, 2014	Kandeu Office
Agriculture extension officer 2	27 October, 2014	Kandeu Office
Village Level		
Village head-Kaziputa	21 October, 2014	Kaziputa Village
Village head-Nyazanyaza	21 October, 2014	Kaziputa Village
Village head (wife)-Manyoni	26 October, 2014	Manyoni Village
Irrigation Management Level		
Chairperson	21 October, 2014	Kaziputa Irrigation site
Secretary	21 October, 2014	Kaziputa Irrigation site
Treasurer	24 October, 2014	Kaziputa Irrigation site
Committee member	24 October, 2014	Kaziputa Irrigation site
Individual interviews		
Irrigators (2 males, 1 female)	24 October, 2014	Kaziputa Irrigation site
Irrigators (3 females)	27 October, 2014	Kaziputa Irrigation site
Non Irrigators (3 males)	26 October, 2014	Kaziputa Village
Non irrigators (2 females)	27 October, 2014	Michi Village
Focus group Discussions		
Village level		
Village heads-Nyazanyaza, Kaziputa, Chona, Chituku, Kampanja (2males, 3 females)	21 October, 2014	Kaziputa Village
Irrigation Management Level		
IMC, Subcommittees, clubs (4males, 7 females)	21 October, 2014	Kaziputa Irrigation site
Irrigators level		
Irrigators and non-irrigators (5male, 8 female)	22 October, 2014	Kaziputa village
Men irrigators only (9)	23 October, 2014	Kaziputa irrigation site
Women irrigators only (11)	23 October, 2014	Kaziputa irrigation site

Transect Walks		
Kaziputa Irrigation scheme	21 October, 2014	From the plots to Livulezi River
Michi Irrigation Scheme	24 October, 2014	From scheme site to the hill top main weir

Table 1: Categorization of participants

The study focused mainly on the irrigators though some non-irrigators were included in the study to get a contextualized picture of gender relations. 57 participants took part in the study and 39 of them were female while 17 of them were male. 27% of the participants were non-irrigators while 73% were irrigators. In some cases responses were obtained from farmers who practiced both rainfed and irrigation farming. Some of the participants took part as both key informants and during focus group discussions.

3.0 Case study: Results

A total of 57 participants took part during the study. This section indicates the different gender patterns characteristic of the Chinyanja Triangle and livelihood strategies utilized towards an improved food production. In Ntcheu district 159027 small holder farmers contribute towards food production in Malawi. Women constitute the majority of the irrigators (75%) while men constitute 25%. Irrigators represent more than half of the small holder farmers, of these very few are below 35years of age while 80% are above 35 years. In every 100 small holder farmers 56 of them are married, 11% are divorced 13% are widowed. Learned males that actively participate in irrigation are fewer than females with a percentage representation of 35% for males. This leaves the male skilled labour out of the irrigation schemes. The Kaziputa irrigation scheme which is the core study site comprises of 75 irrigators of which 18 are male and 57 are female.

3.1.1 Farming methods used by gender

Farmers in the Chinyanja triangle practice agriculture in different ways. These include minimum soil disturbance, retention of crop residues, crop rotation and intercropping. Agriculture intensification has two derivatives namely; labour-led and capital-led intensification. In Kandeu area farming methods are also gendered. Women contribute 71% towards labour-led agriculture intensification while men contribute only 29% of this labour. Male investment in capital-led intensification amounts to 64% while women only have 36% level of contribution in that area as shown in fig 2 below.

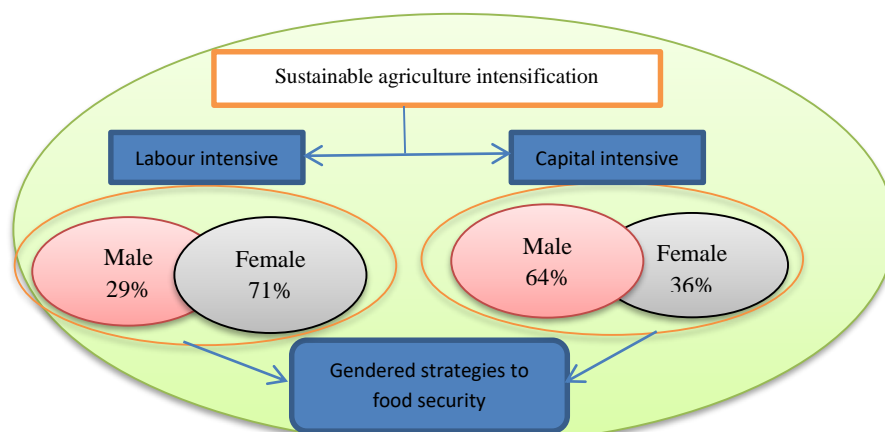


Figure 2: Agriculture intensification strategies by gender

Table 2 below shows the extent to which male farmers dominate when using less labour intensive methods such as use of herbicides and use of fertilizers. For instance, 64% of males as to 36% of females use herbicides while the same skewedness is observed when applying fertilizer. Thus men have knowledge and access to physical inputs (capital-led intensification) which is characterized by high yield. Women on the other hand dominate in labour intensive practices such as ridging (72%) and manure making (69%) hence are more acclimatized to labour-led intensification which however is known to produce low yields. Data collected from the extension services farmers' training sheets on 27 October 2014, revealed that there are three manure preparation methods common in the area inclusive of Chimato, Bocash and the Chinese method. During these training sessions women have a 70% level of representation. Such differences in intensification practices explain the poverty gap between men

and women even in matrilineal societies such as the Ngoni of Ntcheu in the Chinyanja triangle. Table below shows data obtained from 38 interview respondents indicating the different farming methods used in the area by gender.

Farming method	Male farmers	Female farmers
Minimum soil disturbance (use of herbicides)	64	36
Retention of crop residues	56	44
Crop rotation	45	55
Intercropping	31	69
Ridging	28	72
Use of manure	41	69
Use of fertilizer	62	38

Table 2: Farming methods used in Kandeu area

However practices such as crop rotation and retention of crop residues especially the practice of covering soil with maize stova did not show any substantial differences by gender. Inter cropping which is rather capital led is done mostly by women, the percentage is insignificant since the practice of intercropping is still very low and is still in its budding stage in the area.

The farmers also provided that in the event of drought they practice conservation agriculture and women were more affluent in describing the technics involved in this type of farming. Practices such as ‘sasakawa’ planting using manure, crop diversification, tree planting, box ridging and use of herbicides were indicated as the most frequently practiced conservation agriculture practices by the farmers with women on the lead. One key female respondent, Mrs Maluti on 24 October 2014 provided the following as conservation agriculture practices,

“We practice mulching, tree planting and crop residue incorporation”.

In practising sustainable agriculture intensification, farmers in the drylands areas use the integration system where both livestock and crops are managed within confined space to produce higher yields. These small holder farmers supplement crop production with livestock production. Their grazing system is communal with supplementary feeds such as crop residue. The livestock is managed through free range management during dry seasons and are herded during rainy season.

3.1.2 Allocation of resources

The key agriculture related resources found in the research site include; land, water, human resources (extension workers, labourers) and agro-inputs (fertilizer, seeds, manure, pesticides and herbicides). Resources that are commonly owned by women than men include land and water while the same women provide most of the labour for agriculture activities. Nonetheless resources that are commonly accessed better by men than women includes; fertilizer, seeds and agro-chemicals.

3.1.3 Land resources

Land resource allocation in the area is systematic though the farmers have usufruct rights to land. The national policy provides that when allocating resources 60% of the beneficiaries must be women. Land in the Kandeu area in Ntcheu belongs to the government as indicated in the irrigation scheme constitution. Chiefs are the ones that allocate land to individuals even when transactions are made they do not amount to ownership. Documentary evidence postulates that predominantly land tenure in Malawi is customary with rural occupancy of 68% of all land. The 1965 Land Act (Cap 57: 01) cited in Kishindo (2013), defines customary land as

“All land which is held, occupied or used under customary law but does not include any public land”

while customary law is defined,

“The customary law applicable in the area concerned”.

The given definition entrusts the power to distribute customary land in the chiefs and village heads following the African law and norms in the particular area. In the Kandeu area there are two forms of land tenure; long term and short term tenure. Long term tenure involves obtaining land through either inheritance or transactional exchanges and is prevalent within the rainfed farming system. This particular tenure is inclined more towards women who are the culturally recognized custodians of the land and related resources in the area. Out of the 38 interviewees 34 of them indicated that they had access to land through inheritance and these were females while only 4 men indicated getting access to the land mostly through transactional exchanges.

(a) Land allocation in the irrigation scheme

Short term tenure is mainly observed within the Kaziputa irrigation scheme where land is allocated through club membership within five existing clubs namely; Gobeke, Chikamba, Chimwalira, Namichimba and Lithethe. Each club is made up of 15 members of which majority are women. The irrigation scheme plot register shows that out of 75 names 54 of them are women which show that irrigation plots are registered in the woman's name. The irrigation plot is registered in the man's name in instances where the woman has moved to stay at the man's home hence the man has the upper hand on land and resource access. According to observation multiple allocations exist in the scheme as a result of multiple memberships in any of the five existing clubs hence there are more plots than the members in the scheme. Irrigation plot size averages to 0.1 ha for both men and women. During a focus group discussion comprising of 11 irrigation committee members, the secretary of the Lithethe club, Mrs Fumulo on 21 October 2014 highlighted how land is distributed in the scheme,

“Land is cleared first then basins are constructed. The irrigation management team count the number of basins constructed and then divide by the number of the irrigation members. Land cannot be sold from the irrigation scheme but can only be rented out. Plot allocation for our scheme was done with the village head and mostly targeted the resource poor, mostly women and elderly men”.

This statement was consistent with the contents of the irrigation scheme constitution which provided that 60% of the irrigators should be women and 40% of these should be elderly. This implies that the rest can then join the scheme by paying 2200kw as joining fee and in this case more men are likely to pay the joining fee since the bulk of the women are recruited by their default disposition of being legitimate land holders culturally.

In South-central Malawi, while the transfer of irrigation schemes to farmers was to promote ownership, consequently farmers' rights especially for women are even more unjustifiable. Policy is silent with regards to matrilineal inheritance and this has led to lack of clarity on who the title holder of a customary irrigation plot will be has consequently affected irrigation reform by transferring women's land and water assets to men. Considering the fact that 90% of the land is generally accessed through matrilineal ties hence should belong to women. Nonetheless, the introduction of irrigation farming that allocates uniform pieces of land and constructs water facilities for the beneficiaries has seen women making up 72% of the farmers accounting to at least 18% of the women having lost land to men in the context of growing commercial value for irrigation land (intensifying agriculture). Women have been marginalized in the allocation of irrigation plots or were forced to abandon them since they could not sustain the intensification of the agriculture production or increasing water fees. However Mrs Chipanda a female farmer on 27 October 2014 indicated,

“At times women give away land to men if they are busy with other things”.

Thus when women lose land it is not always a coercive process. Ms Mavhuru a female farmer, a mother of 4 children deserted by the husband who got insane responded to the question why she was not an irrigator on 24 October 2014 and she answered,

“I am not an irrigator but survives on rainfed agriculture because I cannot afford the membership fees and other requirements of the scheme including the recommended inputs (seed and fertilizer) and tools such as pangas and hoes”.

This statement is a reflection of how women are being gradually elbowed out of having the *de facto* land use rights (cultural) while men are accruing the *de jure* land use rights (legal) through irrigation policies.

(b) Land allocation in the rainfed plots

The lineage patterns in Chinyanja triangle are largely matrilineal, hence extended family systems shares one land which with time becomes too small for the expanding family membership where some of the land is even infertile. In one focus group comprising of farmers with both rainfed and irrigated plots discussions were made on the way in which rainfed plots are distributed and also provided the plot size ranges as from 0.2 ha to 1.5 ha with women having larger plots than men. Thus due to population growth average land holding has decreased from 1.5 ha per household (1965) to 0.85 ha per house hold (Kishindo, 2006).

Women’s possession of bigger plots can be attributed to their legibility to inherit land from their parents unlike men who tend to leave their parent’s land and join the wife (uxorial land use rights). 92% of the participants indicated having acquired land through their mother’s kinship ties, of these 95% are women and only 5% are men. Under this arrangement the husband acquires usufruct rights to land and cultivation through marriage which is valid as long as the union is still in existence. Upon divorce or death of the wife, the husband will lose this right as the land is passed on to daughters. In support of this, a key informant village head from the Nyazanyaza village on 21 October 2014 indicated,

“The husband goes back to the parents’ home after divorce”.

Even when tenure is unpredictable men still invest in women’s land since children still benefit despite the high level of potential that the man may return to his parental home. In another focus group discussion held on 21 October 2014, comprised of village heads from Nyazanyaza, Kaziputa, Chona, Chituku and Kampanja villages within the Ntcheu district, data on rainfed land the allocation mechanisms was obtained. The majority of the farmers indicated that they are Ngoni by origin though historically the Ntcheu area belonged to the Chewa tribe. By the virtue of the Ngoni being a matrilineal society most of the land is obtained by women through the mother’s kinship ties. Men only have access to land through their wives upon marriage. Mrs Msampa from Kaziputa village on 26 October 2014 reported that,

“I inherited land from my mother but it was not enough to share amongst my four daughters...I managed to give land to the eldest, the youngest took over my portion and the other two are renting”.

thus the wife’s birth order also determines the size of land accessed by men. Although few men (5%) inherited land through the mother, Felix Sikheva a male farmer from Nyazanyaza village uses land inherited from his mother (data obtained from 26 October 2014). This case is different from the rest because there is no land on his wife’s side so the wife had to move to stay at the husband’s home. He reported that he has challenges in accessing inputs such that at times he get assistance from external organizations such as Limber leaf which provides loans for farmers. Out of the 57 participants only 5

(8%) obtained land from their father's kinship lines. For example, Dickson a male farmer from Chituku village on 26 October 2014 indicated that,

“I was given a piece of land by my grandparents from my father's side since I had come to stay with my father after he separated with my mother long ago”.

Under such circumstances a third party, the chief would be consulted and some transactions made for security. Another different case from a particular Ngoni woman from Kampanja village also inherited land from her father since her mother went to stay at her father's home on 27 October 2014 reported,

“Negotiations had to be made to make my mother stay at my father's home though this may not guarantee permanent residence on her husband's land”.

Under such arrangements the husband then makes a lot of decisions regarding the use of the land. Another man from the same village married a wife from a different tribe known as the Thumbuka tribe who had no access to land hence the man had to make transactions in form of livestock to get a piece of land. One key informant woman chief's wife, Mrs Abraham from the Manyoni village indicated on 26 October 2014 that she has both rainfed and irrigated plots. When asked how much land she had she said,

“Ah! The land is big, remember as the chief I have the biggest piece of land... But now the process of distributing land involves asking for land from those who have been allocated bigger portions if they so wish to share with others”.

When the interviewee asked for the actual size of the land it was estimated to 1.4ha. She went on to indicate that long back land used to be allocated to household members freely from the mother's land, the chief was the distributor of land at village level because land was in abundance. Where transactions were made though not mandatory the parties would agree at a fee.

In the Ngoni culture the village head is usually a man--a son to the preceding head but he goes to stay at his wife's home though making decisions about his home village in absentia (Village heads without land). Paradoxically those who own the means of production (women) do not have decision making power, it is in the hands of the landless--matrilinity is not matriarchy. Men use strategies such as intimidation and patronizing in order to control women when it comes to distribution of resources such as land.

3.1.4 Access to water resources

Resources such as water are scarce in the area hence have disaggregated uses according to sources. The commonly identified sources of water in area include; wells, boreholes and rivers. These are used according to different purposes depending on availability and suitability. Thus 70% of the water for irrigation is drawn from the river except for only 30% of farmers who use wells. The borehole is the main source of drinking water for 65% of the farmers, though some of the interviewees indicated that at times the boreholes run dry and they wait long queues until the water is available again. The river is at least 1.8 to 2 km away for the village holdings such that 80% of farmers travel considerable distances to access water for the animals, while only 20% of them provide animals with water from the wells.

Source	Water use		
	Irrigation	Domestic	Animal water
Well	30	30	20
Borehole	-	65	-
River	70	5	80
Total	100	100	100

Table 3: Water source use allocation by farmers

The farmer-borehole ratio in the area is 1borehole: 250 farmers. This is an indication that the demand is substantially high for the borehole to sustain hence some boreholes run dry. Thus women are the ones to bear the burden of finding alternative sources of water than men. In as much as water for domestic purposes is obtained from the borehole sometimes it is obtained from unprotected wells and some farmers even obtain it from the river. For instance, during a transect walk on 24 October 2014 one woman was observed washing plates in the river and was asked why she did that she answered,

“The water from the well is available usually at night, during the day it can only supply three 20litre buckets after which one has to wait for four or more hours for the water to infiltrate into the well again, I want to go to the field I don’t have time to wait”.

Though water has disaggregated uses some farmers mostly women do not stick to the stipulated water source-use requirements due to their multiple task engagement during the day. Key informant, Mrs Abraham (Chief’s wife) also reported that at some point in time she had her own borehole drilled at her home but it has since dried hence she is getting water from a nearby borehole where she has to pay 100Kwacha per month for permission to access the water. This particular response shows that resources are not always accessed equally in Kandeu area despite one’s position in the community women have to at times engage in monetary transactions just to access a water source.



Figure 3: Women fetching water from different water sources for different uses

In the irrigation scheme water is allocated according to clubs in an alternating manner. Each club is given three days for watering their crops irrespective of gender. Observations from transect walks reflected that the canal system does not allow for water storage instead water is channelled straight from the stream into the fields. Hence when water level in the stream is low at that particular time no water comes out of the canals hence the farmers have to wait for it to infiltrate and rise again which usually happens at night when the rate of evaporation is low. Measurements were done at the main weir control points to determine the volume of water that can fill a 125000cm³ capacity up to 40cm deep within a given time. Thus 100000cm³ of water was collected in 19 minutes amounting to a water collection rate of 312500cm³/hr during the dry season. This is an indication that during summer the water collection rate can increase exponentially. However the scheme system in Kaziputa do not have storage tanks, hence water flows straight from the river to the fields and most of it is lost on the way. During field visits in the irrigation plots it was seen that canals are also not covered some parts not cemented hence some of the water is lost on its way to the field due to evaporation and infiltration. Thus the designing of the irrigation canals disadvantages the women who are the majority farmers and who needs water at all times.



Figure 4: Water flowing in a canal is eventually lost due to infrastructure dilapidation

Water allocation was reported to be source of conflict amongst farmers in the irrigation scheme. The offence record on water allocation indicated that 60% of the time men are the most mischievous; they usually shift watering roasters without alerting other farmers hence pay more water fines than women.

3.1.5 Access to agro-inputs and human resources

Despite women's better accessibility to land irrespective of ownership their degree of accessibility to inputs such as fertilizer, hired out labour, farming equipment, technical expertise and seed is not so high. Consequently, men seem to manage pests better than women while both tend to have capital challenges equally the same. While women have easier access to markets, they have limited ability to sell their produce at higher prices than those of males. Thus even when women manage to grow crops with improved yields, the sustainability of agriculture intensification becomes a challenge to them since market and transport challenges affect their income which is meant to cater for the next planting season.

Inputs	Fertilizer, pesticides and seeds	Credit	Extension worker	Markets	Farming equipment	Hired labour
Male	69	43	56	35	62	68
Female	31	57	44	65	38	32

Table 4: Access to inputs by gender

The farmers in the female focus group showed knowledge of the required inputs needed for crop production. They gave the following as the most important post planting inputs; fertilizer and pesticides. Women indicated that it was not easy for them to get such inputs and suggested that this problem can only be solved by them having to attend to piece works (ganyu) for more income to buy the inputs. Mrs Chipanda, a female farmer on 27 October 2014 indicated,

“Inputs such as fertilizer and pesticides were required in the irrigation farming and that women had less access to these inputs since they are economically disadvantaged. Some farmers have access to soft loans...especially women”.

Thus women can only have improved access to such resources through external intervention in this particular case; assistance from the NGO's in form of soft loans. Contrary to the statement above the male irrigators focus group gave a different picture by indicating that when it comes to irrigation production the farmers get some of the resources from the government programmes and under such circumstances, women in the irrigation scheme have more access to the resources. The statement from the male farmers is a reflection of limited accessibility to resources which is rather circumstantial than fundamental. When asked why the government would choose to give the inputs to women, the response given was far from reflecting women's disadvantaged position as the primary drive towards them being given the priority instead, Mr Singo, a male farmer in the group discussion on 23 October 2014 said,

“Women are given inputs because if the inputs are given to men some of them misuses them by either selling them for beer or exchanging them with other farmers for personal gains”.

The farmer’s remark is a reflection of how gender shapes responsibility and one’s susceptibility to alienation when it comes to access to fundamental resources. Government funded agriculture input subsidy was reportedly existing in the Ntcheu District and there is a slight decrease in the number of beneficiaries from 65300 in 2013 to 63500 in 2014. The decrease is attributed to improved agriculture production.

Human resources such as agriculture extension workers are reported accessible to both men and women farmers. However women have been attending the training sessions more than men. Statistical data from the Ntcheu District staff recruitment sheet indicated that agriculture extension staff appointment positions are reflecting that one female staff was appointed against 6 male staff. While there is no female staff recorded as receiving terminal benefits, one female was indicated as retired out of 12 staff members where 11 were men. Staff members promoted included two men and one female while only one female was found absconding against two men. The recorded activities reflect that overall, men dominate the agriculture extension services and hence are positioned to advocate for the interest of the farmers with bias.

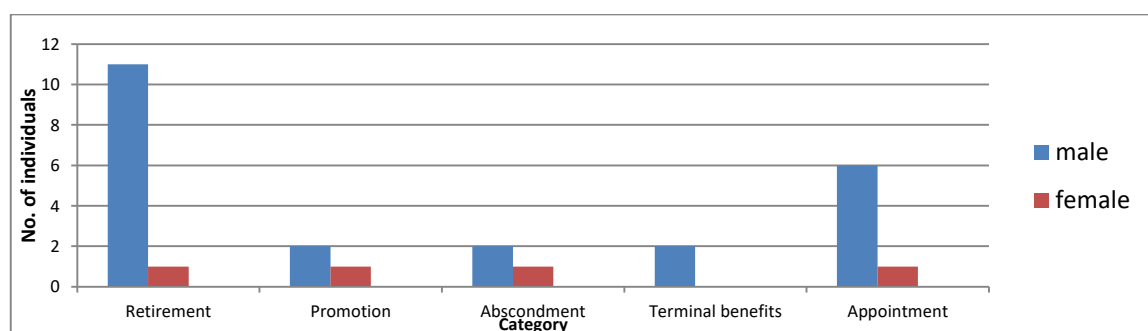


Figure 5: Staff recruitment by gender

3.1.3 Gender and irrigation production

(a) Crop production by gender

Decision making relating to types of crops produced in the irrigation schemes and rainfed plots also differ by gender. Crops such as tobacco and cow peas are grown much more by men than women while groundnuts and vegetables are grown more by women than men. Cash crops such as tobacco and cowpeas are largely grown by men while women decide on growing mostly subsistence crops such as maize, groundnuts, sweet potatoes and soya beans. There is a clear domination of women in crops such as groundnuts and vegetables where 72% and 67% of the farmers respectively recognized themselves with these crops. Such a high recognition qualifies the crops to be classified as women’s crops.

Irrigated plot			Rainfed plot		
Type of crop	Male	Female	Type of crop	Male	Female
Maize	46	54	Maize	49	51
Vegetables (onion, tomato, mastered)	33	67	Groundnuts	28	72
Beans	49	51	Tobacco	69	31
potatoes	53	47	Beans, Soya	47	53
			Cow peas	57	43
			Millet	50	50

Table 5: Crop production by gender in Kandeu area

A key informant, Mr Tibvekeyani supported the idea of gendered classification of crops on 26 October 2014 by saying,

“The man makes most of the decisions on production in the home...however groundnuts belong to the wife who make decisions even on the use of the income from the sales...money from groundnuts is for home consumption”.

Thus groundnuts are considered a woman's crop in Ntcheu district of Malawi. The same key informant specializes in vegetable production at commercial level particularly the eggplant. Though it is small scale production the farmer makes most of the decisions and is the one who works in the irrigated plot towards the production of the crop and goes further to sell the crop himself. Thus vegetables are considered women's crops when they are assigned low value, men always want to invest in their production only when there is substantial economic value attached to them. Seemingly different from the above, Mr Rimbande hires people to work for him in the field and goes on to say that on 22 October 2014,

“The man works more in the field than the woman though the woman has control over sales from produce”.

This statement has sarcasm in it considering the fact that the though the amount of investment in the field is high this farmer mostly use hired labour and is not the one working that much hence has nothing to lose in terms of labour investment. However there is insignificant difference on maize and millet production by gender from both rainfed and irrigated plots. 51% of the participants in a mixed focus group indicated that they grew maize in the rainfed plots and were female while 49% of the participants who also grew maize in the same plots were male. The number of female farmers who confirmed that they grew maize in the irrigated plot rose slightly to 54% while that of men declined to 46%. Thus overall women dominate in subsistence farming especially on producing key crops such as maize. The table above shows variations by which men and women decide on the crops grown.

Within irrigation scheme contexts these crops are generally grown at subsistence level though there are few exceptions where crops such as maize and beans can be produced at commercial rate. More so crops like maize are generally planted by poor farmers indicating blurred gender distinction. Though women appear to be involved in much of production decision their involvement is inclined towards subsistence farming. Thus when it comes to intensive crop production whose aim is to produce more yields to boost food and income production women are still a long way to go in the drylands area. The data above indicates that when it comes to intensive production of crops with a commercial motive women's decision making capacity especially on commercial production tends to be overridden by men since they lack the time, financial capacity to acquire new skills and to commercialise in the face of the domestic and reproductive duties they have to bear.

In female headed households women make almost all decisions on what to grow, nonetheless almost all men who make decisions on what to grow on women controlled plots are from male headed households. Females produce more food for the household than males though they appear to be sidelined when it comes to commercial production in irrigation farming. Men's involvement in irrigation is mainly commercial hence food provided for the household by the males is regularly bought and men have many other sources of food than those of women.

Production level is high in rainfed plots than in irrigated plots since the rainfed plots are bigger in size averaging at 1.5ha than the irrigated plots which have an average size of 0.1ha. Women own highly produced crops such as maize, beans and groundnuts especially from the irrigation scheme hence women have an upper hand in the production efficiency than men. However with respect to intensification there is more production of yields per given area from the irrigated plots than rainfed plots where women are dominating.

In spite of having bigger plots women tend to have lower yields than men. For instance in Ntcheu district-Malawi, male owned rainfed plots have an average size of 0.62 ha and produce yield at 2923.5

kg/ha. Women owned rainfed plots also have an average size of 0.79 ha and produce a total of 1658.3 kg/ha. Thus the size of the plot owned by women does not positively match production, a fact which can be attributed to the types of crops grown by women and accessibility to inputs such as fertiliser and pesticides while only accessing manure which is rigorously produced in lower quantities. By disposition (having access to bigger plots and ability to mechanically produce manure) women have the ability to practice sustainable agriculture intensification if the availability of supporting inputs such as fertilizer and pesticides are given at equal footing with men.

3.1.4 Challenges to crop production

The key challenges reported during interviews include the loss of crop to pests, parasites and diseases. Data obtained from the key informant agriculture extension workers indicated that men are much able to control pests and diseases than women due to their ability to access agro-chemical inputs through purchasing. Women tend to get access to such inputs through subsidies or through group contributions which however are not always a success. Mrs Bazowa, a member of the Kaziputa irrigation scheme indicated that she belongs to the Gobeke club and the club members buy pesticides for their crops as a group.

Pest	Crop	Disease	Crop
Army worm	maize	Maize streak virus	maize
Weevils and rodents	Maize and beans	Cassava Mosaic	cassava
Stalk borer	maize	Early leaf blight	tomato
White grubs	beans	Bacterial wilt	potato
Birds	maize		
Aphids	Irrigated beans, potatoes, tobacco, vegetables		

Table 6: Pests and diseases in Ntcheu District

Considering the finding that crop production in Ntcheu is gendered, crops such as beans, vegetables and maize are largely grown by women. From the table above maize and beans are attacked by more than one type pests and diseases hence are highly susceptible. Thus women face the greatest challenge during crop production since crop yield is compromised by the pests and the diseases. The limited access by women to agro-chemical inputs amplifies this challenge. While men are inclined towards tobacco and potato production, the crops are vulnerable to a narrow array of pests and diseases. While men have increased access to agro-chemical inputs, this places them in a better position in controlling pests and diseases.

Low productivity and lack of diversification by farmers in Ntcheu has led to persistent food insecurity and poor dietary intake. Such challenges have a direct impact on women who spend most of their time with the children who happen to be the most vulnerable to hunger and poverty effects. One of the agriculture extension workers nonetheless indicated that farmers were gradually adopting the use of hybrid seed.

(b) Livestock production by gender

The degree of investment and control of livestock varies with gender and by the perceived social and economic value of the animal. Men in Malawi places a greater investment and control in cattle than women considering that it brings with it higher social presence for the men. A focus group discussion comprising of both men and women farmers engaged classifying livestock ownership and control by gender through participatory categorization. Out of 11 participants 8 of them indicated that they had chickens of these 5 were females (63%) while 3 (37%) were male. In Ntcheu chickens are not mainly kept for commercial purposes but for consumption and as symbolic measurements of wealth. From the same group 7 indicated that they owned goats and pigs and of these 4 were women (57%) and 3 were men (43%). Only 3 out of 11 indicated having cattle and all of them were men. Thus chicken ownership indicated a higher number of participants, followed by goats and lastly cattle.

The men oriented focus group discussion reflected that more than half of the men in Ntcheu area had control over cattle and the same proportion towards investment (herding and supplementary food

provision) of cattle. Contrary women showed a very low level of control of cattle and they seem not to invest in them either. Mr Ripande a key informant farmer on 24 October 2014 indicated that,

“Cattle belong to the man while chicken and goats belong to both”.

The word both is an indication of limited ultimate control over the mentioned livestock by either party. The key informant Mr Tibvekeyani on 26 October 2014 indicated that he owns goats and chicken and went on to say,

“A woman does not own livestock”.

Women invest into and control chicken production more than men. There seem to be a balanced control and investment by both men and women when it comes to goats and pigs. The table below shows varying levels of control and investment placed into different types of livestock by both men and women.

There is no remarkable difference by gender when it comes to control and investment towards goats. Such differences in the areas of focus by men and women leaves women concentrating on less valued livestock such as chickens and which require more labour in order to produce enough income for the household. Men are left to concentrate on highly valued livestock such as cattle which produce high enough income even at a once off sell. This leaves women with challenges when it comes to integrated agriculture intensification.

Group membership and Leadership

3.1.6 Leadership

(a) Irrigation management

Also in Malawi women's voice in decision making has not been directly addressed even if the new irrigation policy includes robust statements supporting women's equal participation in irrigation agriculture. Women are highly represented in the management committees but they do not hold strategically influential positions of decision making. For instance, the irrigation management is comprised of the main committee where the chairperson is a man. Gender ratio in the Irrigation Management main committee is 6 women: 4 men. The duties of the main committee are to monitor management and maintenance of the scheme in collaboration with the sub-committees. The irrigation management committee indicated that it monitors all the irrigation activities done but would only consult the village community leaders when crops have been damaged by animals or when they want to start planting crops. Women are highly represented in this committee hence more women take part in the management of the scheme at the highest level. However the chairperson of the committee is a man which is an indication that key positions of management in the scheme are occupied by men. Though women make up the majority of the irrigators on average 30 in every 100 of the women actually participate in irrigation scheme decision making meetings. Paradoxically in 72 out of every 100 times women are more effective than men when placed in IMC positions.

Reporting to the main committee are other subordinate committees such as the disciplinary committee, water allocation committee and land allocation committee. The Disciplinary sub-committee has equal number of men as to women. This implies that when it comes to issues to do with reinforcement of rules and societal norms both men and women have an equal footing in Ntcheu district. Land allocation committee comprises of 7 women and 3 men while the water allocation committee has more men than women with a ratio of 5:3 in favour of men. Women are many in the committee that is responsible for allocation of land which in addition to their culturally inherent control of land, women are also highly participating on land distribution even in the scheme setting. However the degree of autonomy in controlling land resources in schemes is compromised by the involvement of the constitution which has

some claw back clauses that gives men a certain amount of influence on land allocation as well. Water allocation is dominated by men due to their perceived ability to maneuver, repair and control the flow of water in the irrigation canals. The sub-committees also branch into club committees. In the Kaziputa irrigation scheme there are 5 different clubs namely; Gobeke, Chimwalira, Namichimba, Chikomba and Lithethe. The figures indicated in fig 6 exceeds 57 since some of the members have multiple allocations (belong to more than one club).

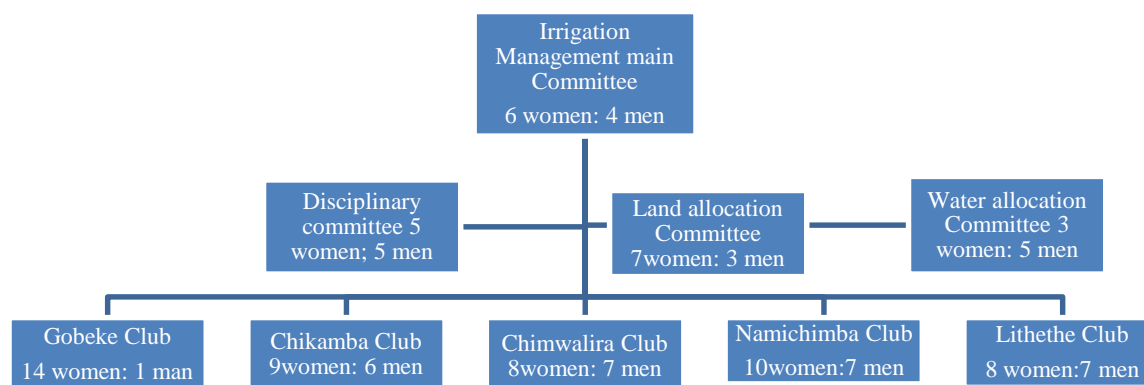


Figure 6: Irrigation Management Hierarchy

In the Kaziputa irrigation scheme management committees, women dominate in terms of representation, however they tend to occupy lower levels of decision making positions. For instance the main committee is chaired by a man. Mrs Seremani the treasurer on 24 October 2014 remarked,

“There are 14 women and 1 man in the irrigation club in which I am a member, despite the man being the only one in this club he is the one who make decisions for the whole group... he is the chairman”.

Thus in this particular case the majority group does not always control by the minority group as result of certain perceived culturally inherent attributes of the latter group. The farmer indicated that even though she is not part of the scheme leadership women who are in leadership are doing it well. Participation by men and women in the monitoring of water and related resources in the scheme is done equally by both.

(b) Community leadership

35% of village heads in Ntcheu area are women while men make up 65% of the traditional leaders. When asked why there were more men in leadership than women one of the irrigation committee chairperson on 21 October 2014 provided that it is within the Ngoni culture that village headship is a man’s role, he added,

“...the coming of gender awareness has resulted in consideration of women in such posts, otherwise it is not our culture...”.

The situation in Ntcheu places women as pseudo-owners of resources but they however don’t have distributional powers (control). Women continuously reported that they did not see anything wrong in having men decide for them since it was their culture. Contrary Mrs Mavhuru on 24 October 2014 stressed that she belonged to the Gobeke club where men (minority) group chairs the club and stressed that women participated well in the committee since the Ngoni culture, according to her, accepts women as leaders. Mrs Mavhuru’s contribution has some irony in it since mere acceptance of women leadership

without effecting it does not commensurate to empowerment. These statements were however said out in mixed group discussions where both men and women were present and elements of ‘interactional modus vivendi was observed (honouring the perspectives given by the other group even not in total agreement). The mere fact that men are considered as the legitimate leaders at house hold level as well as community level does not match reality in that women are responsible for the day to day running of the scheme (implementers). When interviewed away from the group, the key informant Mr Singo on 23 October 2014 highlighted,

“Scheme members become committee members by election. Women do manage the irrigation activities but not often...they are taken as unwise people by the men”.

This statement gives a stereotypical view of women by men, which this paper views as a coping strategy used by the minority male irrigators (cultivating inferiority complex in the women) in order for them to survive in women dominated spaces such as irrigation schemes. The group member indicated that they did not find it out of line when men made decisions all the time because it was their culture that women are to respect their husbands.

3.1.7 Women’s roles in irrigation farming

Women constitute the larger labour force in irrigation agriculture. Rather than women’s participation in governance structures; women’s labour has been largely recruited to maintain the irrigation infrastructure. Women provide more labour at 74 in every 100 times than men and 66 in every 100 women participate more in elections.

Due to their high numerical representation women are the reliable contributors of scheme financial requirements and production loan repayment. This was reflected in the scheme accounts records where 70% of financial contributions specifically for the scheme were collected from women. This leaves men at the periphery of the irrigation development box while women are right at the centre. This pattern is attributed to the fact that men invest in other off-farm activities hence their absence in irrigation development box. Women are also responsible for selecting crops for the season and they are also involved in implementation of the scheme management and maintenance (day to day running of the scheme) more than men. Due to their high investment in irrigation farming in terms of time, labour and financial commitment women tend to have direct contacts with the means of production more than men.

(a) Group membership

When it comes to group membership poor women farmers have challenges in meeting the demands of the group hence tend to be excluded. The management of the scheme is done by the guidance of the constitution which encourages full participation by the members. It entails that for one to become a member a joining fee of 2500Kwacha should be paid and 200Kwacha as water fee. This requirement is aversive to some women farmers who are found sidelined due to failure to meet the group demands. A person can only be given land when they meet the above mentioned requirements. As a result economically disadvantaged women find it difficult to become members of the irrigation scheme since they do not have the requirements. Behaviour is controlled by the constitution and certain behaviours just call for rebuke while others call for fines. For instance acts of misconduct such as late coming and absenteeism and vandalism and misbehaviour are charged a fine. When crops are damaged by animals, the owner of the animals pays 500Kwacha to the committee as compensation for the damaged crops. Three misconducts lead to expulsion from the scheme. In this scheme men are the most charged.

3.1.8 Time allocation

Women work longer hours with less time for income generating activities due to the burden of domestic work. Women always attend to field first in the morning before doing other duties. More than half of Malawian women have not attended school due to early marriage, motherhood and family

responsibilities. For instance, Ester one of the recently married farmers caught asleep (resting) in her field after she got very tired from constructing ridges on 21 October 2014 reported,

“I got pregnant at 13 years of age that’s when my parents handed me over for marriage, I could have been writing my Junior certificate exams this year”.

Women spent some of their time in domestic activities which tend to compromise their time in the fields; paradoxically they constitute the larger portion of the agriculture labourers. Men seem to have more time to engage in other off-farm income generating activities. Off-farm income is a supplementary source to irrigation produce and is a source of livelihoods in dry lands. More men than women engage in income generating activities such as cash for work and hiring out labour. In Malawi for instance, females make up 4 out of 10 of off-farm labourers while men make the majority of those who hire out labour (*ganyu*). However 59 out of every 100 women participate in food for work while the same is done by 29 in every 100 men. 12 in every 100 provide joint participation and this is rather minimal. When asked about the most appropriate time for women to start working in the fields, the irrigators reported that they usually begin irrigation work very early in the morning. Generally the irrigators indicated that by 4am they will be in the field working. Mrs Chimwaira on 23 October 2014 said that,

“When there is moon light--by 2 am I will already be in the field working until 10 or even 11 am... We leave our husbands unattended to come to the field early... In my case I had to work in the irrigation field throughout my pregnancy, I only stopped working when I went to give birth...”.

This statement is an indication that the irrigators can go up to 8 hours of labour in the fields. The female irrigators further explained that they go to the fields early in the morning in order to have time to attend to other household chores later in the day. This is another indication that certain roles are forgone in order to attend to field work. When a woman is pregnant and is closer to giving birth she is exempted from doing irrigation activities. Nonetheless one woman was carrying a one year old child and attended the meeting while seated behind a tree away from other irrigators because she was breast feeding her child during the focus group discussion. The woman attended the meeting sitting in for her husband Peter Chimwaira who could not attend the meeting because he wanted to go and do other income generating activities. Thus women are sent to attend meetings while men practice *ganyu* to raise more money which they will have control over.

When asked on how they allocated their time women said that they attend the fields first thing in the morning then go back home to attend to domestic chores such as cooking for the household. These farmers indicated that this was not a burden to them since it was their culture that a woman cooks food for the family despite her having other energy draining activities to her attention. The female farmers indicated that sometimes they bring the food to the fields and have their meals there since they do not have time to have proper meals at home. Mrs Ripande on 27 October 2014 said,

“I would rather bring the food to the field than waste time going back home to have a meal and come back... At times we even sleep at the fields in anticipation of getting water to irrigate our crops since at times the water does not come out from the canals until late at night--our husbands are not even afraid when we leave them at night because they know we would have come to the fields not gone anywhere else”.

This statement shows that men are sometimes left at home enjoying their night’s sleep while women have sleepless nights in the scheme.

Farmers' seasonal Calendars

Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Income	No cash					Enough money			Little cash			
Food	Very little food			Little food	Plenty of food			Little food			Very little food	
Rainfall	Torrential rains	Enough rain		Little rain	No rain						Torrential rains	

Table 7: Rainfall intensity, food availability and income availability by season

Generally female farmers exert more labour than their male counterparts in agriculture activities in both rainfed and irrigated plots, though variations can be observed with seasons. Females are involved less intensively in irrigation field activities as from October to April. The period from May to August is characteristic of high labour intensification in the irrigation scheme, a period characterised by dryness. Women have the highest level of labour provision during this period specifically on tasks such as desilting the canals and fertilizer application (*see Annex A*). Though men take a lead in activities such as watering and canal repairing the level of labour provided by men is lower than that of women. Contrary there is less labour intensification during the same period on the rainfed plots, except for the month of August where labour demand is high on both plots. A gradual increase in demand for labour on the rainfed plots is observed from December to April. This period is characterized by food scarcity and low income though rainfall will be plenty. An asynchronised relationship between labour demand and food availability amplifies the vulnerability of agricultural labourers especially women. Provision of labour by males is higher than that for females in April when tobacco fields are attended to most and also in October when tobacco nurseries and planting stations are prepared.

Temporal variations in labour intensification by gender													Total
Month	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Male (Irrigators)	-	-	-	3	18	6	18	12	12	3	3	-	75
Female (Irrigators)	-	-	-	6	21	12	27	15	15	6	6	-	108
Male (rainfed)	18	12	15	21	6	15	9	18	6	12	6	15	153
Female (rainfed)	18	24	21	18	6	15	9	18	6	6	9	18	168

Table 8: Labour intensification monthly scores by gender

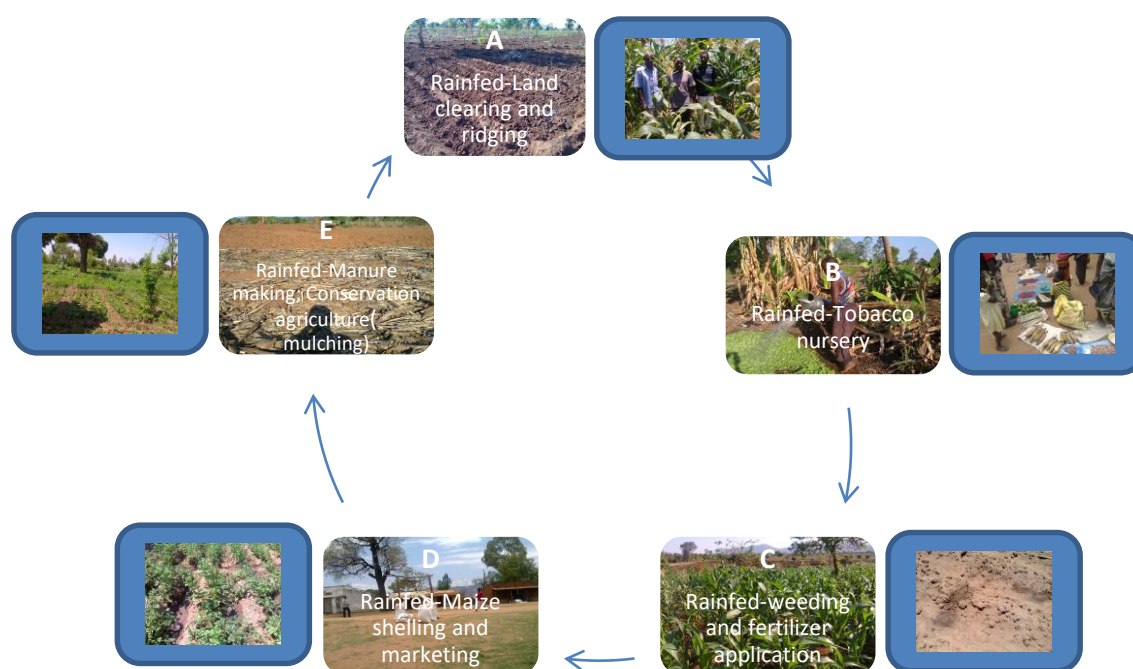


Figure 7: Activity cycle for both rainfed and irrigated plots

Fig 4 above is a demonstration of the cycle of activities that are done in the irrigated plot and the rain fed plots. In scenario **A** while land preparation is done in the rainfed plots where women are found doing most of the ridging activities in preparation for the summer crop, irrigated crops will have reached maturity stage and some would be consumed (*see Annex A*). Women are less vulnerable during this period since there will be plenty of food from the previous rainfed harvest and new irrigation produce. Scenario **B** reflects that labour intensification by men will increase in the rainfed plots as tobacco transplanting occurs considering that men work more in tobacco plots than women. During the same period farmers will have harvested crop produce from the irrigated plots and women will be found more at the market place selling their produce than in the fields. In case **C** while the rainfed crops are managed and fertilizer application occurs, very little activity will be taking place in the irrigated plot. During this time women will still be at the market but this time selling fruits and engaging in casual labour (*ganyu*) for income. Women are vulnerable at this time of the year since food availability from both rainfed and irrigated plots will be very little. Men will be taking part in off-farm activities such as selling fish, construction selling baskets and providing transport to the markets. Thus men will be economically less vulnerable than women during this period. Scenario **D** reflects that in the irrigated plots newly planted crops will be growing while farmers are busy shelling the harvested maize for the market and for storage. This task is mainly done by women hence men as well will have more off-farm activities to work on. In case **E** farmers will be covering the rainfed soil with crop residue in preparation for the next season. This task again is done more by women than men (*see Annex A*). In the irrigated plots fertilizer application, weeding, canal maintenance and watering will be taking place. These tasks demand equal labour from both men and women. This leaves women with a load from the rainfed conservation practices.

3.1.9 Income and expenditure

(a) Sources of income

A focus group discussion held with a mixture of 5 men and 8 women benefiting from both rainfed and irrigation farming was held. Each individual was requested to respond to the income sources categories given. The responses show that women benefited more from agriculture produce than from other off-farm activities. Men on the other hand benefited satisfactorily from agriculture activities and more from off-farm activities. Table below provides an indication of the degree to which men and women benefits from the given sources of income.

Source of income	Rainfed farming	Irrigation farming	Casual labour	Selling firewood	Selling craft work	Transport	Selling beer
Male	3	4	5	4	3	3	-
Females	4	8	5	2	1	-	2

Table 9: Source of income by gender

From the table above out of five scores, women scored all in benefiting from irrigation farming and only four indicated selling their produce from the rainfed plots. When asked to justify their inclination towards irrigation farming than rainfed one vegetable farmer, Mrs Nyasoni scheme committee member on 24 October 2014 revealed that women work in rainfed plots mainly to obtain food for the family while irrigation produce brings in income. Four of the men also indicated that they got more income from irrigation than rainfed. The difference was that the number of men who indicated benefiting from both plots was lower than that of women by 42%. While all the men indicated obtaining income from casual labour, three out of eight women revealed that they could not attend to casual labour as much as men since they had domestic chores to work on hence out of eight women five indicated engaging in casual labour. Tasks such as selling firewood and craft work and transport was seen as men's main source of income. Two of the women reported selling beer for income, a task which other farmers indicated as not beneficial to the society as whole. One non-irrigator Agnes on 22 October 2014 reported

that beer selling promoted men into diverting household income into corrupt activities and would usually act irresponsibly. This indicated that some sources of income by other women would affect their fellow women in the process.

(b) Market negotiation by gender

Women sell more since they are the majority in the scheme. Though men have limited land than women, they tend to produce more income from their produce than women who seem to have more land. Men sale their produce at a higher price than women while women incur greater costs in the transportation of their produce from the field to the market. In Malawi for instance, on average male irrigators sell their produce at an average of 47000Kwacha (105.38 usd)¹ per produce while women sell their produce at an average of 32727.27Kwacha (73 usd)* per produce. Women tend to sell their produce at a giveaway price than men. With one hand women are giving their produce at an affordable price which is beneficial to the society but at the same time they are the ones that will be losing out since the income will not be enough for the household and farm inputs--thus women's benevolence in marketing agriculture produce is a double edged sword. One outstanding woman upon being asked how many bags of the field produce she had sold Mrs Ntchenje the scheme secretary on 21 October 2014 reported that she had not sold any produce because she was waiting for the prices to be high. However the previous season she obtained 235000kw from the selling of maize at (9000kw per bag). The produce was sold at home not at the market and the husband decides how the income should be used. Further inquiry into the respondent's economic status it was discovered that she was married to a teacher who provided safety nets for her hence this reinforced her market negotiation inertia.

The women reported that they sell their crops to individual buyers but usually they go to the common market place 12km from their homes while carrying the loads on their heads. The road to the market place is mountainous and scary but they do not have much choice but to go at times with children on their backs. Thus women are exposed to danger whilst on their way to the markets. The group participants indicated that on average a woman can carry 20 kg at most to the market twice a week. When asked how much they usually got from the sales 3 different levels of income was observed from the 11 women present in the discussion group.

Amount of income	Frequency
60000kw	2
30000kw	6
20000kw	3

Table 10: Levels of Income for women

This data indicated that on average women obtain at least 32727.27kw from the irrigation produce. The irrigators also reported that they obtain more income from the irrigation produce than from the livestock. They accumulate their income in the Village savings loan (VSL) that has been introduced by government and extension services and share at the end of the year. Women benefit more from these activities than men.

In addition to such shortfalls on marketing produce by women also they also have challenges in accessing cheaper transport to the market. The mode of transport commonly used is the bicycle which is considered a man's asset in the area. Consequently few men will have to hire transport and where there is need they have a better bargaining position than women since they dominate the transport industry in Ntcheu. In Ntcheu district in Malawi also the average transport costs incurred by men is 2795.3Kwacha (6.27usd)² while women transport their produce at an average cost of 3500.6Kwacha

¹. * Exchange rate used was 1usd: 446Kwacha

²Exchange rate 1usd: 446 Kwacha

(7.84usd). Thus if an individual male farmer produces three different outputs he is most likely to get a total of 174.76usd take home while the same farmer if female would have 137.39usd as profit. Thus women's difficulties in accessing markets and transport compromise their income even if they have same produce as that of men. Table below shows the total amount of cost produce, cost input and transport cost by gender.

Commodity	Male usd	Female usd
Sum cost of produce	316.14	219.0
Average cost of input	135.21	73.77
Average transport cost	6.27	7.84

Table 11: Sales and expenditure levels by gender

(c) Income and asset control

Women have control over income in cases where the land is from their own kin. For instance in women choose to dedicate labour and investment over their own land not to cash crops on land that has been obtained outside the matrilineal system since they lack secure tenure over that land. Men in matrilineal societies as Ngoni may also avoid investing in land when their tenure is insecure such as in cases when the wife's brother may force the husband to leave. Even within households poverty among women is higher than that of men and women may not have strong bargaining power over how income is spent.

It is usually the man who brings the idea of buying assets and the woman supports the idea. The community leaders stressed that it is very rare that women bring ideas especially to do with asset acquisition. Most of the assets are controlled by men. In the case of divorce field produce and livestock is shared at a ratio of 1:4 in favour of women for the sake of the children. Assets such as chairs and tables are for children while the bicycle is for the man. The husband goes back to the parents' home after divorce. If the man is the one who has decided to end the marriage pays the woman a divorce token of 10000Kwacha and for women it becomes the same and the procedure is done in front of elders. Farmers have other sources of finance such as the *ganyu* to subsidise for family income and men are the ones who frequently participate in the *ganyu*.

(d) Intra-household gender differences on income expenditure

Women indicated that they cannot accept to have men take the money that they will have worked for hence use other tactics to keep the money away from the men. Mrs Ripande a woman key informant said on 27 October 2014,

"I use the money belts to prevent my man from taking the money...I give the money to my relatives for safe keeping...I make sure I do the selling of the produce myself so that I know the amount produced--I don't want to be cheated".

Mrs Fumulo on 21 October 2014 also indicated that despite attempts to keep men away from getting the money they always know when and how much they would have obtained from the market so instead of hiding the money one woman said,

"I simply give a portion of the money to the man for his personal use so that he does not keep nagging about it then keep the rest for the household consumption".

A different case was observed from one of the female farmers Mrs Chipanda on 27 October 2014 who reported that,

"The goats, pigs, and chicken are mine I decide on when to buy, sell or use them".

This statement could be attributed to the fact that the woman is the main source of off-farm income which is used for purchasing assets. She uses fertilizer, manure but does not work with extension workers. The women provided that they use profit from farm produce to pay school fees and assets such as radios and bicycles. However the produce is largely subsistence. The farmers are willing to engage in commercial agriculture but the main challenge is accessibility to inputs such as hybrid seed, and fertilizer and at times the water flow in river is too low hence they wish if there could be a storage tank to store water collected during rainy season which could be used for irrigation during winter. Women are the most affected by the distant markets since they have to cross a mountain range whilst carrying buckets of maize which is physically draining and also dangerous for them. Hence they indicated that they are anticipating if the local leaders could find contractors for them so that they can sell their produce easily and with certainty.

Gender power relations are observed even when it comes to income expenditure and control. In one case gender related conflict was observed during an interview with a 41 year old female (*Agnes*) non irrigator who got divorced 14 years ago after she had a quarrel with her husband on how to run a grocery store which was incepted from the income obtained after good crop sales from the woman's plot. Considering that land belongs to the woman in this society, the crops were from her field, nonetheless the decision on how to invest the funds appeared to be in her husband's hands. She reported that on 22 October 2014,

“My husband's sister wanted to take over the management of the grocery store and I refused then my husband chose to take his sister's side hence I was compelled to leave the marriage and chase the man back to his parents' home”.

She was given 150 Kwacha as a token of divorce in 1997. This scenario is an indication that gender aspects shape income expenditure and control. She mainly practices *ganyu* as her main source of income and she has been strengthened by social groups such as churches who provide emotional nest for her. She indicated that she has no intentions to get married since she had many problems with the first man and even encouraged other women to learn to be independent even when they are married, because shocks such as spouse's death and divorce might disturb them if they do not learn to be independent.

She has never been able to buy any assets because of the income that she obtains is not enough. She has learnt from the extension workers and from other lead farmers how to practice productive farming which has helped her to raise her 4 children to date. The interviewer asked the elders if they could locate a man in their village that also had suffered divorce but was still managing on his own. Kaziputa village head on 21 October 2014 responded that,

“You can't find one because after being chased from one woman men always make sure that they stay briefly at the their parents' home and then proceed to another woman's place, so it is difficult to find such men in this village...In the case of divorce field produce and livestock is shared in favour of women for the sake of the children”.

He went on to stress that it is difficult for women to do the same since they have to wait for a man to propose to them first, if no one does so then they remain single and also may do it for the sake of their children”. This statement is an indication that despite the fact that men do not own means of production (land) they make effort to locate where they can be heads of household only to access the means of production and the benefits associated (income).

Irrigation agencies such as CARE Malawi and Total Land Care are effectively facilitating gender issues within irrigation schemes by giving farmers access to inputs. Other farmers also suggested that if farmers could be given access to loans from the banks that could also be helpful to them. Some indicated

the importance of having small businesses to boost their income base and also with interventions from other external stakeholders such as NGO's.

In spite of the fact that irrigation improves accessibility to water, having water access may not necessarily increase the possibilities of improving food and livelihood security and income levels. The mere fact that women have limited access and control over other forms of income creates an obstacle that hinders their ability to raise sufficient financial capital to pay the water fee hence are forced to rent or sell their plots. Women have ultimate control of the income to pay rentals mostly in female headed households while men have control in family (both men and women) owned plots.

3.2.0 Asset ownership by gender

In the focus group discussion held on 23 October 2014 for men only, the question of asset ownership was answered as men gave a list of the assets that they own at home. The participants were asked to name items that they considered as men's assets. All technically advanced assets such as bicycles, radio, phone, sickle, carts, bed and construction instruments such as spirit level, trowel and shovel were indicated as men's assets. Men's assets are given high social value in the society but have secondary or even tertiary benefits to the household.

In another focus group discussion held on 23 October 2014 with women only; the same activity as above was done. Women indicated that assets such as hoes, kitchen utensils and the residential plot belong to women. Thus women tend to control assets that have are primarily used in the field such as the hoe and that primarily contribute to the basic needs of the household such as kitchen utensils and residential space. These assets are fundamental to household survival however have little recognized societal value.

3.2.1. Strategies used in controlling resources, production and income

Both men and women use specially calculated mechanisms to control resources in spite of ownership. One of the strategies employed by female plot holders in protecting their resource control radius was to actively engage themselves in constructing a more self-reliant identity by redefining gender roles. This was demonstrated by Mrs Chipanda on 27 October 2014, who reported that,

“The goats, pigs and chicken are mine, I decide on when to buy, sell or use them”.

This participants defied the notion that women are weak and unable to make decisions hence need are in need of a “head”. Thus resource control by women can be enhanced through reified self-perception by the female farmers. Another strategy used by the women includes challenging social order (pragmatic behaviour). For instance Agnes had to chase the man from her residential plot after an attempted overthrowing of the woman from the controlling household income said on 22 October 2014

,

“My husband's sister wanted to take over the management of the grocery store and I refused then my husband chose to take his sister's side hence I was compelled to leave the marriage and chase the man back to his parents' home”.

Agnes's portrayed an act against the norms-- “kicking the referee in the stomach” a strategy which can only be used when the environment or societal norms support are too blind to protect resources at stake. Mrs Ripande on 27 October 2014 also showed another resource control survival strategy by saying,

“I use the money belts to prevent my man from taking the money...I give the money to my relatives for safe keeping...I make sure I do the selling of the produce myself so that I know the amount produced--I don't want to be cheated”.

The above participant used concealment and tactful deception to be in a position to control resources for the benefit of the family including the man. At times women strategically dispose of the agriculture produce through delayed selling till the prices are high or selling produce to better paying customers through bargaining. Often times taking a minority position in the presence of men (feigning) is another strategy that women employ to control resources by using men as conduits (weapons of the weak). During meetings women employ *interaction modus vivendi*--honouring the men's ideas but not being in agreement, this is illustrated by the ability by Ntcheu women to accept male village heads when in fact the culture residential patterns are uxorilocal.

Men work on women's land as an investment for their offspring -- gene perpetuation mechanism. More than 90% of the male participants reported practicing farming on land that they accessed through the wife. In other circumstances men invest as way of creating a psychological contract with the woman thereby protecting their territory. At times men use aversive means such as intimidation and patronizing to control resources at both household and scheme level. A statement by key informant Mr Tibvekeyani on 26 October 2014 suggested that he should be sole owner of livestock by saying,

"A woman does not own livestock".

Thus such a strategy reaps off the women's effort even in investing in the livestock hence will have limited or no control of such resources. Such behaviour by both men and women are used as mechanisms to control and own resources within the agricultural arena particularly in irrigated areas.

Caveat: Some of the key informants also participated in focus group discussions. Most of the data for the study was obtained from Kaziputa irrigation scheme though a visit to nearby Michi scheme which is still under construction was done to get a picture of gender based scheme inception mechanisms used in the area.

4.0 Discussions **Caveat:** While some participants practiced both irrigation and rainfed agriculture, some of the key informants also participated in focus group discussions. Most of the data for the study was obtained from Kaziputa irrigation scheme though a visit to nearby Michi scheme, still under construction was done to get a picture of gender based scheme inception mechanisms used in the area. In some cases responses were obtained from farmers who practiced both rainfed and irrigation farming.

Discussions

The case study findings indicates that in all the domains of resource control within the agriculture arena there are differences in the degree in which men and women participate. Each gender places more effort towards activities which bring social or economic rewards. This notion was also presented by Doss (2002) who indicated that there are separate tasks for the same or different crops for both men and women. The gendered division of labour in irrigation schemes shapes the promotion of agriculture intensification activities in the irrigation schemes. Interestingly the issue of access to land by women may not be the main issue but rather how they make use of the resources (land and inputs) and stand out through the systemized patriarchal discrimination through institutions.

The paper finds that when it comes to intensive production of crops with a commercial motive women's decision making capacity especially on commercial production tends to be overridden by men since they lack the time, financial capacity to acquire new skills and to commercialise in the face of the domestic and reproductive duties they have to bear. This creates another gap between men and women where men will tend to get more income than women. Thus developmental pointers such as assets will be realized more by men who in the case study are secondary land tenants.

Contrary to Kevin (2004) who categorizes women as being disadvantaged by both constitutional and customary land tenure systems; the Ngoni culture actually places the woman at the centre of land

resource control. Ironically the institutional mechanisms for land distribution (Land laws) are controlled by men giving away land to women. Thus the Ngoni women have access to both rainfed and irrigation plots and are the very source of labour hence have a wider asset base upon which to bargain for resource control. However the contention by Rodgers (2005) that the control of land provides security for credit, a criterion for access to fertilizer and seeds, is not manifested in the Chinyanja triangle. Control over income and expenditure by men and women in Ntcheu district is determined by the level of control of production resources and labour investment thus the degree of investment in the same land by men is more instrumental than an act of responsibility.

Women in Malawi are not a homogenous group in other cases the powerful and most influential ones get more benefits of the resources while others are marginalized, while in other instances land ownership varies by birth order. The degree to which individual women adapt to farming techniques also differs as contented by Doss (2013) who indicated that technology adoption in intra-household (bargaining framework) is determined by the gender of the household head.

Water resources are strongly tied to land hence the formalization of land distribution through irrigation development tends to transfer both land and water which are primarily women's resources in the area towards men. Thus women in matrilineal societies are gradually elbowed out of land holding positions through systemization of land distribution in irrigation schemes. Land tenure in Kaziputa irrigation scheme is rotational between the default land lords (mostly women) and the dry season tenants (irrigators). The renting of plots by irrigators also create more financial resources for the women who are the primary land holders.

In the Ngoni culture the village head is usually a man--a son to the preceding head but he goes to stay at his wife's home though making decisions about his home village in absentia (Village heads without land). Paradoxically those who own the means of production (women) do not have decision making power, it is in the hands of the landless--matrilinity is not matriarchy. By disposition (having access to land and ability to mechanically produce manure) women in Ntcheu have the ability to practice sustainable agriculture intensification, consistent with Word Bank (2012)'s resource equality hypothesis; if supporting inputs such as fertilizer and pesticides are given at equal footing with men. However this assertion seems not to accommodate the issue of markets where women's bargaining power is still compromised.

Women are more inclined to labour intensification while men are inclined to capital intensification. While capital led intensification produces more yields, the Ntcheu case is non-exceptional in that men who owns smaller pieces of land tend to produce more because they have access to capital inputs. The labour invested by the women does not positively correlate with yield due to lack of physical inputs. The gender polarified intensification scenario increases the gender gap especially when it comes to level of production. The paper therefore arguments FAO (2011)'s contention that if both men and women are given equal access to input yield will increase by 20-30%. This contention is only applicable where the degree of complementarity between men and women is significant.

Community leadership engagement by men and women in Ntcheu District is gradually shifting towards men. This shift could be attributed to the infiltration of patriarchal values in the area which places the man as the 'head' as given by Van der Mole (2001) that women transfer irrigation responsibilities to their male counterparts culturally perceived as heads. Despite men taking lead in technically specialized tasks, the momentum that women show towards development activities builds some level of potential in them to be leaders in such developmental activities.

Conclusion

This paper concludes that intra-household power dynamics catalyse gender differences that are observed in the fields, markets, management and even in resource ownership and control. Gendered spaces manifested in differentiated crop choices and labour investment in selected tasks by men and women indicates that gender gaps still exist in the agriculture arena particularly in irrigation schemes where cultural checks and balances are compromised. The results indicate that women in Ntcheu are the landholders and have some degree of control on resources such as land and water however they have limited control over markets--a gap that breaks the empowerment cycle. Community leadership is also an area where women are lacking control, a situation brought about by the penetration of western ideologies which are patriarchal. More so the introduction of irrigation scheme plot allocation mechanism has loosened women's grip on land resources even in matrilineal societies. This paper therefore recommends that irrigation facilitation practiced consistently with the existing local cultural tenure systems to protect the existing systems which in matrilineal societies support the interests of women. Such approaches would boost women's asset base which is fundamental towards constructing a firm ground on which to bargain for resource ownership and control at household and community level. This in a way closes the gender gap that has been created between men and women. A holistic approach to scheme development is required which encompasses both field and domestic roles of irrigators to limit the burden particularly on female farmers who also are the primary care givers.

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List of Annexes

Annex A (Table 11): Seasonal Calendar

Key (6-high participation, 3-average participation, 0-no participation)

Month	Activity in irrigated plot	Male	Female	Activity in rain fed plot	Male	Female
January				Second weeding (banking)	xxx xxx	xxx xxx
				Top dressing	xxx xxx	xxx xxx
				Tobacco reaping	xxx xxx	xxx xxx
February				Continuation of tobacco reaping	xxx xxx	xxx xxx
				Mango selling		xxx xxx
				Vegetable preservation		xxx xxx
				Ganyu for food	xxx xxx	xxx xxx
March				Tobacco reaping	xxx xxx	xxx xxx

				Tobacco grading and baling	xxx xxx	
				Harvesting of beans		xxx xxx
				Groundnuts harvesting	xxx	xxx xxx
April	Land clearing and ploughing	xxx	xxx xxx	Tobacco grading and baling	xxx xxx	
				Crop harvesting	xxx xxx	xxx xxx
				Manure making, CA	xxx	xxx xxx
				Tobacco stalks removed for the next crop	xxx xxx	xxx xxx
May	Planting of various seed in the irrigation site	xxx xxx	xxx xxx	Maize shelling and acetylic application (preservation)		xxx xxx
	Sand removal from the canals (de-silting)	xxx	xxx xxx	Sending of bales to auction floor	xxx xxx	
	Canal maintenance	xxx xxx	xxx			
	Fertilizer application to the planted seeds	xxx	xxx xxx			
June	Top dressing	xxx	xxx xxx	Land preparation for summer crop	xxx	xxx xxx
	First weeding	xxx	xxx xxx	Tobacco shed construction for the next season	xxx xxx	xxx
				Ganyu to buy inputs	xxx xxx	xxx xxx
July	Land ploughing	xxx	xxx xxx	Land clearing	xxx xxx	xxx
	Basin making	xxx	xxx xxx	Ridging	xxx	xxx xxx
	Seed planting	xxx	xxx xxx			
	Watering	xxx xxx	xxx			
	Manure application	xxx	xxx xxx			
August	Apply fertilizer	xxx	xxx xxx	Ridging	xxx	xxx xxx
	Weeding	xxx	xxx xxx	Manure application	xxx	xxx xxx
	Watering	xxx xxx	xxx	Mulching	xxx xxx	xxx
				Tobacco nursery	xxx xxx	xxx
September	Weeding	xxx	xxx xxx	Tobacco seed transplanting from the initial bed to the mother bed	xxx xxx	xxx xxx
	Apply fertilizer	xxx	xxx xxx			
	Watering	xxx xxx	xxx			
October	Selling green maize	xxx	xxx xxx	Marking of planting stations for tobacco	xxx xxx	xxx
				Watering the tobacco nursery	xxx xxx	xxx
November	Selling of green maize	xxx	xxx xxx	Marking of planting stations and shade maintenance and construction for tobacco	xxx xxx	xxx

				Millet dry planting		xxx xxx
December				Planting of various crops	xxx xxx	xxx xxx
				Fertilizer application (basal dressing)	xxx	xxx xxx
				First weeding	xxx	xxx
				Planting where germination failed	xxx	xxx
		75	108		153	165

Annex B (Table 12) Summary of objectives and methods used

Objective	Methods used	Focal points
To identify the relationship between lineage factors and household gender relations.	Key informant interviews –Community leaders	Land tenure, resources distribution and control, gender rep in leadership, government interventions, Ngo's, farm input distribution, conflict management, scheme history, irrigation agencies, Policy/law resources allocation, culture, lineage patterns, access to water, markets,
To identify the gender roles and responsibilities over access, ownership and decision making on the means of production.	Focus group discussions Key informant interviews-irrigators	Livelihood strategies, Crop and livestock choice, gendered tasks, gendered fields, access to resources, plot sizes, income control and expenditure bargaining positions, assets ownership and control, marketing strategies, seasonal calendars, amount of produce per area, amount of income per area, development indicators, gender disaggregated data on type of water source and use
To evaluate the extent to which gender shapes access and ownership of resources.	Focus Group Discussions- mixed men and women Key informant interviews -Social support group leaders	Gender related conflicts, resource distribution, communication, education, security, alternatives livelihoods, gender equitability in leadership and infrastructure maintenance
To determine the implications of involving women in irrigation scheme management.	Observations Key informant interviews- Scheme management	Scheme history, scheme membership, representation, scheme design, participation, multipurpose infrastructure, institutional mechanisms (constitution, elections, registers, funds)
To assess how gender influence the degree of control over income and expenditures of irrigation produce.	Focus group discussions- (women irrigators only); men irrigators only Key informant interviews	Bargaining position for men and women, assets control and ownership, market negotiation, crops and livestock choices, access to water and related resources, scheme participation and management, benefit related use of outputs (income expenditure), seasonal calendars, community leadership, livelihood strategies/alternatives
To determine how gender contribute to the allocation of time to productive and non-productive tasks.	Observations Key informant interviews Focus group discussions	Access to water and related resources, gender division of labour, benefit related use of outputs (income expenditure), seasonal calendars, community leadership, livelihood strategies/alternatives
To assess the possible implications of gender on Sustainable Agriculture Intensification	Observations Key informant interviews-extension workers Focus group discussions	Existing relations, services provided and paid for, costs, preceding conflicts/challenges with irrigators, stakeholder mapping, irrigation agencies, irrigation institutional mechanisms, contractors, markets, inputs, NGO's, government interventions

Pictorial summary



1. Woman carrying sand for construction



2. Men and women constructing canals



3. Women cooking at a community gathering.



4. Irrigation produce at the market



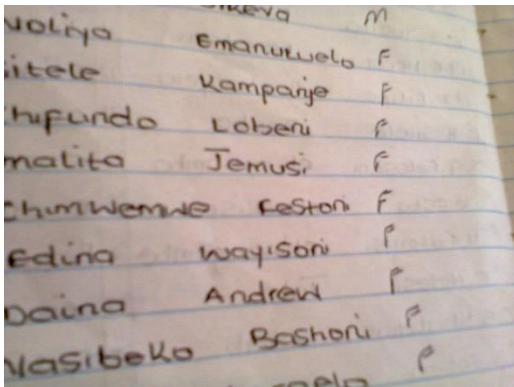
5. Ridging (Conservation Agriculture)



6. Man watering tobacco nursery



7. Women carrying wood for cooking fuel 8. Fish at the market



9. Irrigation scheme register 10. Farmers' association office post



11. Maize residue (Conservation Agriculture) 12. An irrigator in his plot