Learning through Farmer Field Schools: A Case Study of the Taita Hills, Kenya

By

Dina Najjar

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ABSTRACT

Agricultural practices are central in the struggle to transition to a more fruitful food production system in sub-Saharan Africa (SSA). The choices farmers make around their practices stem from societal and environmental reasons engrained within their communities.

This research explores Farmers Field Schools (FFS) as an example of agricultural extension grounded in community development and environmental sustainability, and how they affect the learning of farmers involved in them. The underlying premise is that agriculture is the basis of rural communities in Kenya, and that the conventional agricultural system (including markets, labour, resources and access to resources) is unsustainable having been undermined by a number of interdependent factors including the HIV/AIDS epidemic, climate change, gender inequalities (encompassing access to and control over resources and decision making in local agriculture) and youth and male out-migration.

Using transformative learning theory, the research explores the learning that takes place amongst adults who participate in FFS, and how this affects their agricultural practices, roles and worldviews at large. The ultimate question investigated is whether the FFS outcomes can create lasting change amongst learners and their communities, resulting in more environmentally and socially responsible type of agriculture, and therefore a more sustainable agricultural system.

The objectives of the research were to examine the roles and practices of the current agricultural systems and limitations to agricultural production; consider gender specific interests with implications for the FFS program; assess the conditions of learning by operationalizing the ideal learning conditions in an FFS context concerning local people (both gender, of different generations and differing economic status), government workers (agricultural extension agents and coordinators) and NGOs (both local and transnational); examine individual learning associated with a mixed FFS; explore what this learning means in and for the broader community, and the potential impacts on sustainability.

The research was conducted in the Taita Hills of Kenya through face to face interviews, focus group discussions, document review of farmers' notes and FFS reports for concerned NGOs as well as through the researcher's own observations while attending FFS sessions and visiting and working on farms. Three different models of participant interfaces were considered: single-sex male groups, single-sex female groups and mixed groups.

The researcher found that all participants experienced either communicative or instrumental forms of learning, with cultural premises and roles profoundly impacting such learning. The role of experiential learning was key in creating changes in participants' behaviour related to increasing production and soil and water conservation. Almost all participants experienced transformations in meaning schemes related to farming. This transformation was evident through epistemological changes and heightened levels of autonomous thinking and social responsibility, contributing to a more sustainable society.

Men's participation in a mixed FFS points to the potential for transformations in their meaning perspectives. Closing the gap between gender inequalities by the provision of interaction between the two sexes on an equal basis, in informal learning programs that relate to their personal livelihoods, (agricultural production), in their own biophysical and societal conditions is not only a desirable step for the involvement of men in agricultural work in SSA and for the exchange of roles between the two sexes, but also in reaching a more equitable society.

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List of Acronyms

AESA	Agro-ecosystem Analysis
AFC	Agricultural Finance Corporation
AIV	African Indigenous Vegetables
AMREF	African Medical and Research Foundation
ASAL	Arid and semi-Arid Land
ASCU	Agricultural Sector Coordination Unit
CDA	Coast Development Authority
DANIDA	International Danish Development Agency
FFS	Farmers Field Schools
FGD	Focus Group Discussion
FT	Farm Transects
FTC	Farmer Training Center
GAD	Gender and Development
GoK	Government of Kenya
HESA	Human Ecosystem Analysis
ICIPE	International Center for Insect Physiology and Ecology
IPM	Integrated Pest Management
KAPP	Kenya Agricultural Productivity Program
KARI	Kenya Agriculture Research Institute
LGB	Large Grain Borer
MoA	Ministry of Agriculture
MoF	Ministry of Forestry
MoH	Ministry of Health
MoLF	Ministry of Livestock and Fisheries
NASEP	National Agricultural Sector Extension Policy
NEMA	National Environmental Management Authority
PCCS	Pwani Christian Community Services
PFI	Promoting Farmers' Innovations
PLAR	Participatory Learning and Action Research
PRA	Participatory Rural Appraisal
PR&E	Participatory Research & Extension
PTD	Participatory Technology Development
RFM	Resource Flow Maps
RH	Reproductive Health
RRA	Rapid Rural Appraisal
SSA	sub-Saharan Africa
T & V	Train and Visit
TOT	Training of Trainers
ToT	Transfer of Technology
UNCCD	United Nations Convention on Combating Desertification
WIN	Women in Development
YMV	Yellow Mosaic Virus

GLOSSARY OF TERMS

Baraza	Public assembly
Daroura	Emergency
Duka Dawa	Organic pesticides
Fisadi	Corruption
Harambeh	Community work
Hyparenyi	Swampy area
Jembeh	Hoe
Jomla	In bulk
Kishagha	Unproductive soils
Kukwasheh	Shallow tillage
Kushimba	Deep tillage
Mafigha	Randomly
Maowa	*Tithonia divesifolia*
Mbili	Two
Mdavida	Local
Moalimo	Facilitator
Muzungo (pl. wazungo)	Caucasian person
Panga	Machete
Shamba	Farm
Sharia	Tradition
Ugali	A paste made from grounded maize
Wadodo Ma Adowi	Pest insect

INTRODUCTION

> Managing change in the direction of ecologically sound agriculture makes much greater demands on the understanding of learning than does the promotion of 'more of the same' within the conventional paradigm.
>
> (Rolling & Jiggins, 1998)

1.1 Background

Farmers in sub-Saharan Africa (SSA) constantly face problems characterized by a high degree of uncertainty and complexity (Hall, 2001; Rockstrom et al., 2003; Percy, 2005; Minnis, 2006). Rockstrom et al. (2003) note that in SSA "the risk for crop failure remains a reality every fifth year and the risk for yield reduction every second year," and that the area faces the "the largest food deficit and water scarcity challenges today" (p. 146). Furthermore, population in SSA is "projected to increase by 78% in the coming three decades" urging an intensification in food production (Hall, 2001, p. 39). Consequently, Percy (2005) notes that farmers in SSA can no longer depend solely on their local knowledge to farm as they did in the past. Indeed, recurrent crop failure and consequent hunger, often resulting in civil strife and dependence on food aid, in SSA is increasingly becoming the norm rather than a crisis, or the exception (Minnis, 2006; Doyle, 2008). Compounded with declining soil fertility (Deugd et al., 1998; Defoer, 2002), lack of access to ready markets (Defoer, 2002; Leewis, 2004; Minnis, 2006), HIV/AIDS epidemics and gender inequalities, the food crisis in SSA is further complicated.

The food crisis in SSA is particularly feminine, with women constituting most of the agricultural labor force (Percy, 1999a; Spring, 2000). Female-related problems, such as

lack of right to inherit land, limited access to credit, increased workloads due to an increase in female-headed households resulting from both male migration to towns and the breakdown of social traditions, have contributed much to the food crisis in the area (Due et al., 1997; Percy, 1999a; Spring, 2000; Sever & Jolly, 2003; Minnis, 2006; Berg & Jiggins, 2007). Crisis, however, can be an extraordinary opportunity for change (Mezirow, 1994, 1997, 2000; March et al., 1999). This change entails an increased investment[1] in the agricultural sector (Minnis, 2006) and a paradigm shift in agricultural extension (Rolling & Wagemakers, 1998; Leeuwis, 2004; Rolling, 2005), with a particular focus on gender relations (March et al., 1999; Percy, 1999a,b).

In the biophysical realm, secure food production mainly relies on management practices that maintain soil fertility, meet crop water requirements and limit pest populations. The conventional green revolution extension or the transfer of technology (ToT) approach addresses these management practices by prescribing fertilizers, irrigation and pesticides, respectively. These technologies, or scientific innovations, are produced under uniform and controlled conditions (Deugd et al., 1998; Pretty, 2002; Rolling, 2005). Agriculture in SSA, however, is particularly diverse with many micro-niches of high soil and crop variations, mixed tree stands and animal husbandry (Tittonell et al., 2005). Furthermore, in SSA 95% of agriculture is rain-fed (Deugd et al., 1998; Rockstrom et al., 2003) which limits the absorption of fertilizers and pesticides. Additionally, the smallholder farmers, who constitute more than 80% of farmers in SSA (Minnis, 2006), cannot afford to purchase fertilizers, pesticides and hybrid varieties, or the extension

[1]The research acknowledges the essential focus on investment in the agriculture sector (research, credit, extension and infrastructure); however, issues related to the investment in the agricultural sector are beyond the scope of this research.

package promoted by ToT (Deugd et al., 1998; Spring, 2000; Defoer, 2002; Daily Nation, June 7, 2006).

Further to the cost-prohibitive technologies, the ToT's sole focus on transferring information to individual farmers dilutes the essential focus on issues beyond the individual level. These issues include underlying social factors impeding agricultural production that mainly include access to land, resources and power in decision making (Minnis, 2006; Leeuwis, 2004; March et al., 1999; Percy, 1999a). For example, access to markets requires collective action, given the smallholder dominance in SSA, (Leeuwis, 2004; Duveskog, 2006) and the conservation of natural resources including soil and natural predators due to their ecological characteristics inherently require collective action (Tyler, 2006; Fliert et al., 2007). Additionally, the ToT approach is limited in its emancipatory potential in addressing other societal factors such as gendered powered relations. Indeed, evaluations of ample development programs using the ToT approach reported gendered power relations, especially the lack of power for women in decision making, as a hindering factor to adopting more productive agricultural technologies (March et al., 1999; Newmark, 2002). Berg and Jiggins' (2007) study on Farmer Field Schools (FFS) revealed that, in contrast to individual farmer extension learning setting, the farmer field school setting—a collective learning setting—resulted in action in the social and political realm, where farmers practised farmer-to-farmer extension, in context of limited extension staff, and had a stronger access to markets. Hence, the blanket application of the ToT package with its focus on individual farmers seems to be of little benefit to these diverse and smallholder dominant areas (Rolling, 2005).

Given the importance of land use intensification, access to markets, the ecological conditions of resources which extend beyond the individual farm boundaries, and the limited contribution of the ToT approach in SSA, concerned academics are calling for a group oriented (Leeuwis, 2004; Fliert et al., 2006; Jiggins, 2007) and knowledge intensive agricultural extension, with site specific understanding of local soil fertility management, crop interaction and pest management (Pretty, 1995, 2002; Deugd et al., 1998; Defoer, 2002; Leeuwis, 2004) and underlying social factors impeding production (March et al., 1999; Percy, 1999a). Indeed, agricultural extension in SSA is undergoing decentralization (Percy, 1999a,b), with a focus on farmer-to-farmer extension (Defoer, 2002) and collaborative research between farmers, extension and research organizations in what is termed as participatory research and extension (PR&E) (Percy, 2005). This type of extension requires an investment in learning (Pretty, 2002, 1995; Percy, 2005). Ideally this learning will result in farmers taking action to change oppressive social structures in their community, such as a shift in gendered power relations (Percy, 1999a,b, 2005), overcoming mythical invincibility of drought and pest issues (Freire, 1970; Percy, 2005) and vulnerabilities to HIV/AIDS (Guerny,1999, 2002; Chhaya, 2004; Jayne et al., 2005).

This paradigm shift in agricultural extension, mentioned earlier, moves away from the focus on technology transfer and advisory services to a sustained focus on adult education (Rolling & Wagemakers, 1998; Percy, 1999, 2005; Leeuwis, 2004). This nascent focus on adult education, where farmers are perceived as co-learners with the extension and research institutions, has yet to explore the learning processes, conditions and outcomes that result in sustaining the resource base, intensifying food production and

innovating locally relevant solutions to production, marketing and labour issues (Rolling & Jiggins, 1998; Leeuwis, 2004; Rolling, 2005). The theory of transformative learning (Mezirow, 1978) is a growing theory that proved promising in facilitating learning outcomes stemming from crisis and resulting in informed decisions when acting on such crisis, given the provision of specific learning conditions (Taylor, 1998, 2000, 2007; Shcugurensky, 2002). With the focus of PR& E on facilitating conditions for learning rather than a top-down transfer of knowledge, the theory of transformative learning offers a strong theoretical framework with which to facilitate and evaluate extension outcomes. Given the opportunity to participate in a democratic learning process, the outcomes result in learners acquiring the communicative and instrumental competence needed to make and act on informed decisions that serve goals beyond individual gains, such as an increased role in decision-making in environmental governance (Marschke & Sinclair, 2007) and taking interest and action in protecting the local watershed (Simms & Sinclair, 2008).

1.2 Purpose and Objectives

Farmer field schools are increasingly gaining precedence in SSA for the application of the decentralized, farmer driven and farmer centred type of extension (Khisa, 2003; Berg & Jiggins, 2007). Farmers themselves learn, discover and disseminate solutions to their problems in their local social and biophysical conditions (Scarborough et al., 1997; Rolling & Fliert, 1998; Khisa, 2003). Given the food crisis in SSA and the potential contribution of the decentralized and farmer centred type of agricultural

extension, this research explores transformative learning occurring in FFS in Kenya following five specific objectives:

1- to understand the characteristics of the local agricultural production systems;

2- to consider gender specific interests with implications for the FFS program;

3- to assess the conditions of learning;

4- to understand the individual learning outcomes of farmers involved in the FFS;

5- and to determine whether the extension activities promote broader community thinking about sustainable agriculture.

1.3 Significance of Study

This research falls within the global critical reflection on the food crisis occurring in SSA, with a practical and scholarly significance. The research explores the potential of FFS in overcoming the food crisis with implications for the FFS program in place. The scholarly significance of this research stems from its extensive attempt to contextualize transformative learning processes, conditions and outcomes in a non-Western, collective and non-academic setting.

1.4 Summary of Methods

The research design consisted of a qualitative case study of farmer participation in FFS in the Taita Hills in the coast province of Kenya. Methods included Rapid Rural Appraisal (RRA), Participatory Rural Appraisal (PRA), Resource Flow Maps (RFM) as outlined by Osilaba et al. (2005) and Chambers (1997), Farm Transects (FT) as outlined

by Titonell et al. (2005a,b), local NGO workshops on gender sensitization and a document review of farmers' notes, NGO and government FFS' forms and relevant minutes of meetings. Participant observation (which included participating in farm work, attending FFS sessions and farm visits) proved particularly salient for understanding gender roles, how learning occurred in FFS and subsequent changes in behaviour and roles.

The case study design addressed the threats to reliability and validity by employing methods that had both a latitudinal and longitudinal focus (Berg & Jiggins, 2007). The latitudinal facet of the research compared roles and behaviours of participant farmers with non-participant farmers. Further, the latitudinal aspect of the research aimed at examining the dissemination of learning from farmers who participated in the FFS to farmers who did not participate. The longitudinal facet, similarly, explored the changes in roles and behaviour as a result of FFS over a six year period for participant and non-participant farmers in the community of the case study area.

Nvivo, Excel and ARC MAP software were used in the data analysis. Data used for addressing the first three objectives of describing learning context, understanding gender specific needs and assessing learning conditions, were based on interviews with FFS facilitators, FFS farmers' notes, concerned NGOs and government institutions and twenty FFS belonging to three different agro-ecological zones in the case study area. The last two research objectives of understanding learning outcomes and the implications of such outcomes on the boarder community setting focused on data derived from a single FFS, the Mwora FFS. Refer to Chapter Three for methods details.

1.5 Thesis Organization

The thesis is organized into eight chapters. Following this introductory chapter, the second chapter provides a literature review on agriculture in Kenya with a focus on sustainable agriculture practices and the development of agricultural extension into adult education with an emphasis on the theory of transformative learning. The third chapter covers the research approach and methods, including the case study site selection criteria and limitations. The fourth chapter provides a detailed description of the agricultural systems that the research covered: the roles, limitations and physical attributes. The fifth chapter describes the introduction of the farmer field school program to Kenya, the types of FFS visited in the Taita Hills, and the history of extension in the Taita Hills with specific consideration to the problems faced by the twenty FFS visited for the purposes of this research. The sixth chapter assesses the conditions of learning in FFS in the Taita Hills using the voices of farmers, agriculture extension officers and NGO and government officials. The seventh chapter offers a detailed description and analysis of the learning outcomes (instrumental, communicative, empowering, emancipatory and transformative) as a result of Mwora FFS in the Mbonbonyi community. The eighth chapter offers conclusion of findings and their implications on the FFS program. The concluding chapter, as well, identifies the contribution of this research to knowledge.

AGRICULTURE, EXTENSION AND LEARNING

2.1 Introduction

In the first part of this chapter (Sections 2.2, 2.3 and 2.4), an attempt is made to situate sustainable agriculture within the context of the dominant smallholder farmers in Kenya and appropriate facilitation models. The second part (Section 2.5) of this chapter will describe transformative learning theory, and identify the learning processes which the theory focuses on. Then, an analysis of how transformative learning theory can inform learning occurring in PR&E is provided.

2.2 Agriculture in Kenya

Agriculture in Kenya accounts for 30 to 35% of gross domestic product (GDP), more than 50% of export earnings and 70% of employment (Moaldm in Spring, 2000). Smallholder farms, averaging under two hectares, are responsible for more than 75% of agricultural production in Kenya (Spring, 2000; Shibanda & Seru, 2002). Most of the land in Kenya is characterized as dry land: arid, semi-arid and dry sub-humid. Depending on the location and rainfall pattern, farmers, under rain-fed conditions, may harvest once or twice per year. Where a bi-modal rainfall pattern occurs, such as in parts of western and southern Kenya (Hall, 2001), farmers have two cropping seasons, while in drier areas usually only harvest once per year (Hall, 2001). Kenya has two main types of farming systems: the pastoral and maize mixed farming systems (Hall, 2001).

The pastoral farming system is mainly found in the very arid region, pastoralists raise cattle, sheep, goat, and camel with high incidences of stock theft (Hall, 2001). The maize mixed farming system is located in dry sub humid to moist sub humid agro-ecological zones (Hall, 2001). Maize is the main staple food, while tobacco, coffee, cotton, groundnuts and sunflower are grown as cash crops (Hall, 2001). The maize mixed farming system focuses on the integration of crop production and livestock. Such that, oxen prepare the land, dung is collected to fertilize crops and crop residue and forage plots constitute animal feed sources (Hall, 2001).

Drought constitutes the main vulnerability to both systems. Hall (2001) notes that due to drought pastoralists lose significant amount of their stock; while in the mixed maize farming system, dry spells that last for more than ten days (e.g. long rains of 2000 in Kenya) often result in complete crop failure (Rockstrom et al., 2003).

2.3 Sustainable Agriculture in Diverse and Risk Prone Areas

> Sustainable agriculture seeks the integrated use of a wide range of pest, nutrient, and soil and water management technologies. It aims for an increased diversity of enterprises within farms combined with increased linkages and flows between them. By-products or wastes from one component or enterprise become input to another. As natural processes increasingly substitute for external inputs, so the impact on the environment is reduced. (Pretty, 1998, p.31).

It is suggested that low productivity in rain fed agriculture is due to sub-optimal management practices, rather than to low physical potential (Pretty, 1995, 1998; Agarawal & Nairin in Rockstrom et al., 2003). Pretty (1995, 1998) suggests regenerative practices to increase production. Farmers adopting regenerative technologies “have doubled or

tripled crop yields, often with little or no use of external inputs" (Pretty, 1995, p.19). These knowledge intensive, regenerative practices require an investment in learning about site specific opportunities for increasing the flow between farm components (Deugd et al., 1998; Leeuwis, 2004).

2.3.1 Regenerative practices

Integrated pest management, integrated nutrient management and integrated water management "do two important things: they conserve existing on-farm resources, such as nutrients, predators, water or soil; and/or they introduce new elements into the farming system that add more of these resources, such as nitrogen fixing crops, water harvesting structures or new predators, and so substitute for some or all external resources" (Pretty, 1995, p.129). These regenerative practices contribute to environmental conservation as well as to an enhanced and sustained agricultural productivity.

Integrated pest management

Integrated pest management "is the integrated use of a range of pest (insect, weed, or a disease) control strategies in a way that not only reduces pest populations to satisfactory levels but is sustainable and non-polluting" (Pretty, 1995, p. 97). According to Hans et al. (2005, p. 137), in tropical agro-ecosystems "the small size of farms and high crop diversity often actually favor natural control mechanisms." Hans et al. (2005) contend that in tropical agro-ecosystems, in many instances, farmers have not yet adopted the generalized use of pesticides. These areas are a valuable opportunity for scientists and

farmers to work together in the presence of existing natural control base to reduce pest impact (Hans et al., 2005).

Indeed, Hans et al. (2005) and Pretty (2002) note that in Kenya participatory on-farm trials for stem borer and striga control on maize using 'push-pull' strategies led to a significant increase in maize yields. Push-pull approaches are locally adapted technologies "especially suited for mixed crop-livestock farming" (Hans et al., 2005, p. 142). The pull involves trap plants such as Napier grass and Sudan grass that attract stem borers. The push involves stem borer repellent intercrops and includes molasses grass and the legume *Desmodium*. The legume is allelophathic to striga, while the molasses grass is a host for the stem borer's natural predator: Cameron. All of these plants are then used as animal fodder contributing to increased livestock production.

Further, integrated pest management practices are promoted in the East African Sub-regional Pilot Project for FFS in Kenya.

The following management practices were implemented in the project:

-Crop rotations aimed at rotating non-host crops with susceptible crops;

-Intercropping in order to disrupt the relationship between the pathogen and its host;

-Cultural practices that substitute natural chemicals for pesticides (including the use of ash for aphid control and marigold for fungal blight).

Integrated nutrient management

Integrated nutrient management, also referred to as integrated soil fertility management, is "managing the widest variety of possible sources of fertility in the most

efficient ways" (Defoer, 2002, p. 148). In general, soil organic matter constitutes an important source of nutrients for farmers that have limited access to fertilizer, as is the case in SSA (Defoer, 2002; Orr, 2003; Rockstrom et al., 2003; Tittonell et al., 2005a,b). Animal manure additions, green manure crops, legume rotations and intercropping practices may be collectively used to replenish soil nutrients and increase productivity. The tse tse infestations in the coastal areas of Kenya, however, limit the ability to raise cattle and the subsequent use of cattle manure (Tittonell et al. 2005a). Nonetheless, in general, the maize mixed farming system in Kenya may increase agricultural productivity by adopting integrated nutrient management practices. Hall (2001) recommends the following integrated nutrient management practices for the maize mixed farming system:

-judicious use of legumes for biological nitrogen fixation, especially for fallow enrichment and in rotations, or as intercrops with cereals;

-integration of livestock in the farming system, maximizing use of manure, e.g. through stall feeding;

-composting any available plant material;

-woodlot planting to reduce use of dung and crop residues for fuel.

An enhanced soil fertility management scheme, however, has a limited impact on yield in absence of enhanced water management. For example, in Kenya rainfed crops failed completely during the dry spell of the year 2000 during the long rain season, despite fertilization (Rockstrom et al., 2003).

Integrated water management

Integrated water management entails the use of widest possible practices to preserve soil moisture content and efficiently use water resources, such as water harvesting and conservation tillage practices. Water management is crucial in rain-fed agriculture where "precipitation received in whatever intensity has to be efficiently used" (Krishna, 2003, p. 180). Water management in rain-fed systems is yet to make better use of the received rainfall. Rockstrom et al. (2003) contend "that between 70 and 85% of rainfall can be considered lost to the cropping system as non-productive green water-flow (as soil evaporation) and as blue water-flow (deep percolation and surface runoff)" (p. 150).

Further, the main reason for crop failure, especially in maize, is attributed to dry spells, rather than to the cumulative amount of rainfall (Rockstrom et al., 2003). Consequently, Rockstrom et al. (2003) call for water harvesting techniques that will especially provide secure water access to overcome dry spells (i.e., supplemental irrigation), particularly during sensitive growth stages (such as flowering stage in maize and tillering stage in wheat). According to Rockstrom et al. (2003), supplementary irrigation using water jars or tanks for harvesting rainwater for later use during dry spells is a viable option. A survey in Kenya revealed that smallholder farmers rarely consider irrigation using storage tanks, and that supplemental irrigation for food crops (such as maize and sorghum) is seldom applied (Jurdell & Svensson in Rockstrom et al., 2003). Rather, if rain-water was harvested in subsurface tanks, then its use was restricted to cash crops (Jurdell & Svensson in Rockstrom et al., 2003).

In addition to rainwater harvesting, a focus on the efficiency of rain water use is essential for a better water management scheme, such as the use of conservation tillage. Conservation tillage practices range from zero-tillage to reduced tillage and aim at maximizing soil infiltration and minimizing water losses, while conserving labour (Hall, 2001; Rocktrom et al., 2003). Conservation tillage practices preserve soil moisture and often entail the use of green manure crops (Power & Prasad, 1997; Hamilton, 1998). In extremely arid and semi-arid environments, however, maintaining below ground root systems which is essential for preserving soil moisture is difficult due to desiccation (Hall, 2001; Rockstrom et al., 2003). Hence, in dry areas a focus on drought tolerant crops, grasses and shrubs that maintain a ground cover is important.

It should be noted that integrated water management and soil fertility management have synergistic effects: Faso in Rockstrom et al. (2003) proved that integrated soil-nutrient and water management increased yield three-folds as compared to a 1.5-2 fold increase when using either alone. Further, in rain-fed conditions water availability proved to be a major incentive for farmers' investment in enhancing their soil fertility and pest management practices (Rockstrom et al., 2003).

2.4 Agricultural Extension

Originally, the purpose of agricultural extension was to extend research findings beyond the walls of universities and research stations to farmers' fields (Rolling & Wagemakers, 1998). Extension's central mandate was to provide training and technical advice on the usage of inputs in the form of a train and visit (T&V) approach (Deugd et

al., 1998; Rolling & Wagemakers, 1998). Training was offered on the blanket application of fertilizers and calendar spraying of pesticides and the subsequent use of hybrid crop varieties. Farmers were perceived as technology receivers, while extension agents were viewed as experts and science was valued for the predictive powers of its generalizations (Rolling & Wagemakers, 1998; Leeuwis, 2004; Rolling, 2005). Over time, however, insecticide resistance, aquifer pollution, site-specific problems, poisoning and cancer-related incidences and the loss of soil cover, among other adverse impacts due to the adoption of the ToT approach, led to a paradigm shift in agricultural extension, termed participatory research and extension (PR&E) (Rolling & Wagemakers; Pretty, 2002; Percy, 2005; Rolling, 2005). This type of extension offers a different perspective on the role of extension agents, farmers and science.

2.4.1 Participatory research and extension

In PR&E, farmers adopt the role of individuals seeking self-learning and discovery, extension agents adopt the role of facilitators and science adopts the role of a collaborator in the innovation and adoption of agricultural practices (Rolling & Wagemakers, 1998; Leeuwis, 2004). Percy (2005) identifies farmer field schools (FFS) and co-learning approaches as examples of PR&E. The PR&E approach is concerned with fostering voluntary change in behaviour through experimentation and information sharing (Rolling & Wagemakers, 1998), thereby farmers “increase their awareness of what does and does not work” (Pretty, 2002, p.162).

Farmer Field Schools (Scarborough, 1997)

Farmer field schools are referred to as schools without walls where 25 to 30 farmers meet weekly during a growing season to engage in experiential learning. Farmers work in groups of five and usually carry out two trials, one using conventional methods and one using sustainable management methods. The conventional trial is managed according to conventional practices, such as applying fertilizers and pesticides. The other trial includes sustainable management practices that usually pertain to integrated pest management. During each session, farmers respectively engage in the following learning processes: field observation or agro-ecosystem analysis, subgroup discussions and analysis and presentations of findings and conclusions to the larger group. With time, as farmers enhance their communication skills due to discussions and analysis, more complex tools are introduced, such as 'energy flow diagrams' and 'insect lifecycle interactions'. Eventually, farmers develop complex knowledge that matches management practices with insect and crop lifecycles and entails the usage of non-polluting and sustainable practices. Because farmers are engaging in systemic observations of the relations between crop development and pest and disease problems, collaboration between insect ecologists and farmers leads to increased understanding of integrated pest management strategies. Hence, the FFS aims at maintaining links with research agencies.

Participatory learning and action research (Defoer, 2002)

Participatory learning and action research (PLAR) is a process-based approach that pivots on iterative knowledge generation and learning. The PLAR involves the whole village. At the beginning of the PLAR process, change agents perform diversity analysis

of soil fertility management practices by working with subgroups divided according to age, gender and kinship. Afterwards, test farmers are chosen to represent the diversity found in the village with respect to soil fertility management and social groups. Test farmers are exposed to alternative ways of managing soil fertility through the use of resource flow maps (RFM) and joint analysis. The RFM are maps that visualize soil fertility management on the farm. Farmers engage respectively and iteratively in diagnosis and analysis, planning, implementation and evaluation. The test farmers form a committee that acts as a link between change agents and the rest of the village. Experiments are evaluated together with change agents, and accordingly new RFM are drawn. The new resource plans constitute a management plan for the next experiment. Eventually, farmers enhance their soil fertility management practices and disseminate their learning to the rest of the village.

Co-Learning tools (Hamilton, 1998)

Co-learning approaches entail the usage of learning tools that aid farmers in discovering what is occurring on their farms. The tools used often involve research tools such as the soil corer and demonstration tools such as the rainfall simulator. The soil corer is a research tool that allows the removal of a complete core of soil for up to 2 m. Often farmers have little knowledge of what exists below 15 cm, the usual planting depth. By using the soil corer, farmers jointly learn about their soil profiles and monitor soil moisture storage over time. By knowing about soil moisture content, farmers could decide on whether to plant immediately or to continue the fallow process and plant at a later date. The rainfall simulator allows farmers to experiment with optimizing soil moisture storage.

Rainfall simulator produces water drops that are similar to rain. Farmers collectively nominate their treatments and monitor their treatments allowing for an enhanced understanding of the relationship between fallow management practices and rainfall.

2.4.2 Gender issues in agricultural extension

With the growing focus on addressing local farmers' needs in their own local conditions, gender becomes particularly relevant to agricultural extension (Percy 1999a,b; Spring, 2000; Defoer, 2002; Minnis, 2006; Duveskog, 2006). Agricultural needs in SSA are gendered, with women facing the bulk of these needs, which include a more equitable land tenure system and alleviation of work loads. Female-headed households in SSA are more likely to be living in abject poverty (Duveskog, 2006). Additionally, because of their subordinate status these women are especially vulnerable to HIV/AIDS (Guerny, 2002). Women with heavy work loads, no access to land, lack of money to buy needed supplies and physical weakness are limited in their ability to invest the required labor and resources for farming.

Kabeer in March et al. (1999) maintains that gendered power relations are the backbone for the subordinate status of women and calls for the provision of conditions in development projects that sharpen, and even produce, bargaining skills (March et al., 1999). These bargaining skills are key for redistributing power in the society and for women to attain equal rights with men in all spheres (March et al., 1999). Such conditions can be potentially provided in a mixed-group setting, in which men and women learn together in agricultural extension programs, offering an opportunity to resolve power imbalances. Pretty (2002) found that male farmers who learned together with female

farmers became less gender rigid on their farms. In reality, however, most development programs focus on building farming and marketing skills for women, rather than a higher-order type of empowerment whereby women gain rights to inherit land and decision making in the local agriculture governance (Due et al., 1997; March et al., 1999; Percy, 1999a,b).

2.5 Transformative Learning Theory

The theoretical basis of this study is embedded in transformative learning, an overview of which follows. The first part identifies and describes some of the key processes that occur in transformative learning, while the remainder of the section links key concepts from transformative learning to PR&E.

Transformative learning theory focuses on a process through which adults reach an autonomous and socially responsible way of thinking and acting (Merriam & Cafarella, 1999; Shcugurensky, 2002; Belenky & Stanton, 2000). To reach this ultimate stage of autonomous thinking and social responsibility, adults need to establish a certain level of instrumental and communicative competence.

Instrumental learning, which refers to obtaining skills and information, occurs through determining cause-effect relationships, grasping information and through learning of skills, such as communication or farming skills (Mezirow, 2000). As adults increasingly involve themselves in instrumental learning they sharpen their instrumental competence: their ability to control natural variables and other people (Mezirow, 2000).

Communicative learning, however, pertains to learning at the abstract level on abstract issues such as values, intentions and feelings (Mezirow, 2000). As adults

increasingly engage in learning at the abstract level, they develop communicative competence: ability to negotiate meaning for oneself instead of passively internalizing meaning communicated or interpreted by others (Mezirow, 2000).

As adults establish their communicative and instrumental competence they experience an epistemological change, in which they are actively seeking other points of view, reflecting and acting on consequent learning within their society, hence a transformation in meaning perspective (Mezirow, 2000). Such change in meaning making and consequent action is emancipatory: it frees adults from oppressive social structures and personal biases passively internalized from parents and society that were distorting ones life (Mezirow, 2000).

The theory focuses mainly on rational discourse for learning in adulthood and calls adult educators for a sustained focus on rational discourse (Merriam & Cafarella, 1999; Schugurensky, 2002; Percy, 2005). Rational discourse refers to dialogue between adults which occurs alongside the ideal conditions of learning: the provision of accurate and complete information, freedom from coercion, openness to alternative point of views, ability to weigh evidence and assess arguments, greater awareness of the context of ideas, equal opportunity to participate in various roles of discourse and willingness to seek and accept a best judgment (Mezirow, 2000).

2.5.1 Transformative learning and agricultural extension

It is now realized that sustainable practices, solutions to site specific problems and community development efforts are adopted, sustained and created only when local people in their own local conditions are the main participants and contributors in the

processes of extension services (Duegd et al., 1998; Rolling & Wagemakers, 1998; Leeuwis, 2004). Extension work through PR&E methods recognizes this (Percy, 2005). Transformative learning outcomes of social responsibility and autonomous thinking are a match with the current agricultural extension intentions in SSA of devolving agricultural decision making, technology innovation and dissemination to the farmers themselves.

2.6 Summary

The dominant agriculture smallholder context in Kenya requires an investment in learning for increasing the interrelationships between diverse farm enterprises, of cattle and crop production, characteristic of most farming in Kenya, (Deugd et al. 1998, Rolling & Wagemakers, 1998; Leeuwis, 2004) generating income (Defoer, 2002; Duveskog, 2006), reducing vulnerability to HIV/AIDS (Guerny, 1999, 2002; Chhaya et al., 2004) and overcoming injustices, such as lack of power in decision making for women (March et al., 1999; Percy, 1999a,b) . Learning needed results in a heightened sense of social responsibility for protecting watersheds, soils and natural predators and autonomous thinking for local governance in agricultural decision making all in the context of the nascent agricultural extension policies of decentralization (Percy, 1999a; Rolling, 2005; Duveskog, 2006). The outcomes of transformative learning theory are autonomous thinking and social responsibility when the ideal conditions of learning are present (Merriam & Cafarella, 1999; Schugurensky, 2002; Percy, 2005). Consequently, transformative learning theory can guide agricultural extension efforts in SSA.

Research Approach and Methods

3.1 Introduction

Based on four months of field work extending from May 2006 until August 2006, this research, using a qualitative case study approach, explored transformative learning in Farmer Field Schools located in the Taita Hills in the Coast Province of Kenya.

In order to build a trustworthy relationship, a paramount condition for exposing transformative learning, with the community in place, the research was interactive and adaptive in nature (Reeler, 2007). Participatory methods, such as mapping, community walks and gender and social analysis, and non-participatory methods, such as a review of academic journals, farmers' and facilitators' notes and NGO reports, were performed.

3.2 Qualitative Research

The research adopted a qualitative approach. Changes in behaviour, social action, social change, gender specific agricultural interests and the conditions of learning were qualitative criteria with which transformative learning was explored. Because the research sought out learning outcomes and conditions in FFS from the experiences of concerned farmers, facilitators and government and NGO officials, qualitative research was an appropriate approach of inquisition where the researcher attempts to "establish the meaning of a phenomenon from the views of participants" (Creswell, 1994, p. 20).

Being qualitative in nature, the research focused on very detailed and rich description of context specific data, as suggested by Creswell (1994). Further, rich description of context specific data was essential to overcome the challenges of reading

change (social or individual) (Reeler, 2007), given that the researcher is an outsider with limited knowledge of local farming behaviour, gender roles and FFS technologies. Rich description had scholarly significance, such that, context specific data allowed the exploration of the impact of culture on learning[2], "an area of research greatly overlooked" (Taylor, 2007, p. 185).

Using a transformative framework, a constructivist paradigm of knowledge construction was adopted. Along the same lines, sustainable agriculture was not predefined in interviews or focus group discussions from the literature review, which revealed various definitions to sustainable agriculture. Sustainable agriculture was, rather, defined in focus group discussions by the local people themselves according to their own perceived reality.

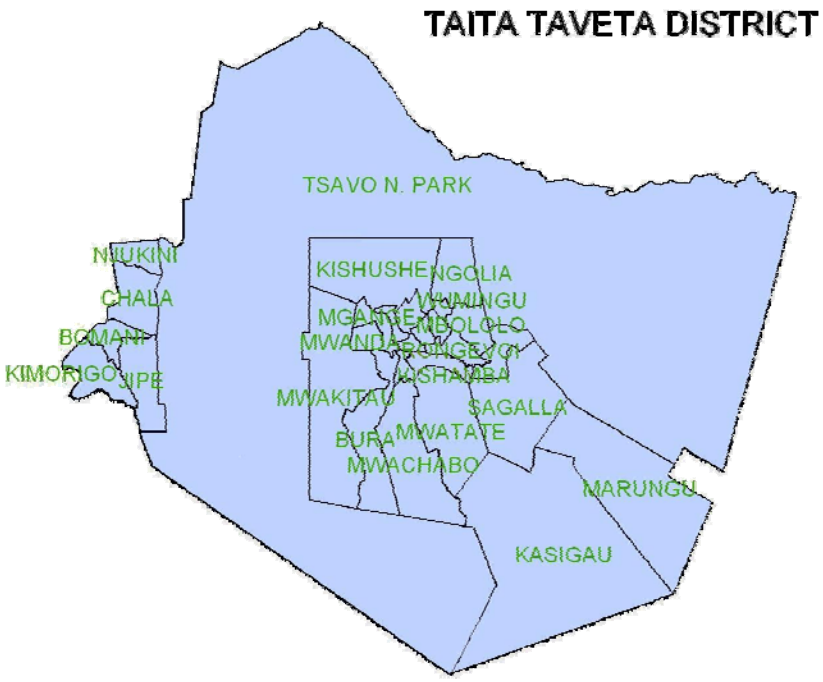
3.3 Case Study Approach

Learning occurring in FFS and the impacts of such learning on the community in general is unpredictable and emergent (Rolling & Fliert, 1998). As such, this research adopted a case study approach. Yin (2003) contends that a "case study strategy may be used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes" (p.15). Further, a case study approach was adopted because the learning outcomes, conditions and contextual factors leading to these conditions and outcomes are beyond the control of the researcher. A case study design is used when the researcher has no control over the phenomena under study (Yin, 2003).

[2] For example singing and acting were one of the learning methods in FFS. Further to art being a cultural factor in learning, roles in the community defined learning outcomes. Refer to Chapter Seven for details.

3.3.1 Site selection

The districts of Kilifi and Taita Taveta in the coast province of Kenya were visited with two of the committee members, Dr. Spaling and Dr. Sinclair. Prior to the case study site selection, three schools were visited in Mwatate, Taita Taveta district and two schools in Bamba, Kilifi district. Taita Taveta (**Figure 3.1**) district was chosen as the case study site for the following reasons:



Source: Central Bureau of Statistics, 2006
Figure 3.1. Taita/Taveta district. The district is divided into 21 locations. The District covers an area of approximately 17128.3 sq km. Only 11% constitutes arable land and Tsavo Park occupies 62% of the district's area.

- The farmers in the Taita Taveta district seemed to be benefiting more from the FFS program than were the farmers in the Kilifi district. The FFS in Kilifi focused on maize production trials despite the fact that Kilifi, more specifically Bamba, is

a semi-arid region. This limited focus on a drought-susceptible crop has resulted in a complete failure in the maize trials (**Figure 3.2**);

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Figure 3.2. Maize failure at FFS site in Bamba, Kilifi district.

- The farmers in Taita Taveta were more interactive, happy and approachable than were the farmers in Kilifi;
- Taita Taveta contains the Taita Hills which belong to the Eastern Arc Mountains of West Africa, a biodiversity hotspot as classified by Myers et al. (2000), having lost more than 70% of its vegetation and containing more than 0.5% of the world's plant species.

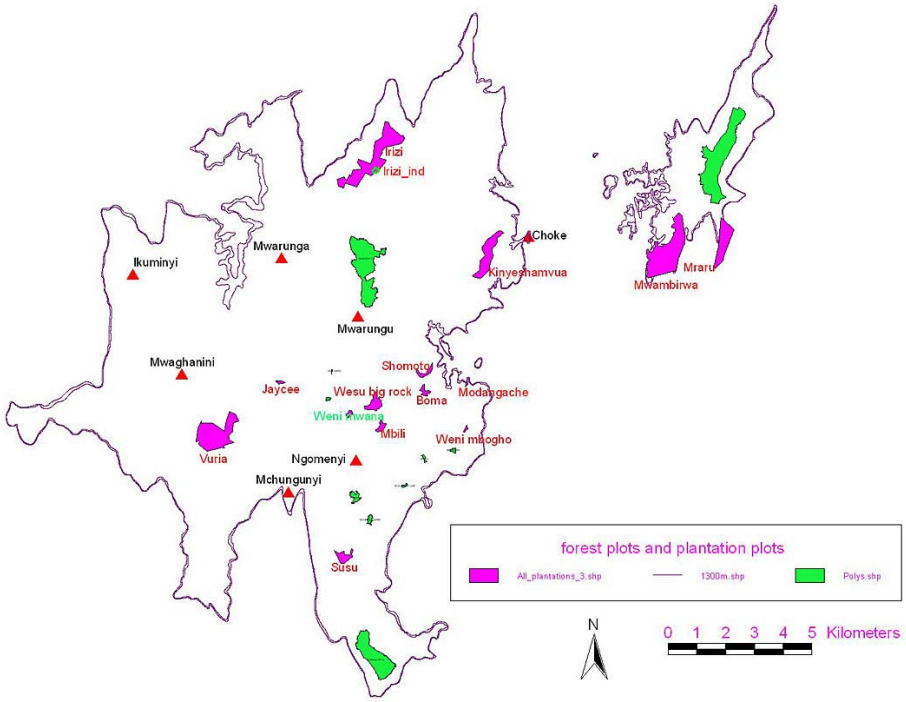
The last condition favored choosing the Taita Hills (**Figure 3.3**) as the research area out of the 21 locations in the Taita Taveta district (**Figure 3.1**).

Source: Google Earth, 2008

Figure 3.3. The location of the Taita Hills in South-East Kenya.

Taita Hills are located in South-East Kenya and occupy an area of 250 km^2 (Brooks et al., 1998). The extent of forest loss, which mostly occurred over the past 200 years, is estimated at 98% and is attributed to human encroachment and associated resource use such as timber harvesting, charcoal burning and expansion of agricultural land (Brooks et al, 1998; Vogt & Wiesenhuetter, 2000; Newmark, 2002). As such, it was interesting to see whether the FFS program has any considerations for limiting the expansion of deforestation.

Thirteen remnant patches of forest are considered to be indigenous to the region (**Figure 3.4**), only two of which are likely to remain with the current level of resource use (Brooks et al., 1998).



Source: Taita Taveta District Geology Head Office, 2006
Figure 3.4. Indigenous remnant forest patches in the Taita Hills.

Moblolo, Ngangao and Chawia are the largest cloud forests in the Hills (Gelbusera et al., 2004; National Environmental Management Authority [NEMA], 2005). The Hills contain the highest endemic species to area ratio in the world (Myers et al., 2000). The Hills' forest ecosystems are habitat for more than 2000 flora species, of which 25 to 30% are endemic (Lovett in NEMA, 2005), and over 400 fauna species, of which at least 30% are considered endemic (NEMA, 2005).

Another interesting factor for choosing the Taita Hills was the fact that the Hills are particularly famous for endemic bird species and are listed by the Kenya Atlas of

Ecosystems and Human Wellbeing (2007) as an endemic and important bird area with a declining status. The Hills contain three critically endangered bird species, with the Taita Thrush being the most endangered (Brooks et al., 1998). Endemism is attributed to the isolation and age of the Taita Hills, which are isolated from any other highland by 80 Km^2 of lowland in all directions (Gelbusera et al., 2004).

3.3.2 Case study selection

After choosing the Taita Hills as the research site, twenty FFS were selected for addressing the first three objectives of understanding context, gender specific interests and learning conditions. The twenty FFS were chosen with the help of three research assistants and were identified following several criteria, to be explained shortly. The FFS were chosen such that the learning enterprise, age and gender distribution criteria were as diverse as possible providing a more comprehensive understanding about FFS in the Hills, and for providing insights into the selection criteria.

One school in the Taita Hills was chosen for an in-depth understanding of its outcomes, addressing objectives three and four of understanding individual learning and broader impact on the community. Evaluations prior to choosing this FFS were carried out over a one month period and evolved through visiting the district library, visiting FFS groups and through interviews with four agricultural extension officers. Eventually, the evaluations, for choosing one FFS for an in-depth understanding, were carried out according to the following criteria:

- The gender and age diversity of participants[3], with preference given to a mixed group in terms of both gender and age;

- The age of the FFS, with preference given to an older school that have graduated, because social action and both individual and social transformations require time[4];

- The diversity of learning program, with preference given to learning programs that focused on relevant needs such as agro-forestry in areas that suffer from landslides and drought resistant crops in medium and low potential[5] areas;

-The presence of farmer innovators, with preference given to an FFS with more farmer innovators[6];

-The presence of resulting farmer-led schools, with preference given to an FFS whose members have facilitated many schools[7];

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[3] Field work conducted by Mweri (2005) on FFS in the same area affirmed that women involved in single-sex FFS failed to adopt the male role of digging *Fanya Jus* (the first cut of drain or terrace) on their farms. *Fanya Jus* (**Figure 3.5**), usually, are very deep and labor intensive, and building them is a task undertaken by men. A possible resolution to such limitations of adopting technologies due to predefined gender roles is a mixed group learning setting. The research explored changes behaviour in a mixed FFS, anticipating an exchange of roles between involved male and female farmers. Through gender-mixed participatory learning, farmers are more likely to realize that sharing roles in the community and household is for the common good (Njoroge, 2004).

[4] The learning program in FFS usually extends over two growing seasons focusing on two crops or enterprises, one in each season. A period of 4 agricultural seasons which translates into 2-3 years might be sufficient time for the FFS learning to be potentially spread to the non-participants, and for FFS farmers to potentially implement the knowledge obtained from the FFS.
For the inclusion of farmer-led FFS, however, a period of at least 4 years is required. Two farmers from each FFS, one year after their graduation, are trained in the training of trainers (ToT) to become facilitators. Another two years then would be required to allow for potential individual and community changes to occur. Hence, a duration of 4 years since the graduation of an FFS is the minimum time required to explore transformative learning at the individual and community levels with the inclusion of farmer-led FFS.

[5]Medium potential areas are areas that receive between 700 and 900 mm of rainfall annually; while low potential areas receive between 350 and 700 mm of rainfall annually (Jaetzold & Schmidt, 1983).

[6] Innovations are defined as the practices that contribute to sustainable agriculture, such as water harvesting and soil erosion prevention techniques (Khisa, 2003). According to the district extension officer, innovations can be assimilated from previous generations, learned from other farmers or can be generated by the innovative farmers themselves.

[7] More farmer-led schools are an appropriate context for exploring social action and potential social change, one of the research objectives.

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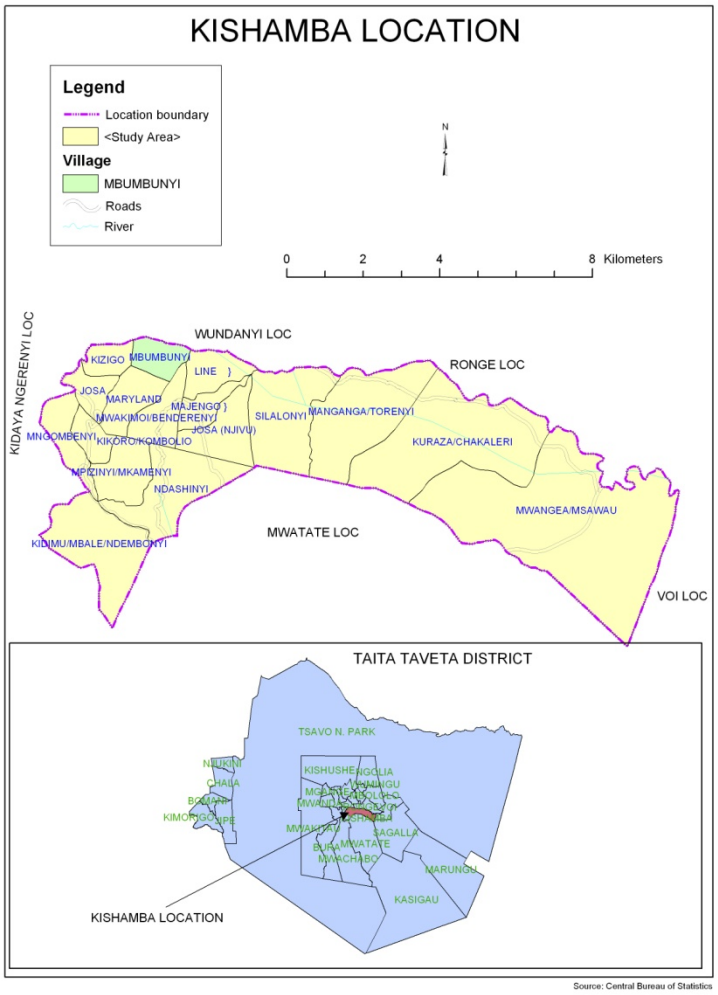
Figure 3.5. Fanya Ju, or the first cut of drain, in an FFS field day held in Mwatate. In Swahili Fanya Ju means 'throw earth upwards'. They are structures in which the banks are above the ditch (Young, 1981 in Vogt & Wiesenhuetter, 2000). Digging these terraces is usually a task undertaken by men in the Taita Hills.

-A convenient community entry point, with preference given to a school that is still meeting;

-The membership status with regards to the FFS network, with preference given to an FFS which belonged to the district network.

Following evaluation, Mwora FFS in Mbonbonyi village (**Figure 3.6**) was chosen for the following reasons:



Source: Central Bureau of Statistics, 2006

Figure 3.6. The location of the Mwora FFS in the village of Mbonbonyi, in the Kishamba sub-location.

- The number of female participants is roughly equal[8] to the number of male participants (6 men and 8 women);
- The group is one of the first 18 field schools in the Taita Taveta district to have graduated in 2001, allowing for a six year period for the learning to spread and for farmer-led FFS to be established;

[8] Most of the mixed groups had at most three male members out of roughly twenty participants.

- The group learned about diverse enterprises: maize, beans, kale and cabbage, upland rice, sorghum, agro-forestry and bee keeping;
- The group had six farmer innovators[9];
- The group resulted in five farmer-led field schools;
- The group belonged to the FFS district network and the chairman of that network belonged to the FFS group;
- The group was very welcoming and enthused about having a guest researcher/ FFS student and continued their meetings as scheduled.[10]

3.4 Research Methods

As mentioned earlier qualitative research involves a sustained interaction with participants in place, whereby "the researcher enters the informants' world and through ongoing interactions seeks the informants' perspectives and meaning" (Miller in Creswell, 1994, p. 198). Along the same lines, field research depended heavily on participatory

[9] One female farmer preserves seeds using paraffin and ash (**Figure 3.7**) and turns the sex of pawpaw tree from male to female tree, whose fruits are more palatable and marketable.
Another female farmer kills moles by feeding them a poisonous twig, *Ikowe* (*Tephrosia valgeli*). The twig is pushed into the mole tunnel to make the mole feed on it.
A third female farmer innovator controls the pests in the granary by the use of bitter herbs, *Maowa* (*Tithonia diversifolia*), neem and Mexican marigold, as a pest repellent. As well, she controls a mango weevil by fumigation at the abscission stage.
A fourth female farmer can predict the weather by observing the movement of the sun (**Figure 3.8**).
A male farmer innovator traps baboons in strong wooden cages, which were built collectively by both the FFS and community members. He also controls aphids by the use of milk and controls flower dropping of mango trees by passing smoke under the tree, through the canopy, at the time of flowering.
A second male farmer innovator changes the sex of pawpaw trees from male to female by leaving only one male flower on the tree (**Figure 3.9**).
[10] The fact that the FFS groups was still meeting, every Wednesday from 9-12, provided fertile grounds for focus group discussions and provided insights into the impact of the FFS graduates' status (active vs. inactive) on farming behaviour.

methods that included interviews, focus group discussions, gender and social analysis, participant observation, farm transects, transect walks and resource flow maps.

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Figure 3.7. Innovation of adding paraffin and ash to the maize seeds. Seeds can stay for two seasons and can only be used for planting because they are poisonous to eat.

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Figure 3.8. Innovation of weather prediction. Note the Sagalla Mountains, and the Voi valley, at the lowlands area. Through out the year, the sun keeps changing the positions

that it sets from. The sun moves from setting from the Voi valley to the Saghalla mountains. When the sun sets from the Saghalla Mountains; then, the rains are near. Consequently, farmers start preparing their land.

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Figure 3.9. Innovation of changing the sex of papaya trees. A female papaya tree is preferred over male trees because the female fruits are more palatable and marketable. To make sure that a papaya tree will end being a female tree male flowers, which grow earlier and are more abundant than female flowers, are taken out and only one flower is left on the tree for fertilization. It was stressed by Hagaii, the farmer innovator, that the removal of male flowers needs to be done during the early growth stages, when the papaya tree is still a seedling.

Qualitative research is interactive-adaptive rather than tightly prefigured (Nelson, 1991). The research was interactive by using methods of participating in the social life of

participants, playing with the kids, singing and dancing in church, cooking with the women, helping in farm work and attending *barazas* (public assembly). It was adaptive by opting for unstructured and semi-structured interviews, in which the questions asked evolved throughout the field work.

Non-participatory methods were also used. Non-participatory methods included a review of the local literature, which included relevant manuals, NGO FFS reports and minutes of meetings, farmers' and facilitators' notes and reading local newspapers on a daily basis. In most cases the review of the local literature informed participatory methods. To illustrate, gender and social analysis was based on a review of an International Danish Development Agency (DANIDA) gender empowerment workshop. Reading and hearing about the Proposed New Constitution of Kenya in its attempt to give women the right to inherit land (Kenya Gazette Supplement No. 63), led to the introduction of "Can ladies inherit land? What do you think? Should they inherit land? Please explain." question in interviews.

3.4.1 Social and gender analysis

Gender analysis, the gendered study of roles and access to resources (March et al., 1999), was done to contextualize learning in FFS and its outcomes, as well to compare gender roles between the participants and non-participants. In addition to using tools such as interviews and gender-segregated focus group discussions for gender analysis[11],

[11] This proved salient for revealing data which otherwise would be unrevealed in the presence of the other gender. To illustrate, Phidilia in a female focus group discussion noted that, "the men are not here, now we can talk about them."

research methods included concepts such as social relations, as suggested by Kabeer in March et al. (1999)[12].

Social relations and its institutionalization[13] were explored at the family and community level. Gender inequalities start in childhood; participant observation by playing soccer with the kids, for example, affirmed that boys play soccer while girls fetch water and firewood. At the community level, single mothers and landless women had to pay the village elders to farm on community land.

Gender and social analysis attempt to answer questions such as "[w]ho participates in development (research) interventions, projects, programmes and policies? How exactly? Who benefits from them? Who remains excluded or isolated?" (Vernooy, 2006, p. 14). For the application of gender and social analysis the research used the Moser Framework as outlined by March et al. (1999). The Moser Framework was adopted for gender analysis because it accounts for gender relations, reported by many development projects as an influential factor determining the success of projects (Due et al., 1997; Percy, 1999a,b; March et al., 1999). Focus group discussions, interviews and participant observation were used to understand the gendered reproductive, productive and community roles and how they are shaped by the access to and control over resources. These gendered roles had profound impacts on the FFS outcomes at both the individual and societal level.

[12] "Kabeer uses the term 'social relations' to describe the structural relationships that create and reproduce systemic differences in the positioning of different groups of people. Such relations determine who we are, what our roles and responsibilities are, and what claims we can make; they determine our rights, and the control that we have over our own lives and those of others." (March et al., 1999, p. 103).
[13] "Kabeer defines an institution as a framework of rules for achieving certain social or economic goals. Institutions ensure the production, enforcement, and reproduction of social relations and thereby create and perpetuate social difference and social inequality." (March et al., 1999, p. 104).

For social analysis, the inclusion of participants from various ages and social status was sought, including youth FFS. Further, the research sought out marginalized farmers in the community who tend to be the most reserved and isolated (Tyler, 2006). "Social conventions [such as exclusion from public *barazas* and group gatherings as found in this research] may render these people almost invisible in a community: uncounted, unmentionable, unconsulted" (Tyler, 2006, p. 77). Indeed, many of single headed households, divorced and unmarried mothers were neither encountered in church groups (e.g. the choir and *harambeh* (community work)) field schools nor public *barazas*. To address this limitation, people passing by randomly in the community were approached and visited at their convenience. In addition, when farmers skipped prearranged appointments, an attempt was made to talk to whoever was willing to participate, some of which belonged to this subordinate group.

3.4.2 Participant observer

Participant observation proved particularly salient for collecting context specific data. Participant observation included participation in social life, such as church choir, playing with kids and housework; FFS activities, such as FFS sessions, participatory monitoring and evaluation, field day and graduation; public *barazas*; farm visits. One of the research questions was in relation to changes in behaviour resulting from FFS. A participant observer role, which according to Yin (2003) is "insightful into interpersonal behaviour and motives" (p. 86), would address this research question. In addition, Taylor (2000, 2007) maintains that most research on transformative learning is based on

retrospect which is limited by the ability of respondents to recall events and to skip learning or changes that was out of their awareness.

Participation in social life was paramount for reducing bias related to the researchers' presence in the community. Indeed, in the beginning people were behaving in uncharacteristic ways. People in the community used to be shy in the presence of the researcher and would give the researcher considerable attention. Throwing oneself into situations that would prove that one really wants to fit in played a role in the community accepting the researcher. Knowing that the church constitutes a highly valued activity in the lives of women mostly and men in the community, a sustained participation on Sundays in dancing, clapping and singing in the church choir in the local Kitahita, by reading from handouts, was made. Women were quite impressed. "So you really can dance," one woman said. The researcher's participation in social life was bounded by the roles assigned to females, and the research assistant advised on what was culturally appropriate. The researcher refused to sit on chairs and would sit on the floor like the rest of the female farmers and would serve chai as this was the role adopted by females. Eventually, people started to behave more normally in the presence of the researcher.

Visiting the community, especially on the weekends, without the research assistant, reduced the feeling of guilt of being an extractive researcher[14] and made the community members more accustomed to the student researcher. The researcher always

[14] A position that is inherently adopted because of the nature of the research: ethics rules which limit the role of the researcher, short timeline to collect data and the research design itself which excluded any participatory or action research. The objectives of the research were predetermined and somewhat changed in the field. More specifically, as outlined in Chapter One objective two 'consider gender specific needs in relation to the FFS program', was formally labelled as 'understand gender specific needs for learning'. When gender analysis revealed gender specific problems in local agriculture, it became useful to understand the impact of FFS learning on these problems and accordingly provide recommendations to the program.

wanted to give something back. When told a story, a story would be told back showing a high degree of curiosity and enthusiasm to whatever was being told. Story telling included some information irrelevant to the research such as the ancestry of the research assistant. Many questions were asked about the researcher's family, where the researcher was staying, how the researcher was doing in the cold (of Wundanyi), and about agriculture in Canada. One time, when asked about farming in Canada, the researcher explained that most agriculture involves big machinery and heavy usage of *doka dawa hata mbolea* (artificial pesticides and fertilizer). It was added that this has resulted in health problems, soil erosion and water contamination. "Then," the chairman of Mwora FFS replied, "you need to take us there to teach you how to grow without these artificial chemicals." Sometimes, when respondents were passive about using pest and soil fertility control the researcher suggested practices learned from other farmers in the community. For example, when asked, "how do you store the seeds?" If the answer suggested a lack of effort to control or prevent pests, the researcher would suggest the usage of the seed preservation method of paraffin and ash.

Further to building a relationship of trust, the researcher knew almost nobody in the Taita Taveta District, and was in a new country and culture that perceives white people as donors. It was made clear that the researcher was a student. One time, one of the FFS members had no money to buy medicine for her child. Driven by the worry of perpetuating the donor mentality[15] and jeopardizing the integrity of the researcher status,

[15]The donor mentality was the main reason for the drop out of many farmers who initially joined the FFS program. Upon the realization that no cash money would be given out from the UN program, they dropped out.

the researcher shared the cost of the medicine with the research assistant, rather than 'donating' the entire cost of the medicine.

The relationship with the Mwora FFS community evolved into friendship at the personal level. The researcher was in a foreign place and needed to relate personal life with the people in place. The entry point to the community was the chairman of the field school who is also the chairman of the Taita Taveta FFS network. This man reminded the researcher of her own grandfather.

Men in Taita are notorious for their abuse to alcohol (personal observation, observation of people belonging to different Kenyan tribes), and the research assistant was Tahitan! After a couple of times of him coming drunk to work, the elderly women in the FFS were told about these recurrent incidences. Being told by the women not to drink alcohol the night before working and having someone elderly know about this inappropriate behaviour, the research assistant never came drunk to work again. The researcher felt protected by these people.

The fact that the researcher was consistently interacting with the community daily from 7 am till 6 pm including weekends, facilitated a relationship of trust with the FFS community including some of the non-participants. For other members of the community who were not in FFS, the church provided an entry point for their inclusion in this research. The researcher would help in cooking, in ironing clothes and going around visiting various houses without a research assistant during the weekends. By visiting houses of both participant and non participants, the researcher was able to observe that FFS male participants were more likely to perform digging, planting, weeding and other

female-related agricultural work than the non-participant male farmers. Non-participant male farmers almost exclusively took care of the cattle. Additionally, observing the cattle vaccination campaign in the village, the researcher was able to see many women taking cattle for vaccination, verifying the adoption of male-related tasks by female farmers in the community.

With time, people confided in the researcher and became more sincere, for example by giving their opinion of the chairman of the FFS; something that they might otherwise feel hesitant to do. Some disclosed changes in behaviour resulting from FFS, sometimes giving very personal examples, that they might otherwise feel ashamed to share. One male farmer, in the end of the stay, affirmed that he used to be heavily involved in alcohol abuse, and that after FFS, he became more inclined to work on the farm. By building this mutual trust, the researcher did not feel that the research was intrusive and invading[16] farmers' lives.

On the FFS site, participating in the FFS work was a main method for understanding gendered roles and relations and for building trust. The research assistant and the researcher participated in FFS activities which included digging, threshing, harvesting and storing of beans. On one occasion, an entire day was spent harvesting beans. One female farmer told her peers that this *mozungo* (white person) was different from other *wazungo* (white people). Humor played a central role in trust and data collection in a culture that appreciates humor. The research assistant (who was an FFS facilitator himself) always used "energizers," as he called them. These included FFS

[16] Many studies that focus on transformative learning were accused of being intrusive because of asking personal questions (e.g. Merriam & Cafarella, 1999).

claps, stretching activities, songs and games. When asking about how many chickens they kept, people were asked if they keep any baboons, as a joke. Baboons are a notorious pest in the community, preventing people from rearing goats and chickens and from growing maize.

In addition to humor, enthusiasm and energy on the FFS site were essential to building trust and acceptance in the community. The researcher used to run behind goats to tie them and many observing farmers used to laugh about it, an over enthused *muzongo* trying to fit in. Many women farmers wanted the researcher to live and get married in the community. Farmers felt comfortable in the presence of the researcher and her research assistant and would share jokes themselves. One female farmer said that she learned that baboons are not afraid of women. She asked the researcher to go sit in the *shamba* (farm) and see that the baboon would come in, look her straight in the eye, and take crops from the farm. Another female farmer said that she would only plant in proper spacing, an FFS learning outcome, on the edges of her farm visible to passersby. However, on the inside she would just do random planting.

Donge (1986) maintains that "[p]eople in rural Africa deserve personal and enduring attention from people who want to claim to know them" and emphasizes that "expatriate scholars have to learn from Africans if they want to write about them" (p. 101). Along the same lines, the researcher always stressed that the purpose of the research is to learn from the farmers and that they were the researchers' *moalimo* (teacher but in the FFS context it means facilitator). One interviewed female farmer said *maskeen* (poor thing) about the researcher. The researcher wanted people to know that she was aware

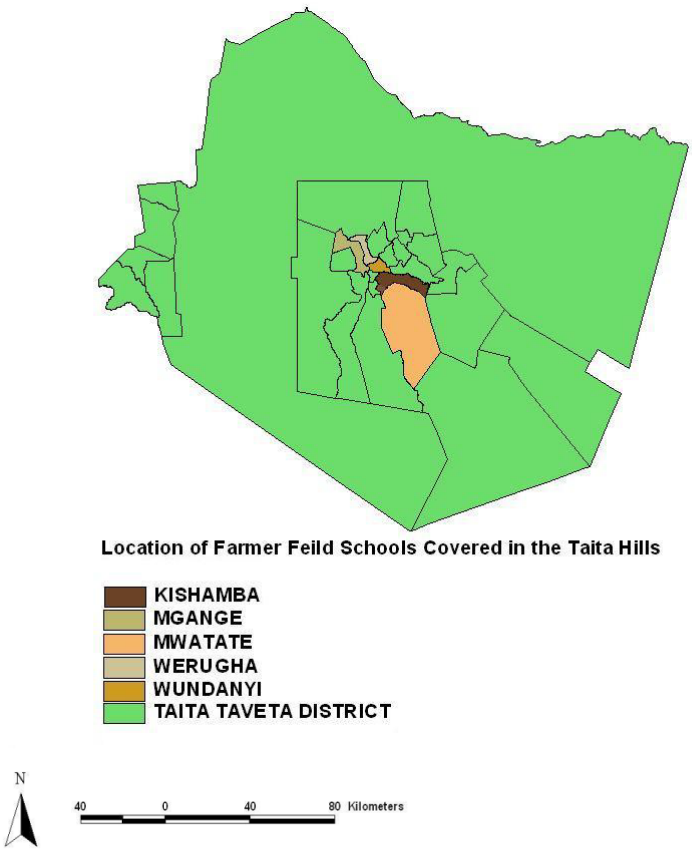
about needing the farmers' participation in the research and about being on their grounds. It was stressed that there were no right or wrong answers; rather, there is only the local people's agricultural system, roles, problems and opinions.

The fact that the researcher was not affiliated with any NGO or governmental organization, offered a high degree of independence to participate in the activities of various NGOs. The researcher participated in participatory monitoring and evaluation with the Ministry of Agriculture (MoA) and the Coast Development Authority (CDA) graduation and field day for FFS funded by Pwani Christian Community Services (PCCS). Being an independent, further, gave a high degree of flexibility for having focus group discussions with FFS funded by various NGOs. For example, the FFS visited in the Hills were affiliated with various NGOs, including DANIDA, PCCS and CDA. The researcher was introduced and was perceived by all organizations visited (such as DANIDA, Kenya Agriculture Research Institute (KARI), Food and Agriculture Organization (FAO), Ministry of Health (MoH), MoA and Ministry of Forestry (MoF) as a student from the University of Manitoba.

3.4.3 Working with translators

Picking a research assistant was a perplexing task. The criteria for choosing a field assistant included social skills, knowledge of roads, knowledge of local agriculture, gender and devotion to work (i.e. if willing to take the work a step further). Ideally, a female research assistant would be chosen because the researcher felt that in a patriarchal society female farmers might not open up as comfortably in the presence of a male research assistant.

For approximately a month, three research assistants helped in this research. They were recruited with the help of PCCS, CDA and the local restaurant in Wundanyi. The three research assistants were from different areas. They were asked to find schools in their areas preferably fitting into the FFS selection criteria, mentioned above in Section 3.3.2, and if possible schedule interviews and focus group discussions with the FFS members whose schools fit into the criteria. The researcher then verified the data collected on the FFS found by the research assistants. This way, 20 field schools (**Table 1**) all over the district from the upper zones in Vuria to lower zones in Mwatate were visited and interviewed (**Figure 3. 10**).



Source: Central Bureau of Statistics, 2006

Figure 3.10. The location of the twenty FFS visited covering several agro-ecological zones in the Taita Hills. The FFS covered were located in the two constituencies/divisions of Wundanyi and Mwatate in the locations of Mgange, Werugha and Wundanyi of the high potential, upper area; Kishamba in the medium potential, intermediate area; and Mwatate in the low potential, lower areas. ***Table 1*** *offers a detailed description of the FFS visited.*

After working closely for three weeks with the two male assistants and one female assistant, a male assistant was chosen for safety reasons and because the female assistant was performing poorly. John was young, thus not as threatening to women, very social (i.e. noted that farmers liked him and laughed for his jokes) and curious (i.e. he had excellent probing skills). He was an FFS facilitator with good knowledge of FFS methods and roads. Most importantly the researcher felt personally comfortable working with him.

Debriefing consistently occurred and took place on the way to the FFS site, Mbonbonyi village, and back to Wundanyi. Discussions went around the farmers' responses to questions, especially when the researcher felt that the responses required further probing, or when the validity of the responses was in doubt. Ideas on how the respondents would open up and be more sincere were discussed. Sometimes this meant changing the way the question was asked.

Additionally, the research assistant translated minutes of meetings, forms, facilitator's and farmers' notes from Swahili to English.

3.4.4 Focus group discussions

Focus group discussions were held in a natural setting on the FFS sites where the FFS groups were meeting. The researcher was given some time after seeking permission from the facilitators to address the research questions. Refer to the guide for questions asked during focus group discussions with the twenty FFS, **Appendix I**. Focus group discussions, nine of which were held with the Mwora farmers, 19 of which were held with the 19 other FFS and two of which were held with elders in the Mbonbonyi community, started and ended with a prayer and lasted from one to four hours.

Topics discussed with the Mwora FFS, in **Table 2**, evolved throughout the research from interviews and personal observation. For example, when asked "what did you learn about sustainable agriculture,[17]?" most farmers found the question confusing. Hence, the research with its constructivist approach to knowledge, sought out the local definition of agriculture. According to the farmers sustainable agriculture meant that

[17] Sustainable agriculture was explained as agriculture that is productive in levels suitable to farmers' needs and is a type of agriculture whereby farmers are always assured of harvesting.

harvest would occur even in times of drought, by planting drought resistant crops. Farm visits, however, affirmed that many farmers plant a small quantity of drought resistant crops. As a result, crop values were then discussed in a focus group discussion to understand why, despite their knowledge of the importance of having drought resistant crops, most FFS farmers chose to plant small quantities of sorghum and cassava.

Focus group discussions with the twenty FFS were gender mixed, while with the Mwora participants were held in sub-groups of men and women working alone on the topics in **Table 2**, then presenting to each other. Seasonal, daily, and weekly calendars were performed to reveal gender specific roles and to verify whether what was learned in FFS was applied in reality. Indicators related to issues such as early land preparation, dry planting, pest control, use of manure, tillage system, multiple weeding and diversification of crops planted.

With Mwora, focus group discussions included community mapping followed by transect walks. These focus group discussions were particularly insightful into the Mwora FFS activities. The community walk revealed the water project done during the FFS sessions in 2001, the planting of trees the group had done for protecting the river, baboon roads and where the cages, for trapping the baboons, were built during the FFS session in 2001.

Methods used in focus group discussions with the Mwora FFS were left at the discretion of the participants. When drawing the community maps, for example, women chose to draw the map on the floor, while men chose to use markers and newsprint. Women chose to rank crops using bean seeds and other criteria such as drought resistance,

price and health status. Men, however, used a coding system of 1-2-3 from most to least important and used food preference.

In the end of the field work, a final focus group discussion was held and debriefing of research findings was articulated to the group with much interest and enthusiasm. The researcher reported that the findings confirm that women work very, very hard in the community and that even in old age they take care of their grandchildren. Jerrita said, "men do work hard, but us the women, we do not even have time to visit each other." At the end of the focus group discussion, Jones, in a side talk, said that he thinks women work very, very hard. The researcher noted in the final focus group discussion that only two out of 80 households interviewed had mentioned HIV/AIDS as a problem contributing to failure in agriculture, and that the Mwora FFS being a mixed group is a suitable entry point for HIV/AIDS awareness in a Reproductive Health (RH) FFS[18] context. Japheth, the chairman of the FFS contended, "You can benefit us in this way."

Further to focus group discussions with FFS groups, two focus group discussions were held with elders in the Mbonbonyi community to understand the history of extension in the Taita Hills and the impact of the Mwora FFS over six years on changes in the society, including gender roles and farming practices.

3.4.5 Mapping

Mapping in a cross cultural setting is ideal for overcoming language and cultural barriers (Leeuwis et al., 2002). Mapping, similar to participant observation, addressed the limitation of the retrospective research approach to transformative learning. Mapping

[18] The RH program is a new program introduced in 2006 through the FFS agricultural extension method in the Coast Province (refer to Chapter Five for details).

consisted mainly of FT, seven with the Mwora participants and six with non-participants in the Mbonbonyi community, and RFM, 14 with the Mwora participants and 17 with non-participants in the Mbonbonyi community. Additionally, community maps, which served as ice-breakers in the first focus group discussion with the 14 Mwora FFS participants, were drawn by each of the gender sub-groups. Illustrative maps are the fourth type of maps with which data was collected. Illustrative maps were used by farmers during interviews and focus group discussions to illustrate what they were explaining.

Both FT, as suggested by Tittonell et al. (2005 a,b), and RFM, as suggested by Chambers (1997) and Esilaba et al. (2005), were particularly insightful into the farming behaviour and underlying factors such as the economic status of the household, biophysical characteristics of the farms and FFS impact. These maps were drawn during farm visits. They were a source of enthusiasm and catalyzed a farm tour and discussion about farming behaviour, on farm validation of such behaviour and an in-depth understanding of whether what was learned in the FFS was applied on the farm. Further, they served as visual representation of farming behaviour for comparison[19] between that of the participants and non-participants.

Farm Transects were drawn by the researcher with the guidance of concerned farmers for revealing on farm diversity and associated farming practices, as suggested by Tittonell et al. (2005 a,b), such as soil fertility gradient, soil erosion control measures, soil types and other farming practices such as animal husbandry. Observing animal behaviour was of particular interest to verify whether the FFS method of stall feeding, rather than

[19] The farming practices of the non-participants did not solely serve as a 'base case' or contrafactual study, but provided further insights into the spreading of learning from Mwora FFS to the non-participants.

leaving cattle and chicken to graze on the farms, was practiced. Resource Flow Maps were drawn by the farmers themselves revealing crop management practices and the interaction between resources including a temporal and geographical dimension, as opposed to the FT which concerned current farming in the immediate area.

In addition to RFM and FT, as mentioned earlier, community mapping and illustrative mapping are other types of mapping used. Community mapping, as suggested by Chambers (1997), aided in gender analysis by providing insights into gendered community perceptions. Females were more focused on peoples' names and houses while men focused on roads and cattle grazing areas. The maps then guided community walks for identifying problems in the community and potential solutions, as suggested by Chambers (1997). Illustrative maps were drawn by farmers for illustrating what they have learned in the Mwora FFS, such as the way terraces should be built (**Figure 3.11**).

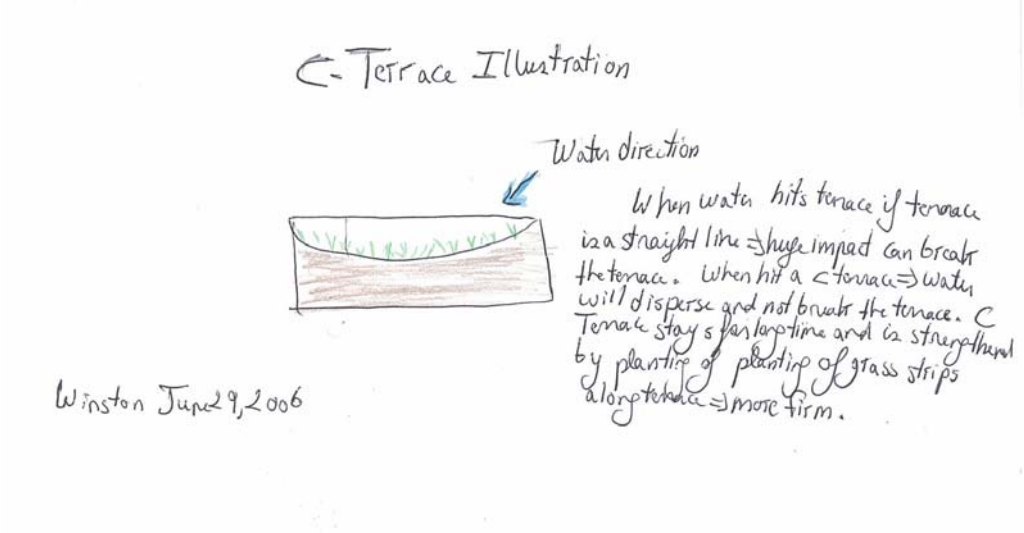


Figure 3.11. Farmer schematic representation of learning about C terracing in FFS.

3.4.6 Interviews

The interviews used varied between semi-structured and unstructured, depending on how knowledgeable the researcher was about the subject being explored. In the Mbonbonyi community twenty four interviews were conducted with the FFS participants, forty nine with the non-participant, six with the Mwora-led FFS participants and four with elders. Outside the Mbonbonyi community, twelve other FFS participants, three members from the Taita Taveta FFS network, eight FFS facilitators[20], ten NGO members[21], eight government officials[22] and three CDA members were interviewed.

Interviews with NGO and government officials were unstructured[23] because the researcher was unfamiliar with the NGO and government bodies' experiences and roles with regards to the FFS in the Taita Hills. Research findings were reported when perceived that a finding is relevant to the institution's role or experience with the FFS. For example, in KARI the researcher reported that maize failure seems to be the norm in FFS despite constant research trials that were sponsored by KARI. In FAO, who was responsible for the introduction of the FFS program in the Hills, the research finding of single-headed household female exclusion from the program was reported as well as the denial of HIV/AIDS impact on agriculture in the Mbonbonyi community. Other than the research findings, the topics discussed were left to the discretion of the interviewees with the researcher probing to better understand what was discussed.

[20] The facilitators were employed by MoA, PCCS and Plan International.
[21] The NGO members belonged to NGOs that used FFS in the Taita Hills. This included research institutions, such as KARI and ICIPE and development institutions, such as SITES, DANIDA and PCCS.
[22] The government officials interviewed represented the MoA, MoF and NEMA. These government bodies had a stake in the FFS program, whether or not they were involved (refer to Chapter Six on the conditions of learning in FFS).
[23] Note that the questions asked during those interviews are not found in the Appendix, but will be italicized when presented in Four , Five and Six.

Interviews with participant and non-participant FFS farmers were semi-structured with open-ended questions (**Appendix I**). The questions asked in these interviews evolved through out the field work as the researcher became more familiar with the agriculture system, including gendered roles, limitations and best practices (through participant observation, interviews and focus group discussions with FFS facilitators and participants[24]) and FFS program (through interviews with participants, concerned NGO members and facilitators and a review of relevant minutes of meetings[25]).

Individual field work with 15 of the Mwora participants, 14 of which were still FFS members, included a a series of four in-depth interviews with each interview lasting between one and four hours. The first two interview rounds focused on FFS learning outcomes and processes, the third round included farm visits and current farming behaviour exploring underlying FFS impact and the fourth round further explored changes in behaviour as a result of FFS and previously mentioned points where the researcher felt that more clarification was needed. The other nine Mwora participants were participants who had left the FFS upon their graduation. Similar to the field work with the other fifteen Mwora participants, changes in behaviour, dissemination of FFS learning and other outcomes in addition to farm visits, when possible, were accomplished on a one-round interview basis that lasted between one and four hours.

[24] For example, identifying farmers' health as a constraining factor to agricultural production in focus group discussions led to the introduction of "what is the impact of human disease on agriculture in the community" question in interviews.

[25] For example, a review of the minutes of meetings held in the district commissioner office, revealed a lack of adequate marketing focus in the FFS program. Hence the question of "do you sell any of your produce" was introduced into the interview guide for both participant and non-participant farmers interviewed in this research.

The interviews with the non-participants included site visits when possible and were on a one-round interview basis. When told that the research was about FFS, non participant farmers felt that they needed to defend, rather than explain, why they were not in FFS. As this was noted, the interviews with non-participants started by stating that the non-participants are an integral aspect of the research which is seeking to understand the impact that FFS has on the community for all farmers, and is neither promoting FFS nor recruiting FFS participants.

Non-participants included elders and administrative figures in the community, such as the sub-chief and the village elder. Further, FFS family members and neighbors were interviewed to verify changes in behaviour as reported by FFS members or to further understand changes in behaviour that may not be mentioned by FFS members. This strategy of interviewing family members and neighbors aimed at overcoming the limitations of a retrospective approach to exploring transformative learning.

3.5 Threats to Validity

The threats to validity were addressed using triangulation, member checks and rich description. The last was elaborated on in Section 3.2. Rich description allowed for an in-depth understanding on what is being explored, hence increasing the validity of the research.

Triangulation is a technique that involved obtaining information from at least three different sources, as suggested by Spaling (2003). In the field, as explained above, triangulation to research findings was systemically sought throughout the research by

interviewing the concerned farmers themselves, their family and neighbors and visiting their farms, and at some points interviewing concerned FFS facilitators.

Translation constituted another area in which triangulation was sought. The researcher (whose first language is Arabic) sought other people to translate information into Arabic, when the research assistant was also translating, for a more accurate understanding of what was being told. When conducting interviews, members in the household who were conversant in English were asked to translate, in addition to the research assistant.

Member checks included "taking … specific descriptions or themes back to the participants and determining whether these participants feel that they are accurate" (Creswell, 1994, p. 196), as explained above in the fourth round of interviews.

3.6 Data Analysis

QSR Nvivo, a qualitative data-analysis software, was used to code and explore data in search of themes and regularities, and to deal with the huge amount of qualitative data, as suggested by Creswell (1994). Excel and Arc Map were used for representing the gender specific adoption rates of FFS technologies in the Mwora FFS and the case study area location, respectively. Data was coded into 100 nodes derived from the interview questions. These nodes were then grouped into five data sets, description of agriculture system, gender issues, how learning occurred, what was learned and social action and change, representing the five research objectives outlined in Chapter One.

On the abstract level, data was analyzed using the discourse of transformative learning: communicative and instrumental learning, at the individual level and emancipatory and empowering, at the societal level. In addition to using the transformative learning framework as a theoretic basis for data analysis, the research applied gender analysis for addressing all of the five research objectives. Gender analysis was particularly insightful into the impact of culture on learning outcomes, an area yet to be explored (Taylor, 2000, 2007).

The Moser Framework which was applied during field work was used, with modifications[26], for analyzing the data as well. The FFS outcomes were contextualized within strategic[27] and practical[28] gender interests, as identified by the participants themselves during focus group discussions. Understanding FFS outcomes using gender analysis and transformative learning discourse, however, was not mutually exclusive. For example, communicative competence, entails an increase in bargaining power, hence communicative competence resulting from FFS addresses women's strategic interests.

[26] The Framework is accused of focusing on women and "ignoring men as gendered beings" (March et al. 1999, p. 65). The research, however, accounts for this shortcoming by addressing gender specific needs for men as well. In addition, the framework is accused of adopting a top down discourse by focusing on needs, which are determined by researchers or NGOs, rather than by the concerned people themselves. Hence the research explored gendered interests in the community through focus group discussions (refer to Table 2).
[27] "Meeting strategic gender needs", such as challenges to the gender division of labour, "helps women to achieve greater equality and challenges their subordinate position, including their role in society" (March et al. 1999, p. 57- 58).
[28] "Interventions which focus on meeting practical gender needs", such as opportunities for earning an income to provide for the household, "respond to an immediate perceived necessity in a specific context often related to inadequacies in living conditions" (March et al. 1999, p. 58).

3.7 Limitations

The short field work period, the status of an outsider, including language barriers and the gender of the research assistant, were the main limitations to this research. Four months of fieldwork were not sufficient for covering a farming cycle to understand the FFS learning outcomes which concern a whole year farming cycle. To illustrate, many farmers when asked if they use manure in the planting hole, maintained that they do so but in the coming cropping cycle, so the researcher was unable to verify this.

Another limitation was the status of the outsider. Despite the similarities between Arabic and Swahili, which is close to Kitahita, the local mother tongue, the researcher had to depend on a research assistant for translation. Hence, the research assistant introduced his bias into the research. Indeed, when asked about whether or not women could inherit land in the community the research assistant constantly polished negative responses. To illustrate, one of male respondents replied, “hakuna msouri” which means it is not good. The research assistant felt reluctant to translate the response and opted for a more diplomatic translation. Afterwards, the researcher stressed an exact translation including the tone used by the respondents.

Being an outsider, might have impacted the responses to the question of “what is the impact of human disease on agriculture in the community?” Despite mentioning human disease as a major limitation to agricultural production in a focus group discussion held with the Mwora participants, individual interviews, for the most part, revealed little concern over the impact of human disease on agriculture in the community. Given that HIV/AIDS rates were more than 15% in the community (NEMA, 2005), it was perplexing

whether the community is in collective social denial or whether the outsider status kept the community reserved about the impact of sensitive issue such as HIV/AIDS on agriculture. Only two out of the eighty households interviewed have mentioned HIV/ AIDS when asked about the impact of human disease on local agriculture.

3.8 Consent and Anonymity

Interviews proceeded only after oral consent from participants. Consent forms (**Appendix II**) were translated to the local language and handed out to the respondents. Almost all the participants mentioned that they would like their names to be included in the research. At some points, when disclosing sensitive data about the chairman of the FFS, other farmers or the FFS program shortcomings, however, they asked that their identities be unknown. Accordingly, when using such sensitive data the identity of the respondents will not be identified.

Table 3 Farmer Field Schools visited in the Taita Hills

	FFS	Village	Location	Enterprise
Other FFS	Wolo Men Group	Mgange Nika	Mgange	Fish Farming
	Chap Chap	Mgange Davida	Mgange	Cauliflower
	Bolenyi FFS	Dembwa	Kishamba	Intercropping Beans/Maize
	Mgolo FFS from Bolenyi FFS	Dembwa	Kishamba	Intercropping Beans/Maize
	Wutessia FFS	Jossa	Kishamba	Reproductive Health
	Mgoro Village Group	Mgoro	Werugha	African Indigenous Vegetables
	Cheleka FFS	Jossa	Kishamba	Intercropping Beans/Maize
	Mgangeh Organic Farming Group	Mgange	Mgange	Guava Trees
	Boilwa FFS in Mwatate	Mwatate	Mwatate	Upland Rice, Sorghum, Ground Nuts
	Monic Lumweri FFS	Mgange Davida	Mgange	Vegetables
	Vuria Women Group	Vuria	Mgange	Vegetables
	Kesera FFS	Jossa	Kishamba	Beans
	Ndoria FFS	Wundanyi	Wundanyi	Vegetables
	Isuwurio FFS Wundanyi	Wundanyi	Wundanyi	Vegetables
Mwora Farmer Led FFS	Mbunbunyi	Kishamba	Kishamba	Beans
	Intec	Jossa	Kishamba	Beans
	Mrema	Kishamba	Kishamba	Beans
	Mullika	Jossa	Kishamba	Kales
	Kizingo	Kizingo	Kishamba	Maize

AGRICULTURE IN TAITA HILLS: PHYSICAL ATTRIBUTES, ROLES, AND LIMITATIONS

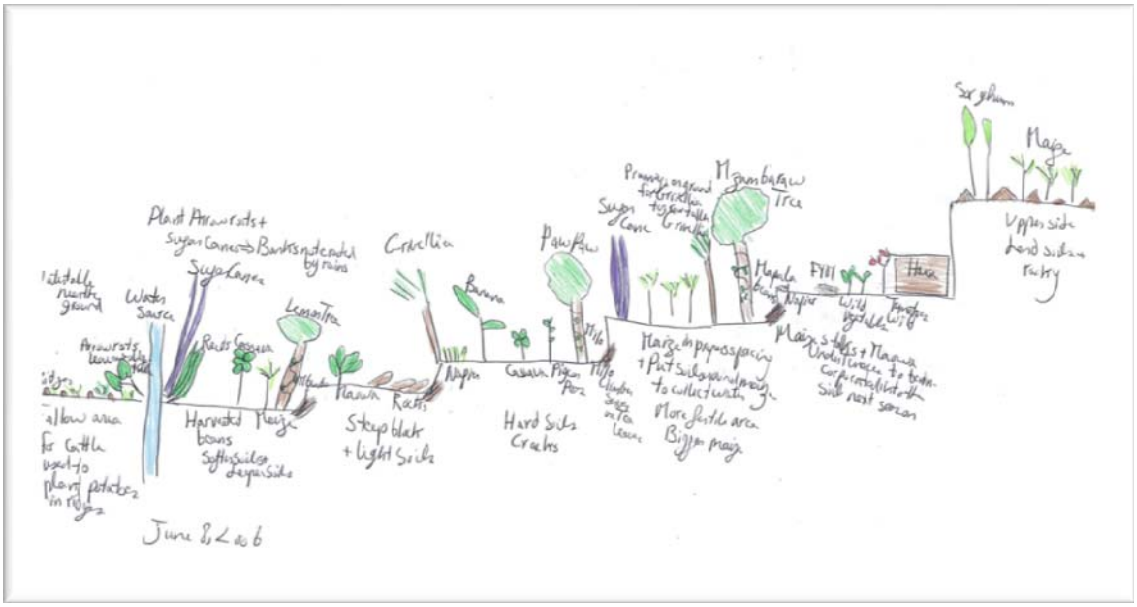
4.1 Introduction

This chapter offers a detailed description of agricultural practices, roles, conditions and limitations to agricultural production in the Taita Hills. The chapter focuses on agriculture in the medium potential[29] area where the Mbonbonyi, or the Mwora FFS community is located in the Kishamba sub-location. Occasionally agricultural roles and practices in the high potential area are described, given that twelve of the twenty FFS visited belonged to the high potential area. Despite some similarities, the Mwora FFS participants and non-participants' roles and practices and limitations differed in various ways.

4.2 Integrated Farming

Agriculture in the Mbonbonyi community is highly diverse such that on small parcels of land, with an average size of 1.7 ha (Jaetzold & Schmidt, 1983), farmers grow medicinal plants[30], semi- perennial and annual crops[31], fruit, aesthetic and fodder shrubs and trees and grasses (**Figure 4.1**).

[29] Medium potential areas are areas that receive between 700 and 900 mm of rainfall annually; while low potential areas receive between 350 and 700 mm of rainfall annually (Jaetzold & Schmidt, 1983).
[30] The district development plan reveals that there is one doctor for every 41,000 people in the district. Village members often rely on traditional medicine, unless the condition is serious enough to require hospitalization in nearby Wundanyi or Wesu. Medicinal plants in the Mbonbonyi community included beans for stomach pain (**Figure 4.2**); Mexican marigold for toothache, and a repellent for the bean pest, nematode (**Figure 4.3**); Maowa for malaria and a repellent for weevil in granaries (**Figure 4.4**); tamarind, pigeon peas and cassava leaves for typhoid treatment and sugarcane is used to treat yellow fever.



Dina Najjar

Figure 4.1. Farm transect showing on-farm diversity of crops planted (sorghum, maize, vegetables, cassava, Mwaypala and Milo climber beans, Nappier, fruit and timber trees, arrowroots, bananas, sugarcanes and sweet potatoes), as well as soil types (steep, shallow, dark, light, loose and hard soils). Note that the crops' type and location are determined by the soil moisture and fertility. Such that, bananas, sugarcanes and arrow roots are planted next to the water source, to the left, as well to prevent banks from eroding; whereas, wild vegetables are planted next to the FYM (farm yard manure) pile, to the right.

[31] Maize, beans, pigeon peas, cowpeas, cassava, arrowroots, bananas, sugarcanes and sweet potatoes are the main food crops in the Mbonbonyi community, with maize occupying more than half of the cultivated area on farms, during both planting seasons.

Dina Najjar

Figure 4.2. Local beans planted next to the homestead for treating stomach problems.

Dina Najjar

Figure 4.3. Mexican Marigold used as a pest repellent for nematodes, a common pest on beans (Mbogo, 2006).

Dina Najjar

Figure 4.4. Maowa (Kiswahili: "flower"). Tithonia driversifolia. Maowa is used for malaria treatment, pest repellent in granary and as green manure.

These farmers often have cattle (usually one cow), chickens and goats with few having vegetable gardens. In the high potential area, however, the wet, foggy areas, vegetable growing is less labour intensive and naturally suited to the area. Indeed, high potential area in the Taita Hills supply Mombasa with vegetables, mostly cabbages and tomatoes (Dijkstra, 1996; CDA, 2001a,b).

In addition to integrating crops, trees and animals, farmers in the Mbonbnoyi community are engaged in cross-ecosystem agriculture. Almost all of the 80 households interviewed (both participants and non-participants) in the Mbonbonyi community rent or own land in the lower area (often in swampy areas) for maize production and/or in the

upper area for vegetable production. The farms in the various agro-ecological zones were connected. For example, cattle manure is transported from the homestead, where the cow is, to the lower zone.

In the Mbonbonyi community agriculture is rainfed. The rainfall pattern is bimodal with short to very short rains as of the end of March and very short to short rains as of the end of October (Jaetzold & Schmidt, 1983) (Refer to **Table 3** and **Table 4**). Consequently, there are two planting seasons: the beans cycle and the maize cycle. Cassava, pigeon peas, sweet potatoes and some fruit trees such as bananas, mango, guava and cherimoya are intercropped with maize and bean cycles. Farmers depend on the short rains during mid or late October. Most of the respondents (participants and non-participants) maintained that the second season of August is more reliable than the first season of March. According to these farmers, the long rains in late March, early April are inconsistent: “It might rain for two months, and then the rain goes away; or, it can rain for three months, and then the rains go away. Rains are *ghafla* (abrupt),” explained an FFS farmer.

4.2.1 Agricultural practices

Agricultural practices entail pest, water and soil fertility management. These practices differed profoundly between the non-participants and the participants, who adopted many FFS technologies. These practices as well differed between participants in the medium and high potential area. The two areas differed in terms of available resources for production affecting the type of agriculture. Commercial agriculture was practiced in

the high potential area and subsistence agriculture was practiced in the medium potential area.

Pest management

Pest management in the Mbonbonyi community almost exclusively concerned the FFS participants. Non-participants were not aware about the type of pests attacking their crops. Most non-participants left the pests to nature/God, with a widely held belief that "rains can cure everything." The FFS participants (both male and females), however, knew the names and more importantly control methods for the pests on their farms. Further, participants started weeding earlier than the non-participants. As well participants performed multiple weeding (two times) as opposed to the participants who performed weeding once, with some indicating that they just plant in the ground without land preparation (refer to **Table 3** and **Table 4**). Furthermore, participants started harvesting earlier than the non-participants, reducing exposure to pest attacks in the field.

In the Mbonbonyi community, local methods for controlling pests included the use of Omo (a detergent) and ash in tomato nurseries and the use of chilli pepper and saw dust, soil, water extracts from bitter herbs (especially *Maowa*) and crop rotations. Additionally, paraffin and ash were used on planting seeds and leaves of bitter herbs in granaries to control maize storage pests. Most of the FFS participants used all of these methods to control pests; a few non-participants as well used some of these methods.

In the high potential area, farmers used pesticides in their local production. The FFS farmers were more likely to use integrated pest management on their farms and were

more aware about the drawbacks[32] of depending solely on *duka dawa* (pesticides) for pest control. Crop rotations and natural local control methods, and occasionally pesticides[33], were collectively used for pest management in the high potential area.

Water management

Water management in the Mbonbonyi community differed between the participants and non-participants in various ways. Seasonal calendars (refer to **Table 3** and **Table 4**) revealed that participants practiced dry planting[34] and early land preparation as opposed to the non-participants who waited for the rains, and then planted. Hence, the participants made better use of rainwater. Further, participants practiced *kushimba* (deep tillage) which aids in water retention as opposed to some non-participants who practiced *kukwasheh* (shallow tillage).

Bucket irrigation in the Mbonbonyi community is done by women and is restricted, for both participants and non-participants, to vegetable irrigation[35]: "Only on vegetables, not on maize. It is very laborious," explained Mary. Few female farmers

[32] When asked about the effects of pesticides, FFS participants in the upper zone, maintained that pesticides cause cancer and may result in chest problems. "These pesticides were affecting us and we didn't know it… I used to feel sick for the whole day, when I used to spray. Dathan affected me so much," explained Mrs. Ludida, Lumeri FFS.
"I will be very happy to learn on cultural methods to control ticks in animals. I am taking the milk. I do not want those drugs in the milk. These drugs are not good for you," said another FFS farmer in the upper area.

[33] Some farmers preferred pesticides because they were less time consuming to prepare and "because the tomato flowers will fall off when you use the local methods for pest control," one FFS farmer said. Some farmers preferred using the local method first then switching to synthetic pesticides if the local method did not work. "I would prefer to use local methods first... For example, from the beginning, I use milk in nurseries to cure blight in tomatoes," one FFS farmer emphasized. Others explained that their use depended on the level of infestation. If the infestation was high, then they directly opt for synthetic pesticides.

[34] Soil temperature is optimal for germination before it rains. When the rains start, temperature decreases gradually and germination would be affected negatively. Research done by KARI revealed that farmers loose two and a half bags of maize in every acre planted per week planted after rains (ICIPE, 2006).

[35] Supplementary bucket irrigation was not done on maize, despite that a perennial spring passed through some farms. Furrow irrigation was restricted in some cases on farms in the Mbonbonyi community. Such was the case when the water level was considerably below the river bank.

irrigate[36] a very small parcel of their maize crop during dry spells[37] using water used for cleaning utensils. To produce vegetables, the FFS participants in particular used box irrigation, an FFS method, by directing water from the source to their farms. These furrows were dug as a water project accomplished during learning in FFS, in 2001. Many non-participants, whose *shambas* fall within the water project benefitted from the water for irrigation as well.

In the high potential area, however, pump irrigation was common. Further, the upper area is wet and foggy, as opposed to the medium potential area where dry spells are part of the seasons. In the upper area, FFS participants have access to water pumps which they rotate amongst each other.

Soils fertility management

Soil fertility management differed according to the household's wealth, health, production orientation and experiential knowledge of FFS technologies. Socio-economic factors affecting soil fertility management were as well reported by Tittonell (2005a) in western Kenya. Female-headed households, of all the non-participants, were less likely to apply cattle and green manure because of the large workloads that these women have, despite some acknowledging the benefits of applying manure. Sickness in certain households was reflected in their soil fertility management practices. These households often refrained from using manure, weeding and left distant parts of their farms fallow

[36] Many farmers complained that even though a perennial river passes through their land they refrained from irrigation because their soils are so shallow and might be carried away by water.

[37] As Rockstrom et al. (2003) noted about farmers in Kenya, this research found that farmers in the Mbonboyni community refrained from mitigating for dry spells through supplementary irrigation to save their staple crops. "I do not irrigate when it is dry. When the rains fail, that is it," explained one farmer, among many others. Supplementary irrigation to mitigate for dry spells according to Rocktrom et al. (2003) is to be done during the most sensitive, flowering stage of maize.

(personal observations). For replenishing the soil fertility, affluent farmers in the community with *shambas* of more than two acres in size, left parts of their farms fallow.

The participants' management to soil fertility differed significantly from the non-participants. **Figure 4.5** and **Figure 4.6** are representative resource flow maps for participants and non-participants. Comparison between the two maps illustrates the flow between resources on the separate groups' farms.

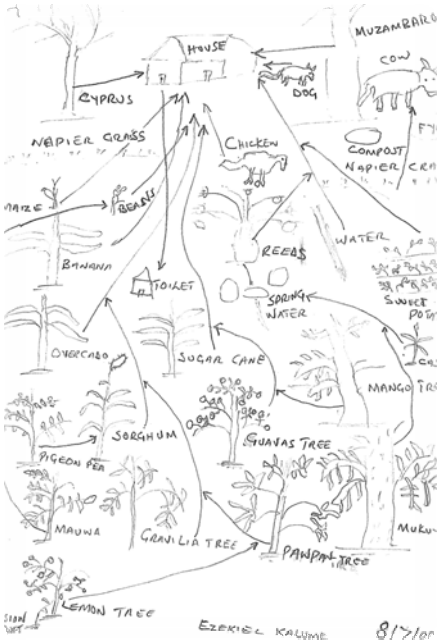


Figure 4. 5. A typical participant RFM. Note the complex interaction of farm components, as compared to Figure 4. 6, the non-participant RFM.

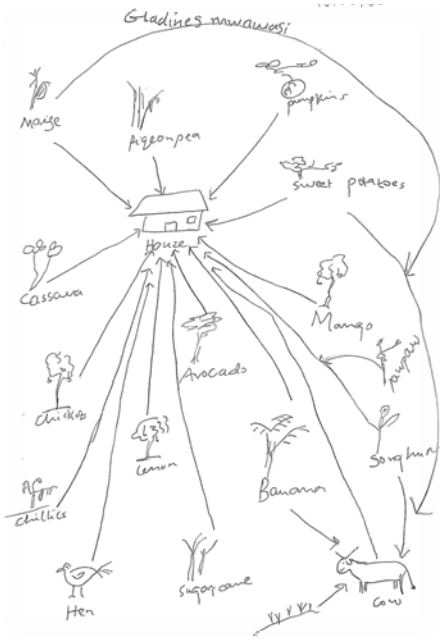


Figure 4.6. A typical non-participant Resource Flow Map. Note the limited interaction between farm components, evident by one direction, linear arrow resource relationships, as compared to the FFS participant RFM (Figure 5). More specifically, limited soil fertility and pest management is evident in this RFM. For example, manure from cows is not used on beans, neither are bitter herbs such as Maowa used on pests. Instead, most non-participants believed that rains can cure everything.

Participants often used banana, *Maowa*[38] and sugarcane leaves and manure for fertilizing their soils. Non-participants, however, refrained from using manure on their crops, with almost none mentioning the use of green manure on their soils. Non-participants had many misconceptions about soil fertility, such as "I don't use manure on my crops; it has a burning effect[39]." On vegetables, however, both participants and non-participants used manure.

Further, participants planted in lines and in proper spacing, as opposed to the non-participants who planted *mafigha* (randomly). By planting in proper spacing and in lines, in addition to multiple weeding and early weeding, as mentioned earlier, participants made better use of the soil fertility. Many non-participants refrained from planting in lines and proper spacing because they lacked the skill for performing proper spacing, despite their knowledge that proper spacing does increase yields.

As found by Tittonell et al. (2005b) farmers (both participants and non-participants) managed their soil fertility by matching the soil fertility gradient on their farms with suitable crops. Areas next to the homestead are often more fertile than distant areas because of dumping household sweepings (which includes chicken manure and food remains) on farm parts closer to the homestead. In addition, animals were kept close to the

[38] *Maowa* was used by almost every FFS participant as green manure. *Maowa* or *Tithonia Diversifolia* , however, does not add to the soil fertility because it is not a legume, nutrients are only recycled in the soil (ICRAF, 1997). It was proven, however, that *Moawa* enriches the soil fertility on the farm: "[h]igh Ca and Mg in the soil under *Tithonia* hedges could result from scavenging of these nutrients by *Tithonia* from a large soil volume, accumulation of the nutrients in leaves and then cycling of the nutrients through leaf fall to soil under the hedges" (Jama et al., 2000, p.206). Consequently, local calicium or CAN (Calcium Ammonium Nitrate) made from *Maowa* is used as a top dressing.

[39] A burning effect is possible only when the manure is not composted well enough. Most of the farmers, participants and the non participants, who were asked about soil fertility management practices and used manure were keen on using old composted manure.

homestead, and “when it rains, water deposits manure in areas closer to the house” explained Bernard. As a result, crops that are more nutrient demanding such as vegetables and maize are planted closer to the house. Crops such as pigeon peas and cassava which are relatively less sensitive to soil fertility are planted away from the house. Soil fertility was as well managed according to the soil types (which varied very much even on individual farms). *Kishagha* (sandy) soils were deemed appropriate by farmers in the Mbonboyni community for growing pigeon peas and red soils were deemed best for growing vegetables and maize, with sharp biophysical discontinuities (sometimes occupying half of the farm area (**Figure4.7**)) on many farms limiting the growing of any kind of crop.

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Figure 4.7. Rocky outcrops, the case on many farms, limits the space suitable for cultivation.

In the high potential area, the lack of manure and the unaffordable prices of organic fertilizer significantly limit vegetable production (interviews with extension officers and farmers; Vogt & Wiesenhuetter, 2001). Consequently, an FFS in the upper area was considering the possibility of transporting manure by lorry from the lower zones, where meat cattle is grown, to the FFS site in the upper area.

4.3 Agricultural Roles

> "Women in Africa work a lot… Women are property. Men's contribution to local agriculture is very little. Men are allocated little jobs by the culture. Women are carrying everything. It is an issue of culture. It is about where the culture places women. … Women even produce income for the family. If you ask a woman why are you in a merry-go-round? She would say 1- to start a small business and 2- to pay school fees," explained the coordinator of SITES, a local NGO.

This chapter offers a detailed description to the male and female agricultural roles in the Mbonbonyi community. These roles differed between the participants and the non-participants and were determined by gendered relations. The changes in roles and gendered relations as a result of field schools is described and analyzed in Chapter Six and Seven.

4.3.1 Moser framework

As outlined in Chapter Three, the research seeks to understand the impact of culture on learning. Hence, gender analysis, which entails the understanding of gendered roles, is of particular relevance to this research. The Moser Framework accounts for gender relations. The field reality revealed that gender relations often determined gender roles. Hence, the

Framework is adopted because it is congruent with the field's reality. The Framework distinguishes between male and female productive, reproductive and community roles, which are defined as the following:

-Reproductive work "involves the care and maintenance of the household and its members" (March et al., 1999, p. 56).

-Productive work "involves the production of goods and services for consumption and trade … Women's productive work is often less visible and less valued than men" (March et al., 1999, p. 56).

-Community work includes "the collective organization of social events and services—ceremonies and celebrations, activities to improve the community, participation in groups and organizations, local political activities, and so on" (March et al., 1999, p. 56).

4.3.2 Female roles

Female roles in the Mbonbonyi community were for the most part reproductive in nature. These roles include preparing food, working on the *shamba* everyday, washing clothes, as well as fetching firewood and water. Reproductive work consumed most of the women's time and energy (refer to **Table 5 and 8**). During vacations and weekends, young girls assist their mothers, often grandmothers, in collecting firewood and fetching for water. Affluent farmers, however, hire labor to assist them during the planting and harvesting seasons, especially during the summer when maize is planted.

Some of the reproductive activities were particularly feminine and included planting and threshing of beans, preserving planting seeds and planting of cassava: 'a true woman must plant cassava' is a common saying in the Hills. Nonetheless, females

(participants and non-participants, of different ages and differing economic status) perform activities that are traditionally done by men such as cattle rearing, brick making, sand-harvesting and raking of stones (**Figure 4.8**).

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Figure 4.8. Woman raking stones, manifesting the erosion of roles in the Mbonbonyi community.

For both participants and non-participants productive work included the selling of bananas, sugarcane, cassava, pigeon peas and milk. Productive work is seasonal and FFS members were more inclined to be involved in selling their produce, which often involved selling of the FFS produce. As opposed to the participants, the FFS participants knew about market issues, including prices and demand.

Women in the community, especially female-headed households, had constant access to cash through revolving funds, or merry-go-rounds. Men migrating to cities

contributed to an increase in female-headed households in the community, as illustrated by Japheth below:

> "When men go to the towns, they forget that they have left their wives back. And then, the women are suffering. They do not have money for school fees for children to attend school. Even providing food for their families is very difficult for them."

Consequently, these women are often short of labour on the farm and are forced to work off their farms as casual labourers.

Female participants in the FFS were more likely to be involved in community work than the non-participants: "Our women are outspoken and more outgoing than the other women in the community," emphasized Winston, Mwora FFS. Female-headed households were the least likely to be involved in community work. Community work is an extension to the women's reproductive roles. Women, mostly FFS participants, participated in choir, school and *harambeh* work, where they practiced tree planting and agricultural work.

4.3.3 Male roles

The male reproductive work, for the most part, is limited to performing physically strenuous tasks, such as building of terraces and digging of trenches (Focus Group Discussions [FGD] with elders). Some farmers in the community, however, expanded their agricultural roles to the female domain due to hunger induced by climate change, as illustrated by Japheth below:

"Although men don't plant beans, traditionally planting beans was meant for the ladies. But nowadays there is an equal sharing of roles … Because men found out that without hard work you will suffer from hunger … Some men were not planting beans, saying that

digging is for ladies. Now both men and women are planting beans because of hunger… These changes have started since 1984-85."

The male participants were more likely to be involved in agricultural work, and further performed tasks that are only carried out by women in the community. The threshing and planting of beans, planting of cassava and preserving of maize seeds were tasks undertaken by male FFS farmers. Many of the male participants' wives maintained that their husbands are more involved in farming and less inclined to abuse alcohol as a result of participating in the FFS. Nonetheless, the FFS participants' farming work was restricted to visiting the *shamba* two times per week (refer to male weekly calendar, **Table 6**).

The male reproductive work in the community was based on rearing cattle, seasonal, masonry work and agro-forestry. Tending cattle includes bringing fodder and water to them as well as milking and selling the milk. Cattle rearing consumed most of FFS male participants' time (refer to daily calendar, **Table 7**).

Community roles for men often overlapped with productive roles when the role was an official government post, such as village elder, chief, sub-chief and school principle. In addition to obtaining government posts, community roles for men as well included negotiating land agreements[40] and facilitating FFS. Male elders in the village had an additional role of making sure that farmers in the community had soil erosion and water conservation structures on their farms.

Alcohol abuse is a non-productive male role adopted by most men in the Mbonbonyi community. Unemployment and limited involvement in farming due to a lack

[40] "I am on this committee because I want to see people getting land," explained elder Judah.

of agricultural skills and interest contribute significantly to the problem of the male alcohol abuse in the community.

4.4 Sustainable Agriculture Defined

As mentioned earlier, the researcher sought the local definition of sustainable agriculture, because of adopting a constructivist approach to knowledge. The Mbonbonyi community describes sustainable agriculture as agriculture that is based on social and human capital and sustenance of ecological services. Sustainable agriculture is defined by the respondents in individual interviews and focus group discussions with both participants and non-participants (of different ages, and differing economic status). Sustainable agriculture meant institutionalizing a social capital whereby farmers arrange themselves in groups for accessing a revolving fund (merry-go-round), rotating labour (*ngowa*), accessing markets and selling milk in bulk (farmer cooperatives) and/or micro-credit (FFS).

Sustainable agriculture was further, and concurrently, based on human capital. Farmers are required to have good health and entrepreneurial skills, for a business oriented type of production. According to the respondents, good health and entrepreneurial skills are interconnected. A farmer who has diverse income generating enterprises of poultry, cattle, crop, fruit and vegetable production has access to a diverse diet and is consequently healthy.

Finally the sustenance of natural and ecological services is the third facet for achieving sustainable agriculture in the Mbonbonyi community. Sustenance of ecological services is specifically achieved through the provision of a permanent soil cover for the

prevention of soil erosion, which is rampant in the Hills (**Figure 4.9**) especially on sloped areas, a constant supply of nutrients for replenishing soil fertility (exclusively defined by FFS participants) and agro-forestry (exclusively mentioned by male FFS participants) for attracting rain and protecting watersheds, the benefits of which, according to the respondents, will be carried on for future generations.

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Figure 4.9. Gully erosion, the most common type of erosion in the Hills (Sirviö & Hargrave, 2004), is partcularly problemtatic in the intermediate area due to the slopy terrain.

4.5 Limitations

Limitations to production in the Mbonbonyi community are shared by participants and non-participants, with female-headed household, who were mostly non-participants, being the worse situation in the community. For the most part, the following limitations

were restricted to women, given that they performed almost all of the agricultural work. The limitations to agricultural production are both biophysical, such as climate change, pests and poor infrastructure, and cultural, such as heavy workloads, limited access to credit and mismatch between the cropping system and the environmental conditions. All of the limitations were identified as limitations to production by the respondents themselves. Only the mismatch between the local environmental conditions and the current crop requirements was noted as a limitation by the researcher.

4.5.1 HIV/AIDS

The Taita Taveta District Development Plan 2002-2008 (NEMA, 2005) states that HIV-AIDS has a 15% prevalence in the Kishamba community. Eighty households in this study were interviewed concerning the impact that human disease has on local agriculture.[41] The impacts were both at the household and at the community level, despite that most of the respondents denied disease-related impacts on the local agriculture.

At the household level, many farmers left their entire land fallow (**Figure 4.10**), distant parts of their farms fallow, were late for the season and/or had limited labour energy.

[41] In a focus group discussion with 14 of the Mwora participants, human disease came out as a major limitation to agricultural production. Hence, it was further tackled in interviews with individual households.

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Figure 4.10. Land (3 acres) left follow due to the illness of the household members.

The following quote by elder Beatrice captures the impact that human disease has on households in the Mbonbonyi community:

> "Because of disease around here, so many people are forced to leave their *shambas* fallow, because of disease … or some of these people are forced to cultivate on a small portion... There is a lady around here who lost her husband, and she is sick. This lady can not work on her *shamba* as a result of disease," explained elder Beatrice.

Most of the respondents emphasized that human disease has an impact on the household level but not on local agriculture. Below the Mbonbonyi village elder, Mwambogha, explains how the impact of human disease concerns the household not agriculture in the community. However, when death results from sickness, then indeed agriculture in the community is affected:

> "There is no impact on agriculture because if you are sick you can not work. If you can not work, then you will have someone in the house who will take care of you[42]. Not the whole community will be affected. The other people will continue with their farming. This is how local agriculture in not affected. If happened to be a death case, however; then, people will be forced to do away with farming activities. Often agriculture will be affected in that way. There are many deaths cases around, but the local agriculture is not affected; people will always continue farming."

When death occurs activities in the community are suspended for up to a week. Some farmers, as illustrated by the quote below, however, emphasized that human disease has no impact on agriculture even during funeral times:

> "No there is no impact on agriculture. When the burial is over or when you attend to the sick, then you get back to farming," said one farmer.

At the community level,[43] a few farmers realized that human disease does have an impact on the local agriculture in the community. For these farmers, being mobilized for carrying diseased people to hospitals, sick people begging for food during the harvesting season and the loss of agricultural knowledge is disruptive to the local agricultural activities in the community at large, as illustrated below, respectively:

> "Yes, human disease is impacting local agriculture. You will see people during the harvesting seasons coming to you begging for food. If you have, then you will have to give them. This way agriculture in the community is affected by disease," said one affluent female farmer.

> "Human disease has an impact on the community. Every time someone gets sick, we get mobilized and need to take this sick person to the dispensary. In the mean time, no agricultural work gets done. There are so many cases around here; every now and then you will hear the whistle

[42] Women are particularly affected when there is a sick person in the family or the community because they are the ones who look after the sick (personal observation, 2006).
[43] Some people identified funeral expenses as a disease-related impact on the community, due to the sharing of funeral costs by community members, a common cultural practice in the Taita Hills (Smith, 2005).

> blowing [the method used by the village elder to mobilize people in the community]," said another female farmer.
>
> "Of course you have the HIV/AIDS epidemic; it is declared a national emergency in Kenya. People are dying and as such the farming skills are lost[44]. Hence, agriculture is affected very much by HIV/AIDS," a young non-participant explained.

Nonetheless, the respondents who saw disease-related impacts on the local agriculture and/or the household and the respondents who did not see disease-related impacts at both levels, maintained nothing could be done about human disease:

> "Disease is from God," said one respondent.
>
> "There is nothing that could be done; you can't stop sickness in the community; it will always be there," replied another.

Therefore, most of the farmers in the Mbonbonyi community were probably unaware that, quite to the contrary, something could be done to stop the spread of the disease in the community. Indeed, out of the 80 households interviewed about the impact of human disease on local agriculture, only two linked human disease to HIV/AIDS[45], rather than perceiving human disease as something natural and inevitable. One respondent was quoted above concerning the loss of agricultural knowledge as a result of HIV/AIDS, and the other respondent below explains that HIV/AIDS is finishing people in the local community:

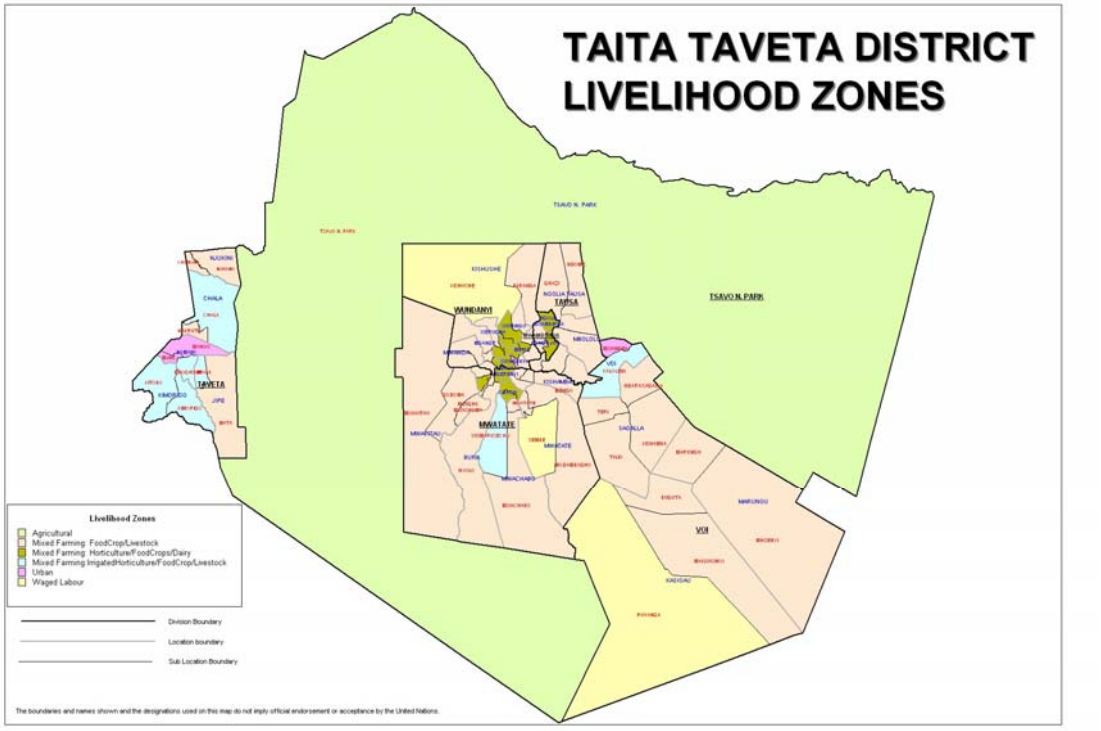
> "Sickness especially HIV is finishing people. It was brought by the white people, and they tried to say it came from Kenya. In 1984, sickness was

[44] Loss of agricultural knowledge due to HIV/AIDS was reported, as well, by Guerny (2002) in his study on HIV/AIDS impact on agriculture in South East Asia.
[45] Being an outsider, as mentioned in the limitations section of Chapter Three, may have limited the openness of people to discussing HIV/AIDS.

brought by newcomers. Disease is a problem in the area because one can not work when sick," said elder Judah.

4.5.2 Mismatch between the cropping system and the agro-ecological zone

Despite that the case study area, Mbonbonyi village, belonged to Livestock-millet agro-ecological zone (Jaetzold & Schmidt, 1983), the livelihood map indicates a maize-livestock agricultural system (**Figure 4.11**).



Source: CBS, 2006.
Figure 4.11. Livelihood zone for the Taita Taveta District. The Taita Hills belong to the maize-livestock livelihood zone.

The maize crop occupies more than half the area of every single farm in the Mbonbonyi community (personal observation, 2006). The mismatch between the agricultural system

and agricultural practices that focus on growing maize[46] in the community are perpetuated by food aid which often includes maize, the Government of Kenya (GoK)'s distribution of maize planting seeds and the cultural attachment to maize (personal observation, 2006).

Despite that most farmers in the Mbonbonyi community cultivated a limited portion of their farms with pigeon peas, sweet potatoes and cassava, in a few cases with local climber varieties of beans, *Mbombo* and *Mwaypala* beans (**Figure 4.12**), these drought resistant crops were not perceived as regular food, rather as *daroura* (emergency) food (FGD Mwora, Crop Values).

[46] By 1848 maize took over as the staple crop (Brooks et al, 1998) in the Hills. In 1962 hybrid seed maize was introduced, after government breeders released the first maize variety (Iseme & Gitau, 2006). The hybrid varieties grown in the Taita Hills are Dryland hybrid DH02, Pwani hybrid PH 01, 511 variety, and the *Mdavida* (local) variety. The Kenya seed company collaborated with Kenya Agriculture Research Institute (KARI) for the release of these hybrid varieties (Iseme & Gitau, 2006).

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Figure 4.12. Mbombo beans, climber beans, which the Mbonbnoyi community's name is based on.

When asked if they had harvested this season, they would say no, mostly, or yes according to whether or not they had harvested maize. For the farmers in the Mbonbonyi community, harvesting of drought resistant crops, *daroura* food, was not considered a harvest. Another area were cultural attachment to maize was manifested, contributing to the mismatch between the cropping pattern and environmental conditions, is in the attachment to the local, low yielding variety of maize (**Figure 4.13**).

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Figure 4.13. Maize Mdavida (local) variety. Note the small cobs (10 cm) Regardless, farmers are keen on preserving the local variety.

Farmers in the Mbonbonyi community are strongly attached to the local variety of maize and are keen on maintaining the variety, as illustrated below by a focus group discussion on crop values with the Mwora participants and a village elder, respectively:

> "We would never fail to plant the *mdavida* (local) variety. It has to be there on the *shamba*."

> "Though agriculturist is trying to tell people to switch from local to certified seeds[47] … I just like the variety. There is this Tahita saying 'it's something from the heart'."

[47] Field work revealed that most farmers, including the FFS participants, preferred growing the local variety over the certified variety because according to them the local variety requires less water and because the maize cobs of the local variety are well-surrounded by tight leaves making the local variety more pest resistant than the certified variety. Similar results were reported by Mweri (2005), in his study on FFS in the lower areas of Mwatate, on farmers' preference to local maize variety for being more pest resistant and drought tolerant than certified varieties.

4.5.3 Land Tenure

Land tenure[48] was a limitation to agricultural production for both male and female farmers (participants and non-participants). Female-headed households, married female farmers and male farmers were all forced to rent land because of the small farm sizes: *shamba kidogo kidogo* (the farm sizes are very, very small), was ranked first between the problems faced in the local agriculture (Mwora FGD1). Hence, farmers in the Mbonbonyi community, especially female-headed households due to their lack of inheritance rights, had to farm on land that did not belong to them. Resultingly they refrained from planting trees and building terraces for soil and water conservation. This in turn reduced the diversity of food sources and facilitated land degradation, especially for female-headed households who only farmed on land that does not belong to them as opposed to the married women who had fruit trees on their husbands' farms (**Figure 4.14**).

[48] "Land tenure can be thought of as a bundle of rights, which may include anyone or more of access, on-site use, harvest, and extraction of a resource, as well as the right to exclude other users, to set rules for resource use, to improve the resource (cultivation, fertilization), and to transfer any or all of these rights to others" (Taylor, 2006, p.8).

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Figure 4.14. Shamba on which a female-head of household is farming on. The land is communal land. Note the absence of fruit trees.

In some cases, many female farmers due to the small sizes of their husbands' farms were forced to farm on marginal land; according to these women labour is very strenuous for cultivating these pieces of land (**Figure 4.15**).

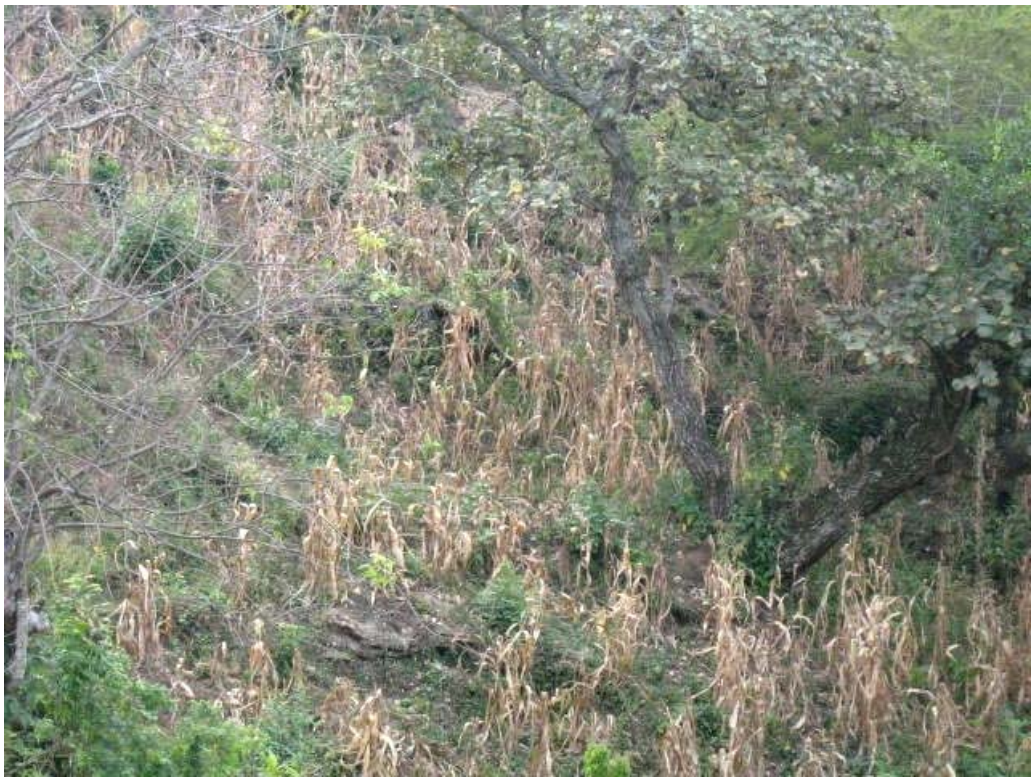

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Figure 4.15. Women farming on marginal land due to the scarcity of arable land. The land is marginal in terms of slope and soil fertility (note the rocky outcrops), increasing further the workload for these women.

Divorced women were in the worse situation with respect to gaining access to land. Male relatives, cousins and brothers, often took control over the land, as illustrated by Christina and Agnes, below:

> "Because I am a woman, my brother and his wife teamed up against me. I only farm on a small portion, and in the lower zone. I have no land at all. It is taken away by my brothers. I am forced to rely on relief food. No land to farm on. See were I planted here, currently the boy [her nephew] grazes goats and chickens. He [her brother] let them feed on my crops, and nobody asks him. Even his father did not stop him from doing that. I feel like I have no land to farm on."

> "There is a *shamba* in the upper zone, but it got taken away from me by my father's cousins."

4.5.4 Climate change

> "In the past, one could be sure of the rains. When one plants on such and such time, one is assured it will rain. Nowadays, one might fail… Nowadays, it can even reach November, September and not rain. You can plant, but you might harvest or not. People are demoralized because rains are not promising so … some people can decide not to cultivate," explained a village elder.

Similar results were reported by Mweri (2005). Farmers can no longer predict the rains. This uncertainty has led to dependence on food aid, "you know I didn't harvest for three years this food aid really helps people a lot," one farmer emphasized, among many others. In the Taita Taveta district 85% of the population experiences crop failure and over 100,000 out of 203,020 inhabitants depend on the government food relief program (CDA, 2006). Some attributed the disturbed rainfall pattern to the lack of forest cover. Further to the uncertainty related to climate change resulting in dependence on food aid, according to a focus group discussion with elders, climate change has significantly contributed to soil erosion. Extreme weather conditions of drought and flooding left grounds bear and increased the incidences of soil erosion, as explained by the elders below:

> "The rainfall pattern has really changed, it is not like before. Big changes the rains are not predictable. It used to rain every now and then. In the past, as a result of continuous rain, there was always vegetation on the ground. Hence, the land was not prone to erosion because of a protective ground cover. But now it becomes so dry that all the ground cover dries up. When it rains the ground is bare hence a lot of gully erosion or even valleys form as a result of water moving because there is no ground cover," said one female elder.
>
> "It is either too much water or no water," said another female elder.

4.5.5 Pests

Monkeys and baboons were the most noxious pests in the Mbonbonyi community. Baboons liked cassava and maize and preyed on goats and chickens. Farmers, consequently, in the affected areas refrained from planting cassava and maize and from rearing goats and chickens. Some farmers had to watch their farm for the whole day to scare away baboons, while others opted for restricting their agricultural activities to vegetable production, given that baboons had little preference for vegetables. A few in the baboon areas left their land fallow and depended on the lower zone for carrying their farming activities.

Insect pests were mainly maize pests with the large grain borer (LGB), *Prostephanus truncatus*[49], being the most prominent. The borer thrives in drought: "The condition [stock borer attacking maize crop] is cured with rains," explained many farmers. Another prominent maize pest was the red ant (**Figure 4.16**).

[49] "Since its accidental introduction into Kenya in the early 1980s, through the Kenya-Tanzania border town of Taveta, the larger grain borer *Prostehanus truncates* has continued to be the most devastating storage pest of maize and cassava in Kenya" (KARI, 2005, p. 53).

Dina Najjar

Figure 4.16. Red ants, a common pest that feeds on maize seeds. Farmers refrain from dry planting, though dry planting increases yield, because seeds will sit in the soil longer before germinating. Hence, the chances of being eaten by the red ants are increased.

This pest attacks maize seeds before germination, forcing farmers to perform ‘gapping’ (i.e. replanting) when realizing that many of the maize seeds did not take up.

Yellow Mosaic Virus (YMV) is another prominent pest in the community. Indeed no clean cassava cuttings, or plants were spotted on the farms visited (**Figure 4.17**).

Dina Najjar

Figure 4.17. Yellow mosaic virus (YMV) on cassava. Clean varieties are very rare to find not only in Taita Hills, but in the entire district. The YMV reduces the yield of the crop (KARI, 2005).

On cassava, the mole pest was also reported to be problematic, such many farmers in certain areas refrained from planting cassava. Theft of potatoes, maize and Napier grass was as well reported to be a problem, especially in the lower zones.

4.5.6 Workloads and gender relations

Focus group discussions and interviews with female farmers in the community revealed that their heavy workloads profoundly limit agricultural production. Many of the female farmers refrained from weeding twice, dry planting and deep tillage, among other labour intensive technologies that enhance agricultural productivity, because of shortage in labour. Further, almost all women interviewed complained about transporting crops,

during the harvesting season, from the lower zones to their homestead: "Transporting the maize from the lower zone to here is very tiresome, and I have to do many loads per day," explained Mercy. Despite the women's heavy workloads, many men in the community refrained from doing agricultural work and opted for abusing alcohol[50] and seasonal masonry work. Women in focus group discussions maintained that "you will find that some men will come and ask for food and they have not been working. That is also a problem women face in the community." (FGD1 Mwora). Further, some elders in the community attributed the lack of home gardens in the community to the male control over cash. According to these elders, while women invest labour in vegetable production, men end up taking the money and spending it on the purchase of alcohol. Hence, the women lost the drive to produce vegetables. Further, men in many instances, had full control of decision making on the farm, hindering the women's ability to adopt technologies that increase production, as illustrated by Jennita and Helen below:

> "I do want to plant in lines and proper spacing; *mzeh* (husband) doesn't like that, though. And, I have to listen."
>
> "I want to put up some terraces on the *shamba*; he does not want me to do that. Maybe, I can ask him politely to set aside a piece of land that I can put terraces on."

4.5.7 Roads

"Barabara mbaya", the roads are bad, emphasized farmers in a focus group discussion, "especially during the month of March when rains completely destroy the

[50] Alcoholism was ranked highly in PRAs conducted in 2005 for AIV FFS (CDA, 2006), resulting in laziness and idleness. Further, a study by Njoroge (2004) on gender and innovation in FFS in the Rift Valley revealed that cheap alcohol is limiting the male role in the local agriculture, increasing the workload for women and putting them at the risk of violence and rape.

roads." The roads are poor to transport agricultural produce to the markets; in addition, according to these farmers, there is a lack of transport and regional markets. To illustrate their lack of access to markets and transport vehicle, concerned farmers maintained that at one time when they produced cabbages and tomatoes they were obliged to sell locally for cheap prices due to the lack of a close market and transport.

4.5.8 Planting seeds

> "The lack of planting seeds is a major problem. Consequently, farmers are late for the season. Hence, they get a poor or no harvest because they were late. This will result in hunger; that is the problem," explained Mwambogha, the village elder.

The lack of planting seeds seems to be a general problem in the Hills, as illustrated by an FFS facilitator monthly report to the MoA:

> "However most farmers do not practice the FFS technologies on their farms because of limited availability of seed during planting which arises from poor planning of their farm activities," (MoA Report on FFS in Taita Hills, May, 2006).

The unavailability of seeds during the planting season, or *kurosa mbegeza kupanda* was mentioned on several occasions in both focus group discussions and interviews as being the primary reason for hunger in the community. Some farmers attributed the lack of planting seeds to drought: "Sometimes when it rains early enough we do not have the money to buy the seeds, and most of the time in the previous season we did not harvest enough, or at all, because of drought." (FGD1 Mwora).

4.5.9 Access to agricultural information

Many farmers complained that extension staffs' visit to the area is very limited, especially, single mothers and the elderly who did not participate in FFS, emphasized the need for extension staff to visit their area and give advice to them. The participants as well demanded more visits by the extension staff. When asked how the FFS can program improve, most participants emphasized, like Bernard, that "the agriculture officer should come back frequently, and see our progress and ask what difficulties we are encountering."

4.5.10 Access to credit

Women, in particular, mentioned access to credit, money and land, as a major limitation to agricultural production, with divorced women being in the worst situation:

> "Maybe if I had a husband to sign a piece of paper for me, it would be easier to get money," said Christina, a divorced farmer.

Single mothers or divorced women who had no parental land to farm on were given permission to build houses and farm on communal land by the village administration. These women have an extra burden of paying fees and other obligations to the local administration:

> "When you want to build your house, it is hard to find elders in the village that will help you get a place for building your house on community land… You also have to pay some money… In general, they are jealous. They want some amount like it or not. You will have to give them otherwise there is no other place to cultivate or build your house on. They also would tell you where to sell and what to do, and you have to listen," explained Hope, a single mother farmer.

Table 3 Non-participants' seasonal calendar

January	Land preparation
February	Land preparation
March	Plant maize and beans
Arpil	Weeding
May	
June	
July	Harvesting
August	Land preparation
September	Land preparation
October	Wait for rains, plant maize when it rains
November	Weeding
December	Harvesting of maize

Table data source: semi-structured interviews

Table 4 FFS participants' seasonal calendar

January	Harvesting maize		
	Harvesting maize		
February	Still harvesting		
	Doing land preparation		
March	Land preparation, deep tillage	First season	
	Doing land preparation	Long rains	
April	Planting maize and beans	Late March, early April rains until July	Plant beans first, after two weeks plant the maize
	Planting beans and start weeding		
May	Weeding for the first time		
	Weeding for the second and last time		
June	2nd Weeding "Mbuza"		
	Harvesting		Also harvesting cassava and pigeon peas*
July	Harvesting maize and beans		
	Done with harvesting		
August	Land preparation	Second season	Apply manure to the soil
	Land preparation		
September	Dry planting for maize		Plant using manure in planting holes
	Still preparing shamba and doing dry planting		

October	If it rains and not done with dry planting then continue planting	Mid or late Oct it rains and goes up to Dec**	
	If it rains and not doing dry planting then start planting		Also planting cassava, sweet potatoes and pigeon peas***
November	First weeding		
	Weeding for the first time		
December	Second weeding called 'Mzuba''		
	2nd weeding and the last time		

Table data source: focus group discussion on seasonal calendar with the Mwora FFS.
N.B.: During each month, the first row represents female practices and the second the male practices.
* Getrude - weather farmer innovator - knows when it rains.
**In the winter season, rains are not reliable and the weather is cold for maize. Hence farmers rely on other crops as well such as cassava and pigeon peas. During the long rains, farmers plant sweet potatoes, pigeon peas and cassava. Sweet potatoes are harvested after five months.
*** Pigeon peas are semi perennial and are planted once every two harvests. They are a source of firewood, and the pods and leaves are fed to cattle.

Table 5 Female participants' weekly calendar

Monday	*Harambeh* work and then to the *shamba* work.
Tuesday	School work and then to the *shamba*.
Wednesday	Mora site and then cleaning the house and helping the young.
Thursday	Go to the *shambas* and do digging and slashing
Friday	Praying in the morning, then take breakfast and go to the *shamba*.
Saturday	Wash cloth for Sunday and some fetch firewood on this day.
Sunday	Going to church when come back home relax and visit friends.

Table 6 Male participants' weekly calendar

Monday	Bringing fodder, milking and *harambeh* work. Local brew afterwards.
Tuesday	Attending to cattle and school work.
Wednesday	Mora site, attending to cattle and *shamba* work.
Thursday	Attending to cattle.
Friday	Attending to cattle.
Saturday	After breakfast go to the *shamba*. Kids attend cattle on this day.
Sunday	Church, visiting friends and local brew.

Table 7 Male participants' daily calendar

5:15	Wake up.
5:30	Boil the water for milking.
5:45	Start milking.
	After finishing milking know the amount of the milk go and the amount to be taken to the dairy
	After taking milk to the dairy, come back home and take tea.
	After taking tea, clean where the cows sleep.
	After being through from cleaning the crush, go and cut fodder for the livestock.
	After cut fodder, now come and feed the livestock directly and fetch water for livestock.
	Go to the *shamba* and see if there is work to be done.
	From *shamba*, go back home to see if livestock has finished fodder, and if need more give them and take lunch at then.
2:00 PM	Feed the livestock and go back to the *shamba*.
4:00 PM	Come back from *shamba* and search for fodder for livestock for the next day.
5:00 PM	Prepare for milking utensils and after finishing milking take certain amount to the dairy.
6:00	Feed livestock and take some tea in the evening and after tea wait for supper.

PM	
9:00 PM	Go to sleep.
2:00 AM	Wake up for a short time to make sure livestock is there and everything is in good order and then go back to sleep.

Table 8 Female participants' daily calendar

6:00 AM	Wake up.
	After wake up start cleaning the house.
	Light up the fire and prepare tea.
	After taking tea clean the utensils.
9:00 AM	Start preparing for vegetables used for lunch.
12:00	Prepare *ugali* and clean the utensils after preparing *ugali*.
12:15 PM	Resting.
12:15 - 4:30 PM	Go to the *shamba* for some work and gather firewood.
4:30 - 5:00 PM	Come back from *shamba* and start sorting out vegetables.
5:00 - 5:15 PM	Fetching water.
5: 15 - 5:30 PM	Taking shower.
5:300 - 5: 45 PM	Preparing tea and vegetables.
5:45 - 6:00 PM	The vegetables are ready and cooked.
6:00 - 6:15 PM	Now want to prepare *ugali*.
6:15- 7:00 PM	Prepare *ugali*.
7:00 - 7:10 PM	Frying the vegetables.
7:10 - 8:00 PM	Taking supper.
8:00 - 8: 15 PM	Through with supper removing utensils from the table.
8: 15 - 9:00 PM	Chatting with family members.
9: 00 - 9: 20 PM	Praying.
9:20 PM	Bed time.

FARMER FIELD SCHOOLS IN TAITA HILLS

5.1 Introduction

This chapter offers a temporal view of agricultural extension in the Taita Hills with a particular focus on the FFS method. The chapter examines the underlying national and international context to the FFS policy, the types of FFS visited in the Hills and looks at who was involved in these FFS. Because gender determines participation in the FFS program, gender issues in the FFS program are explored. Finally, the chapter addresses the problems faced by FFS in the Taita Hills based on the twenty FFS visited.

5.2 History of Extension in the Taita Hills

Agricultural extension was introduced to the Taita Hills in 1935 and was based on a T&V top-down approach. The earliest technologies introduced were terracing and cash crops and associated profit oriented farming. Elder Judah below explains that terracing was the earliest technology introduced by agricultural extension which in turn was introduced in 1935 using a T&V approach:

> "In the past there were no terraces. People used to just arrange stones to control erosion, or they could even lay trash. They could also plant sugarcane, bananas or cover crop like sweet potatoes to control erosion. Terracing was introduced by the agriculture officer in 1935. The idea of agriculturalist was in 1935. Got one agriculture officer go round to every farmer in *shamba* and lay down terraces and even does measurements; and tell how to go about it; and if did it wrong, will tell you do this or this."

Elder Judah continues to explain the introduction of farming as a business in the Hills in 1935 which was triggered by colonialism and focused on vegetable and chili production:

> "Introduction of production with the aim of selling was also introduced in 1935. Hot peppers were also introduced at then; they are produced in the lower zones. People here concentrated on vegetable growing, especially, tomatoes that grow wild. They are free and pest resistant. In 1935 the Hills also witnessed the introduction of the exotic type of tomatoes and another variety of cabbages was introduced. During the colonial era whites wanted people to produce[51] to get money like vegetables. Hence, so many people grew vegetables along this area here. Those people who were concentrating on farming were not taken to WWII. Instead they were left to produce; and the produce was then taken to those people in wars."

In 1980's cows and their feed, Nappier, associated manure application, and deep tillage were introduced into the Taita Hills, as explained by Koreen, a village elder, below:

> "In 1980's Napier introduced. There used to be Napier but only along the river banks. The introduction of dairy cattle in 80s, initiated planting of Napier along terraces."

Beatrice, another village elder, explains that applying manure and associated deep tillage were introduced by extension as recent as ten years ago (which falls within the time cows were introduced as illustrated by Koreen above):

> "The application of manure when planting is not all that old. The use of manure is just recent. Even now, few people try to see if it works. Probably the application of manure was introduced ten years ago; at the same time, deep tillage was introduced by extension officers."

These technologies necessitated the introduction of required farming tools. For example, the introduction of deep tillage was accompanied with the introduction of bigger farming tools such as *jembes* (hoes), to the area, as illustrated by the village elder Beatrice, (not the same Beatrice quoted earlier):

[51] During the second war era 1939-1945 horticultural production in Kenya increased for supplying the war (CDA, 2001b).

> "In the past we did not have the farming tools that we have now, instead we had smaller tools … There was a stick, sharpened at one end, pointed; it is used when doing land preparation, to get rid, especially, of coachgrass[52]. He [her husband] used to be a blacksmith; he used to make farming tools used for cultivation. The *jembehs* were smaller."

Eventually the extension method moved away from individual farm visits to a group-oriented form of extension. The extension technologies promoted, however, remained the same since the onset of agricultural extension in the Taita Hills. To illustrate, Elder Juda below explains that over the time the extension messages promoted in the Hills have been the same only that the method of delivery has changed:

> "I am saying. The extension technologies promoted keep being repeated and are the same of what was promoted in the past. Maybe people forgot about these practices[53], and the Government decided to repeat promoting these practices in a different way. It is a matter of reviving of what was done in the past, because in past had agriculture officer telling them [the farmers in the community] all these practices."

To further illustrate, elder Beatrice explains that since 1977 the technologies promoted in agricultural extension have been similar:

> "Since 1977, when I got married, people here were concentrating on terraces even before Mwora FFS. Even before Mwora, some people changed their farming into like deep tillage, terracing, lines, among other FFS technologies. There used to be an extensionist who does contact visits to farmers, giving advice, and through public *barazas* too."

The shift to a group-oriented form of extension was rooted in the shortage of agricultural extension staff in the Hills, as illustrated by the DAO for the Taita Hills below:

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[52] Most farmers maintained that deep tillage is a must to get rid of the coach grass, a common noxious weed.
[53]These technologies included terracing, line planting, deep tillage, digging furrows, use of manure, planting trees and Napier grass along the terraces, planting more of drought tolerant crops, as well as emphasizing mixed farming—integrating cows, goats, chicken and crops.

> "There is one extension officer for every 1000 farmers. Individual farm visits are impossible. Hence, the government of Kenya adopted a group approach to agricultural extension."

The group-oriented form of extension in the Hills moved away from the top-down transfer of technology, or the use of field days for demonstration and public *barazas*, towards experiential learning in an instructional setting in Farmer Training Centers (FTC) and finally to discovery based, experiential learning in FFS where farmers themselves pay for the extension services[54]. This shift towards increased levels of farmer involvement was triggered by national and international factors.

Devolving technology innovation, adoption and dissemination to farmers themselves for eradicating poverty and combating desertification with a particular focus on women are major goals outlined by the United Nations Convention on Combating Desertification (UNCCD). Influenced by the UNCCD framework, the government of Kenya adopted a national action programme legislating enabling public policies. One of these policies is the National Agriculture Sector Extension Policy (NASEP) (Agricultural Sector Coordination Unit [ASCU], 2006). This policy focuses on a demand-driven extension, commercial type of agriculture with a focus on marketing, strengthening research linkages between farming communities and research institutions and better participation for women in farming and in the market (ASCU, 2006; GoK, 2003).

[54] According to many extension staff in the Taita Hills, having farmers pay for extension services increases the efficiency of these services:

> "If farmers had to pay for the services then they would listen to you. When it is for free they would take it for granted," explained Jane, the extension crops officer for the Taita Hills.

The FFS objectives are engrained in the NASEP. Such that, FFS in the Hills focus on demand-driven agriculture by giving funds to farmers which they administer themselves in order to pay for the facilitator expenses and other FFS-related expenses. The FFS in the Taita Hills actualize NASEP's mandate of an increased role for women in agriculture and strengthening research linkages between farmers and research institutions. In effect, most of the participants in FFS were females. The research linkages between farming communities and research institutions were vast, with linkages between farmers and KARI being the most prominent. Below the Extension Coordinator in KARI emphasizes the importance of research collaboration with farmers for testing crop varieties under local conditions for obtaining information on which crop variety does best in a specific area:

> "We want to obtain site-specific knowledge on which seed variety is best suited to a specific location. This information is very useful to seed stockists, extension agents and to the scientists. This knowledge, further, is crucial for an appropriate up-scaling of the suitable crop variety. Such that when farmers are planting at the FFS site they are also planting the best variety on their farm and telling other farmers about it."

A post-harvest pesticide trial was another collaborative research example encountered between KARI and farmers in FFS, as illustrated below by an extension officer in the Taita Hills:

> "There is this chemical, 'somi kombi'. It was under experimentation; afterwards, I have discovered that it is not very effective. The results I got from farmers, or most of the farmers, reveal that after one month or two the most weevil infestation begins ... I distributed it to all the schools because you get clear answers from schools... When you do experiments start with schools, you will get quick responses."

As explained in Chapter Two, the fact that farmers in SSA have not yet adopted the generalized use of pesticides constitute a valuable opportunity for collaborative research between scientists and farmers on site-specific, natural control methods in an intact environmental base. Indeed Bruce, a PhD student from Kenyatta University, offers a similar explanation to why he picked the Hills for collaborative research between International Center for Insect Physiology and Ecology (ICIPE) and farmers:

> "I chose the Taita Hills because farming is subsistence. If you introduce a biological control at one farm, farmers next door will not be spraying... In addition, the pest that the parasitoid, *Telenomous isis,* is released to control occurs only in Wundanyi. This maize pest was found in a survey done and doesn't seem to be found in other areas."

Since the introduction of FFS in 2001 to the Hills, the national extension policy moved towards the privatization of extension services with a particular focus on marketing component. Hence, the recent introduction of the Kenya Agricultural Productivity Project (KAPP) to the Taita Hills significantly focuses on marketing. Below the Monitoring and Evaluation Officer in KAPP explains the focus of the project on competitiveness between service providers, for enhancing the role of extension:

> "Dealing with SRA[55] [Strategy for revitalizing agriculture, was published in 2004 and guides all programmes and policies in the agriculture sector]; KAPP comes in; brings on board other extension service providers; enhance competitiveness, by encouraging as many service providers as possible."

A service provider, a facilitator from PCCS, below illustrates the competitive environment and the essential focus on marketing in the KAPP project:

[55] SRA recognizes the vital role that extension must play for access to wealth and employment creation. The strategy recommends measures for strengthening extension services, such as commercializing public services and encouraging private service providers. (ASCU, 2006).

> "As an extension agent you sell yourself to the farmer. For example, Elisa [the facilitator] would say, 'plant Amaranth it is good it is drought tolerant.' You need to tell them about marketing. You need to assure them that you will find a market. They will pay for your facilitation if they liked the idea ... In a *baraza* you flag your enterprise. There will be others too. Several service providers flagging maize, cabbage and dairy, among other enterprises. You need to specialize on a commercial product, plant one thing choose one service provider. You tell them about advantages of Amaranth. If they appreciate it, then they will take your enterprise."

Initially when the FFS were introduced to the Taita Hills in 2001 they lacked a focus on marketing and commercial production. Instead, FFS focused solely on subsistence crops. Over the time commercial activities, such as livestock and poultry production and African indigenous vegetables, became enterprises increasingly adopted in the FFS of the Hills (a trend observed in CDA FFS reports over the period extending from 2001 until 2006). Yet up to 2006, the subsistence-oriented FFS are the most prevalent.

5.4 FFS in the Taita Hills

In 2001, Promoting Farmers' Innovations (PFI) FFS were introduced[56] to the Taita Hills with a particular focus on poverty alleviation in Arid and Semi-arid Land (ASAL)[57] areas using farmer innovations[58] (CDA, 2001b; Khisa, 2003).

5.4.1 Promoting Farmer Innovation Farmer Field Schools (PFI FFS)

The PFI FFS aims at devolving agricultural extension to farmers, especially to innovator farmers[59] (Khisa, 2003; Njoroge, 2004; Mweri, 2005; Duveskog, 2006). Farmer

[56] Farmer Field Schools were first introduced in Western Kenya facilitating the adoption of IPM in maize production (Khisa, 2003; Mweri, 2005).
[57] The coast province was fit for the program being the second poorest province in Kenya with a 62% poverty incidence (Kiai et al., 2002) and having most of its land mass classified as ASAL (CDA, 2001a).
[58] "Innovation can be both traditional or new practice as long as it is effective in increasing food security, alleviating poverty and improving environment." (CDA, 2001b, p. 45).

innovators are identified in a ground working phase prior to the establishment of the FFS program in an area and undergo training to become extension agents for disseminating[60] their innovation. Further the program focuses on fostering the creation of innovations through learning processes of participatory technology development (PTD)[61] and the use of agro-ecosystem analysis (AESA)[62] as a tool for judging the effectiveness of PTDs (Khisa, 2003; Mweri, 2005; Duveskog, 2006).

The PFI FFS project is funded by FAO/UNDP, implemented by MoA and coordinated by CDA. In year 2001, 15 PFI FFS schools graduated in the Taita Taveta district; in year 2002, 72 schools opened, half of which were farmer-led. The schools have been multiplying ever since in the Hills, with many NGOs, such as DANIDA, Plan International, Family Concern and PCCS, and other government bodies such as MoH and Ministry of Livestock and Fisheries (MoLF) using FFS as their extension method. These FFS had the same objectives of PFI FFS broadly focusing on increasing food security and dissemination of technologies (Mweri, 2005).

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[59] "Farmer innovators are farmers—or more correctly "land users"—who innovate—that is, they test and try new methods of conservation or production, on their own initiative, often using ideas from various sources. Farmer innovators—largely overlooked as a development "tool" until now—have been shown to come up with better ideas than many offered by development agencies. Farmer innovators can communicate better and spread messages faster among local communities" (CDA, 2001b, p. 45).

[60] The FFS project aimed at identifying and documenting innovations. Indeed, the CDA FFS coordinator prepared a report identifying farmer innovators in the Taita Taaveta district.

[61] "The PTDs [participatory technology development] are implemented to empower participants (both farmers and facilitators) with analytical skills to investigate cause and effect relationships of problems in farming practices" (Khisa, 2003, p. 28). The following are the steps for conducting PTDs: getting started, understanding problems and opportunities, looking for things to try, experimentation, sharing results and sustaining the PTD process (Percy, 1999b).

[62] "The AESA [agro-ecological system analysis] technique is used to record and observe the results of the PTD experiments and is designed to improve observation skills and to develop decision making skills, through the analysis of a field situation … Each group presents their results in a standardized format to the rest of the school, where the findings are discussed allowing farmer-to-farmer information dissemination as well as evaluation of progress as part of the PTD" (Khisa, 2003, p.28).

5.4.2 African indigenous vegetables Farmer Field Schools

Four African Indigenous Vegetables (AIV) FFS, one of which was visited, are funded by Farm Africa and were introduced in 2005 in the high potential area[63] of the Taita Hills with the aim of commercializing AIV (vegetable amaranth, nightshade and spider plant) production using appropriate marketing and production skills, such as irrigation and fertilization as well as education on marketing issues. These skills and information are important for changing the current limitations to production as articulated by the AIV FFS facilitator below:

> "Farming here is mostly subsistence not agribusiness only producing for the family … There is a need to produce commercially and reduce the costs of production. Going to high value enterprise [AIV] is a viable option because there is good money in horticulture. Knowing how to plant and when to harvest for marketing is important."

The types of marketing, formal and informal; middle man limitation[64], buying produce from individual farmers for low prices; and leadership skills are major topics covered in the program (participant observation, Mgoro Village Group FFS Facilitation Session, 2006).

5.4.3 Amaranth Farmer Field Schools

Grain amaranth was promoted by PCCS in six of the FFS for providing a balanced diet to HIV positive individuals and as an income generating activity. Further, grain amaranth was promoted by PCCS to decrease dependence on maize, which is less drought

[63] High potential areas are areas receiving more than 1200 mm of annual rainfall.
[64] "Middlemen problem is a demoralizing factor because not good returns," explained the District Crop Officer.
"The poor are disconnected from the market," explained IDRC Program Officer.

tolerant than amaranth. Below an extension facilitator from PCCS explains the rationale for promoting amaranth:

> "We are focusing on Amaranth by advising farmers on how to harvest amaranth. It takes 45 days for amaranth to mature. There are two seasons here. Hence, farmers can grow amaranth twice. Promote it here ….it is more drought resistant than maize. Amaranth is even more drought tolerant than cassava. If there were no rains the cassava tubers become spongy. Amaranth, however, can stay there; it can escape drought."

Further to obtaining skills for growing the amaranth crop, the program focuses on recipes for using the crops. The graduation day of these FFS included demonstrations on how to make cake, flour, chapatti and porridge out of the amaranth.

5.4.4 Reproductive Health Farmer Field Schools

Reproductive Health (RH) FFS were introduced in 2006 in the Taita Hills with funding from the UN in two FFS, both of which were visited. The RH FFS are an advanced stage of FFS, such that the RH program is introduced to FFS schools that have already shown cohesion and are active. Being active is characterized by the number of innovations in the group (the higher the number the more active the group is), the variety of enterprises taken/ing (the more the enterprises indicating that the group is more active) and acceptable attendance rates. The rationale is that cohesive and active groups are more likely to spread the learning as well as stay together to finish the program.

The program is based on reproductive health, mainly, from a gynecological perspective; gynecological topics included the causes and types of abortion (FFS RH session, 2006). The manual used by the facilitators is called the "Manual of Gynecology" and is in English. In addition, social and cultural issues related to reproductive health are

integrated into the program. For example, guest speakers of women lawyers presented on rape, HIV and violation of women rights (FFS Specialist CDA, 2006, personal communication; District Extension Officer, 2006, personal communication). The program, as well, encourages the participants to know their HIV status on an on-going basis. It was noted, however, that the participants in both FFS, Boilwa and Wutessia, were for the most part old women who have passed reproductive age.

5.4.5 Integrated Pest Management Farmer Field School in Chawia

In 2006, ICIPE was preparing an FFS program, with the assistance of local farmers, the District Crops Officer and an FFS facilitator, on biodiversity conservation in Chawia.[65] Chawia is the third largest moist forest patch in the Taita Hills with a size of 50 ha (Gulbesera et al., 2004). The program is mainly focused on IPM in vegetables, the main agricultural enterprise in Chawia, with the exception of a few FFS concentrating on butterfly and silkworm farming. Funding was available for 24 FFS groups in the area (District Extension Officer, 2006, personal communication). None of these FFS had started during the Researcher's time there, but an interview was conducted with concerned FFS facilitator and extension officer.

[65] For the FFS program to address conservation, a sustained focus is required on reducing logging in the area and the impact of grazing. A study conducted by Brooks et al. (1998) revealed that Chawia, in particular, is threatened by heavy selective logging of young trees which has altered the forest's species structure and composition. Another study conducted in the Taita Hills by Rogo and Oguye (2000) revealed that Chawia suffers from habitat degradation due to heavy cattle grazing which inhibits forest regeneration.

5.5 Who Was Involved

Participation was dominated by female farmers which constituted 81% of the participants in the FFS in the Taita Hills (Mweri, 2005). The majority of these women to be more accurate 87.5% were married (Mweri, 2005). The Mwora female participants attributed their participation in FFS for gaining access to microcredit. To further illustrate the extension coordinator in KARI below explains that because of the current land tenure system women opt to participate in FFS to get access to microcredit:

> "Traditions are difficult to die… That was one reason why the constitution reform was defeated. If ladies want loan from the Agriculture Finance Corporation (AFC), they cannot because they do not have a title deed. This is why FFS is mostly women based."

Female-headed households are particularly restricted in their access to land and have an additional role of income generation for the upkeep of their families (Chapter Four). For these female-headed household participants, the FFS site constituted an income generation opportunity. One facilitator explained that there is an FFS which focuses on growing vegetables for profit and is solely composed of single mothers.

Men involved in FFS were mostly retired labourers, or men who were not able to find jobs in towns. The men preferred being in profit-oriented FFS. Out of the twenty FFS visited in the Hills, male participation, when present, was encountered most in profit-oriented (such as vegetable and organic fruit production FFS) or in delicacy-oriented FFS (such as fish farming FFS). Male participation in subsistence FFS was very limited. In the Mwora community, however, male participants were present despite the subsistence orientation of the Mwora FFS. These men wanted to fight hunger in the community:

"I should remove starvation in my area and in me too," explained Hagaii.

Some other male participants in FFS were administrative figures and described their participation as a duty they owed to their communities, as illustrated by Mwabogha from the Mwora FFS.

> "I joined there [Mwora FFS] because I am also part of the administration not because I do not know about farming. If anything I must be consulted. I … served as being the village elder for so many years ago, since 1970."

In general, most of the male participants in the FFS visited maintained that they had joined FFS because they were interested in learning about the "modern farming techniques" in the FFS.

The FFS ground working report and the focus group discussions with the twenty FFS groups revealed that most of the FFS groups were already registered as groups with the social services before being introduced to the FFS program. Similar results were reported by Isubikalu (2007) in her study on FFS in Uganda, where there was a bias towards forming FFS based on groups already in place. The FFS groups either formed initially for access to rotating credit services known as merry-go-round or to access the FFS program itself. The longer the group has been together or the stronger the leadership in the group, the more cohesive the group is. Cohesiveness is a preferred characteristic for funding in FFS, as explained by the FFS Specialist at CDA who said, "The funding is targeted at cohesive groups."Farmers in the community of Mbonbnyi were well aware that a group status is a prerequisite for access to microcredit, as illustrated by Lydia, a non-participant, "People come together in groups because NGOs help groups not individuals. Like … if you want funding for beekeeping and poultry, it has to be through a

group." Facilitators in the Taita Hills approach leaders in the community to mobilize community members into groups. These leaders themselves join the FFS groups and often become the chairman of the group (such as the Mwora and Ndoria FFS). Lilian, an FFS participant from the high potential area explains that she joined FFS because she was invited by the sub-chief to do so, "I joined [the FFS] because I was invited, through the assistant chief. They choose a few people for each of the villages. I was lucky I got selected."

5.6 Who Was not Involved

Social factors such as poverty, donor perception, out migration and stigma were the main reasons for non-participation encountered in the twenty villages visited in the Taita Hills. Competing demands on peoples' time, health issues as well as a previous exposure to an extension program were also identified by the respondents as causes for non-participation.

Lack of money was problematic for many farmers wanting to join an FFS, as explained in the following quotes. In most FFS, members need to contribute an amount of money for joining, as a registration fee for opening a shared group account[66]. Further, some on-going contributions were to be made in many FFS. Merry-go-rounds were common in the twenty FFS.

> "In the first meeting lots of people but when discover that they want to pay registration fee. In the next meeting you won't find anyone. Big, big problem is poverty cannot afford registration fees," explained an FFS facilitator.

[66] Banks require 5,000 Ksh for opening a joint group account (CDA, 2002), which is a prerequisite for acquiring the FFS funding from FAO/UNDP.

> "There were some contributions to be made in the group and I had run short of money; I was forced to drop out," explained Princeton, a non-participant in the Mbonbonyi community.

Further to poverty, the expectation of a cash handout from the FFS program has impeded the participation of many farmers in this adult education program when they realize it is not like other donor programs.. Aid[67] has traditionally come in the form of food relief, cash, and planting seeds, among other short term benefits (African Medical and Research Foundation [AMREF], 1998). Resultantly, something abstract like gaining farming skills is not an incentive for participating in a program offered by a donor, (UNDP/FAO in this case) and so despite potential gains such as skills for making profit, most farmers dropped out or refrained from participating upon realizing there was no financial handout. Similar results were reported by Mweri (2005) in his study on the spread of FFS in the low potential area of the Taita Hills. The following quotes exemplify the issue of donor perception impeding participation in FFS:

> "Those people they lie. They said you will get money if you get involved. But the group gets the money not each member," explained Christina, a non-participant in the Mbonbonyi community.

> 'They dropped out when they knew they wouldn't be getting money. You know even now, some wanted to drop out because they were not getting money," explained Japheth[68], the chairman of the Mwora FFS.

> "Most people think that a donor will come in and assist; they are after money; it's a big problem," explained the Chairman of Ndoria FFS.

[67] "Dependency Syndrome" on aid agencies is widely reported in the Taita Hills (such as, Vogt & Wiesenhuetter, 2000); as well many farmers attributed harvest failure to laziness.
[68] Similar results were reported by Mweri (2005) where farmers expressed their interest to stay in FFS groups, after graduation, on condition they apply for credit as a group but use the money as individuals.

> "In 2002 started as 17. Then people started to disappear. They thought that they were given money. When they found out that no money will be handed out, they started leaving the group," (Chap Chap FFS FGD).

Communities in the Taita Hills are skewed in terms of age and sex distribution (Elders FGD, 2006). Youth and men migrate to cities looking for jobs leaving behind women, and more specifically old women (Chapter Four). Unsurprisingly, the participation of old women in FFS was dominant, such that 65% of the female participants in the Taita Taveta district were women in their 50's (Mweri, 2005).

When present, men in the twenty villages visited refrained from participating in FFS because of their cultural attachment to cattle,[69] and because they refused to be involved on equal stand with women (perceiving themselves as superior). "Someone has to keep an eye on the cattle," explained the husband of a women FFS farmer. "Men refused to join because they say the ladies are boring" (Wuttesia FFS FGD) another explained. "See FFS only women alone and only men alone. Men don't want to work with their wives," explained the extension officer. 'They don't want to be in a group where the chairperson is a lady," explained the chair lady of Vuria FFS.

Despite their noticeable lack of participation in the FFS, many men were aware about the learning going on in the FFS program. For instance, when interviewing many female FFS participants in the presence of their husbands, these husbands were articulate about what their wives had learned in the FFS program. Further, as illustrated below, an extension officer emphasized that men were keen on learning from their wives:

[69] Similar findings on cultural attachment to cattle impeding male participation in FFS were reported by Njoroge (2004) in her study on gender and innovation in FFS located in the Eastern and Rift Valley provinces.

> "Always ask why more women than men? They would say most of our husbands are working out, and my husband tells me: you go to school and I deal with other things; come back, and tell me what you were taught… The husband would always say I want you to show me what you have been taught."

The youth when present refrained from participating in FFS because they did not own land to farm on, and as such it was difficult for the program to recruit youth for participating in FFS, as illustrated below by the FFS Specialist at CDA:

> "Young people have no access to the land, and the old people are the one who own the land. Young people are discouraged; because if they get the knowledge, then where do they farm. The elders own the land. Getting young people to go to the FFS is challenging."

In addition to their lack of access to land, the youth lacked the interest in farming. Elders in several interviews lamented the dwindling interest in farming, especially for the young generation: "People should take farming seriously because not see farming as a job especially the youth. They take farming as very hard and tedious. They are not following the way it should be; they are following their own track."

Indeed, a focus group discussion with a youth FFS, Mullika FFS, revealed that the members were ready to leave as soon as they get jobs and that many members have left because they found jobs. For them, farming was not a job, rather an activity for passing time. Focus group discussions with youth in the Mbonbonyi community and Wundanyi revealed that youth often come back to their parents' houses due to the lack of jobs in the cities. Many of these youthful community members, mostly men, end up abusing alcohol.

Stigmatization was the fourth social factor leading to non-participation in FFS. Female-headed households, divorced and single mothers, are stigmatized, "they have this shame and do not readily engage in learning with the other married women in FFS," explained Jerrita, a Mwora FFS participant. Some of these women lived very close to the FFS site and were not involved in the FFS activities, for example the FFS field day (personal observation in the Mbonbonyi community). Some of them were articulate about their exclusion from the FFS program: "No one even asked me to join the FFS. No one asks me to form a group. I am not even in the choir," explained Christina, a divorced female farmer in the Mbonbonyi community. Similarly, "I was not asked to join FFS. I don't really like working in groups," said Mary, another divorced female farmer in the Mbonbonyi community. As well, female-headed households in the Mbonbonyi community attributed their non-participation to the heavy workloads, as explained in Chapter Four, the workloads imposed on female-headed households are more demanding than those performed by married women. Similar findings on heavy workloads impeded women from participating in FFS were reported by Buyu (2002) in her study on factors affecting participation in FFS located in Mbeere, Kenya.

The FFS activities require good health, especially since the program becomes an additional load to the other routine work for participant farmers. Accordingly, unhealthy farmers were unable to participate, as explained by farmers in the Mbonbonyi community: "I would like to join, but because of some health problems: I suffer from chest pain," explained one female farmer. "I like to join, but due to health problems, feel I am not efficient," explained another farmer. In addition, several non-participants in the

Mbonbonyi community explained that mourning the loss of a family member and attending to a sick person at the time an FFS was to commence resulted in their non-participation.

Other non-participant farmers in the Mbonboyni community attributed their non-participation to previously held knowledge about FFS technologies. This knowledge was acquired through their involvement in Ngerenyi FTC training or through being employed as agricultural labourers in areas where agriculture is commercial, such as Taveta and Kitale in the Rift Valley province. According to these farmers, FFS farming techniques are familiar to them, as explained below:

> "… planting in lines for maize and beans I know about. When Mora people were starting; I knew all about their farming. I did not join. I know everything … During the colonial era, I worked in Kitale; I learned all about agriculture there," explained Hanna, a non-participant in the Mbonbonyi area.

> "I did not join. I grew up in Kitale; I learned so many things from *wazongo* …The issue of making ridges to plant sweet potato seen that in Taveta, but Mora people did that…The issue of proper spacing and manure, also seen it in Taveta," explained Boniface.

Others emphasized their attachment to the previous knowledge, or old ways of farming, and resisted participating in and learning from FFS. These farmers maintained that they were too old to change their farming methods, as the example below shows:

> "I myself, I do not concentrate on FFS issues. I am old enough… So far I learned nothing because my farming still do it locally. I farm locally. I have not learned anything from them. I feel strong about my opinion. I say that because I do not do line planting I plant in my own way."

Along the same lines, an elder from Mbonbonyi Women Group FFS explained why other elders were not in the FFS:

> "Actually some people think it is a waste of time joining FFS, argue and say since we have been farming for so many years why would we change now, and they don't realize that there is a change actually a big change in adopting these technologies."

5.7 Gender in FFS

The following section addresses gender issues in the twenty FFS visited, including gender distribution in groups and gendered roles in FFS, taking into account farmers and facilitators' preferences. The following findings contest some of the stereotypes formed around agricultural extension in Kenya. More specifically, these findings illustrate that extension is not biased towards female farmers, as well, that those female farmers do not necessarily prefer working with female extension staff.

5.7.1 Gender distribution in groups

Most of the groups were segregated due to cultural norms and roles (such as productive-focused-male roles and subsistence/reproductive-focused-female roles). Most men preferred working in single-sex male groups, while most of the women preferred working in mixed groups. For facilitators working in mixed group setting was the least challenging, with single-sex male groups being unbearable. In addition to farmers and facilitators' preferences for gender distribution in groups, the nature of the FFS program required a certain gender distribution arrangement.

Facilitators emphasized the importance of integrating both men and women in FFS groups. As explained by the extension officers below, mixed FFS groups are needed

because of the gendered activities in FFS and are preferred because decision making between members in mixed groups requires less conflict resolution:

> "We try to see how the FFS groups can integrate men and women. We talk about it in meetings [workshops on gender sensitive extension]... We would ask why should we have both? Because there are things in FFS which men feel shy in doing, while women do it very fast. Like when planting we would see most of the ladies are going for sowing seeds, and most of the men are digging the holes. These are practical example seen in schools. Like when men alone, when decide to do something, they will not come into agreement. They would keep changing their minds. But in groups mixed with women, they would say now let us do this, and they would all end up doing it because there is a balance of forces. But men when men are alone so many problems arise. Men are argumentative and adamant," explained an FFS facilitator, MoA.

> "Women ask what is here for us. For women it is easy to form a group, and decide who does what. They can quickly decide who are the chair man, treasurer and secretary. While for men, it is difficult. Where the group succeeds is where there are a lot of women," explained another FFS facilitator, Plan International.

> "FFS is better off when having both men and women. Like cultivation issues they need to be handled by men and women. For example women, can not handle stone terraces, they got to carry rocks, like big stones, women can't do that. Digging a canal for irrigation, women can't do that either," explained a third extension officer, MoA.

Most men preferred working in single-sex male groups. Cultural norms led to this segregation and preference. The chairman of Mgangeh Organic Farming FFS explains that FFS are inherently homogenous because, culturally, men and women tend to segregate:

> "There are no women in the group because you know in the evenings because of the culture when we sit we do not sit with women. Women sit alone and men sit alone."

On the other hand, most women preferred working in mixed groups and considered the lack of men in FFS as a shortcoming not only in FFS but in local agriculture as well. To these women, the male roles were essential and could not be done properly by women. Cheleka FFS, a mixed group (two men, and 13 women), in a FGD explained the limitation of the lack of men in the FFS groups and in local agriculture:

> "…Men are working away, and those who are available are few. This has a negative impact on farming. There are roles like clearing the bush leave it for men. Cutting trees, pruning trees and digging channels are for men. [The group i.e. the women sounded sincere that they need men to do these roles because according to them women can't do that]. Women drop the seeds and men dig. The women cook and the men eat. Exp [another woman added:] Spraying, the spraying pump is heavy, the men do the spraying."

Few women preferred working in a single-sex male group. For example, in one of the FFS visited, one female farmer was the only female farmer in Chap Chap FFS. She describes how uncomfortable she was in a mixed group setting in which she was the only woman but had to wait until graduation to leave the FFS group:

> "I left the group, and it was always difficult for me to stay working with those men… I used to feel good, but lonely because I was the only female there. I lost the morale by the fact that I was alone in that group. In the group no ladies that have same stories as me… I was waiting to graduate, and at that time I wanted to learn the greatest part of it, and also I was always hoping that another lady will join me."

In addition to farmers and facilitators' preferences to gender distribution in groups, the FFS program as well required a specific gender distribution in groups. For example, in the reproductive health FFS program in which both men and women were involved, it was observed that women were shy (participant observation in FFS RH Session). Whereas, in

a homogenous women RH FFS session, discussions were livelier, and these women seemed to be benefiting from the program more than the women who were in mixed groups (participant observation in another FFS RH Session).

Finally, as described earlier, women groups were the primary participants and beneficiaries in the FFS program challenging the common belief that there is inadequate access for women to extension services in agriculture (Due et al., 1997; Percy, 1999; Spring, 2000; Shibanda & Seru, 2002; Sever & Jolly, 2003). The stereotype holds that men get the extension advice, and women, if married, get the information filtered through their husbands (Saito in Due 1997; Due, 1997; Shibanda & Seru, 2002). Their heavy participation fulfills two of the five FFS policy objectives: (1) realizing the role that women play in local food production and (2) expanding the role of women groups in resource management through more access to research, extension, and credit system.

5.7.2 Gender roles in the FFS

The longer the mixed-gender group stayed together, the more the roles between men and women were interchanged. The quotations below offer an illustration to sharing of roles between men and women in the Mwora FFS, even when such sharing was culturally inappropriate:

> "In the beginning the men were reluctant to plant beans but with time they became comfortable. They had to do it because they chose to participate in the FFS. The facilitator, a man, was planting beans too. They got encouraged to do it too." Explained Madelene, an x-Mwora participant.

> *How come exchange roles in Mwora?*
> "It is because of the unity, agreed we will share the roles equally not say this is done by men and this by ladies. This is why we are still together because we share roles," explained Jones, Mwora FFS participant.

> "We the Mwora participants work as a group. If it was planting beans or any other farming practice, we all work equally in the field school. Men do what women usually do such as planting beans. Women do what usually men do such as digging of trenches," explained Joyce, Mwora FFS participant.
>
> "At first used to have duties, for ladies and men separated not mixed up, but when the baboons did not move away from ladies, we had to scare the baboons in pairs. Because the men can use bow and arrow; the men scare them. They can even move if a man is holding a *panga* (machete) but not a woman. *Sharia* (tradition) dictates not be together, but it is something like friendship. It was not allowed must be respectful somebody's wife somebody husband we have that limit." (FGD Mwora, Gender Roles).

It was observed that in the other mixed FFS visited where only one or two men were involved, as opposed to Mwora where the number of male participant is roughly equal to that of female participant, there was less sharing of roles between men and women, despite that these FFS have been together for the same duration as Mwora. In these FFS, men supervised women's work (interviews with FFS facilitators), rather than working together with the women. Further some of these men sent their wives to perform FFS duties on their behalf, as illustrated by an FFS facilitator below:

> "When divide jobs, men tell their wives to go and do, let's say irrigation for them. When asked why sent your wife to do it? They will tell you she is my wife, and she represents me. Some [of these women] will say yes … I will respect tradition," explained an FFS facilitator, Plan International.

Roles on the political and societal level, however, were less readily interchanged in the Mwora FFS than were the agricultural roles. For example with marketing, men's role involved outer towns and villages, while the role of women was confined to the local market in the community:

> "We had marketing duties because we produced lots of vegetables men move out to sell vegetables and the ladies were left at the site to sell vegetables every day," (Mwora FGD, Gender Relations).

To further illustrate the limited exchange of roles at the social level in the Mwora and other mixed FFS visited, it was observed that the farmer led schools were facilitated by men, rarely by women. Further probing with female participants from the Mwora FFS revealed that "we [the women] recruit women for the men to teach in FFS, we had this agreement in the group," explained Joyce.

At the political level, including leadership positions, lobbying tasks and attendance of workshops and training sessions, men, when present, performed and were expected to perform, by most women and facilitators, most of these roles. Despite that FFS facilitators were trained on gender in development approaches of ensuring a representation for women in the FFS committees[70] and despite that women constituted 80% of the participants (Mweri, 2005; Interviews with FFS facilitators, 2006), 60% of the chairperson positions were held by men (Mweri, 2005). Nonetheless, women, for the most part, held the treasurer positions. In all the FFS visited, including the FFS network, whenever women were present they held the treasurer position. Women were thought to be "more responsible, they will not use the money for drinking alcohol and can deal with money better," explained the chairman of the Ndoria FFS. Men were pleased to have women on the FFS committee in the Mwora FFS and saw women's representation important for avoiding conflict, which may otherwise arise if the entire committee was left to either:

[70] "Gender sensitive is when you try to see how to get both men and women involved in the same FFS group, also in FFS committee, make sure both sexes are there," explained an extension officer.

> "We agreed as a team, if we were having committee members, we should have women in the committee also. Like I saw that *lazma* [it is a must] to involve women in the committee, because if anything, because if anything either of the parties should not complain that maybe because men only this and this happen or maybe because only ladies this and this happen," explained Winston, X-chairman to the Mwora FFS.

The cultural roles attached to women limits their ability to travel for several days outside the community, as a chair person must, even if these women were politically adept. Below Joyce, the vice chairman, explains why she refrained from running for chairperson, although she regards men and women as equal in the FFS:

> "The ladies are aware of their rights. They are confident that they got equal rights as men in the Mwora. They have got this right in Mora because they have got the certificate with them. Hence, they got the right in decision making, same as men… But see, it is difficult for us the women to go for days and travel like Japheth [the current chairman] does, who will take care of the kids and other duties we cannot leave." (Mwora FGD, Gender Relations).

Similar results of women's household roles hindering their ability to become chairperson in FFS were reported by Njoroge (2004) and Mweri (2005). It should be noted here that specific men in the Mwora FFS represented the group constantly, which the other men considered as unfair:

> "In these seminars every farmer should have a chance to attend. If this time I'm gonna go for a seminar, next time not me again; should change. Everyone should have the chance. Some people go and cannot teach what learned from the seminar."

In addition to chair positions and workshop representation, at the political level as well, men were held responsible for lobbying tasks. An example below illustrates the case

of saving the FFS site from being taken away by the community, which had the right to the land because the FFS site was communal land.

> *"So what did you do for not losing the site?"*
> "I went to the chief in Mwatate to CDA (community development assistant), head office is in Wundanyi," answered the only man in Bolenyi FFS.
>
> "The man is important in the group. If it would have been the women alone, then they wouldn't have gone so far to the chief and asked for assistance," commented the FFS facilitator for Bolenyi FFS in a side talk.

A male dominant representation in workshops and seminars was the third role on the political level observed, such that whenever an FFS-related seminar was identified in interviews and focus group discussions men were the respondents. The facilitators tend to pick men for such tasks, as observed by Njoroge (2004), and provided in the following example: "The facilitator picked … [a male farmer]; he is the one who picks who attends seminars and workshops," explained a female farmer from the Mwora FFS. As well, women expected the men to participate in such tasks. Below, Grace, from the Mwora FFS, explains that for a male chair person attending workshops is not problematic as the case is with a female chair person:

> "…Attending to these meetings is problematic for a woman. Like this week, the chairman went to Kisumo for a whole week. If I was the one I would not attend this meeting because other household duties, it is a problem."

Further, an innovator farmer from the Mwora FFS refused to participate in the training of farmer innovators because she was scared to leave her community. Also, Njoroge (2004) and Mweri (2005) reported cases in which women were prohibited by the husbands to

attend a seminar in which they had to travel for days to attend. Nonetheless, women in the FFS visited did participate, though limitedly, especially when the event was close to their communities, in workshops, seminars and training of farmer innovators sessions. Hence gender sensitization at the village level is equally important to facilitator training aimed at better inclusion of women at the political level in FFS and potentially in the community's administrative roles, such as sub-chief and village elder.

5.7.3 Gender of facilitator

As outlined in Chapter One, one of the key objectives is to consider gender specific needs in the FFS program. It is widely believed that women in SSA prefer working or need to work with women extension agents (Ezumah & Di Domenico, 1995; Due et al., 1997; Percy, 1999; Shibanda & Seru, 2002). Ezumah and Di Domenico (1995), Percy (1999), Shibanda and Seru (2002) among others recommend increasing the number of female extension agents to overcome cultural barriers in communication between male extensionists and female farmers, which so far have resulted in few visits to female farmers. Field work, however, revealed that in the Mbonbonyi community many women did not experience cultural barriers in communicating with the male facilitators, with most of these women preferring to work with male facilitators. "I would choose a male because a male facilitator has more teachings to tell," explained an elderly female FFS participant. Men were preferred for being more knowledgeable, adept in public speech, respectful and focused than would the female facilitators, as illustrated below respectively:

> "I will choose a man. A lady teacher could be shy, but a man will be free to talk. I feel that a man can do his best to see if everyone understands, but a lady could feel maybe, like she is disturbing. She might fail to explain to

her or him… So like I feel that men are kind and humble got that love, but lady there are no close bonds as a man," explained Jerrita.

"I will choose a male facilitator because there is this respect of men to women, but between women to women there is that this disrespect between the two. A lady might not fully respect other ladies, or even the female *moalimo* might not respect the other ladies," explained Joyce.

"I would choose a man. I feel that a man will be more efficient than a lady. I feel that the man might not be all that busy. Hence, he might be more efficient," explained Mercy.

"I would go for a male *moalimo* because he is hardworking. A lady, on the other hand, will be in a hurry because she will be thinking of her children and house work," explained Jennita.

In addition to most female farmers preferring a male facilitator in the community, an increase in female extension staff may not achieve what is hoped for in terms of increasing the number of women farmers visited. Female extension staff visits to farmers were especially determined by the accessibility and proximity of their farms/homesteads to the roads. As opposed to a male facilitator who can ride a bike to the site, female extension agents were restricted by safety and accessibility concerns. Annual reports from CDA and DANIDA revealed transportation problems for women extension staff and many recommended not starting FFS sites far away from roads. Further, a suitable FFS was ruled out from being included in an RH program because the site was inaccessible to the female facilitator (FFS RH female facilitator, personal communication, 2006).

Nonetheless, some women in the Mbonbonyi area preferred female extension agents because they could socialize more with them:

"I will go for a lady. I feel that there are lady issues, like lady talks that ladies could only tackle when alone. I would be more comfortable with a lady than with a man," explained Phidilia, Mwora FFS.

Another reason for some women preferring female facilitators, as reported by Grace, below, is that male facilitators tend to be inconsiderate to women's time and constraints.

> "I would prefer a lady facilitator. I feel as a lady, she will understand maybe the apology that a lady farmer has given for coming late, or being absent, because she is a lady herself. As a lady you have certain duties that will keep you from attending the schools. For example, at one time, I was not here, traveled, and other time gone to the lower zone to look for some food for my children. I had to pay 50 Ksh twice. The men could also back up the *moalimo*, end up being defeated and have to pay. If anything the *moalimo* tells us this is a school, and you are learning should do whatever is there. A lady teacher, however, would understand that, but a male teacher argues and make you pay 50 Ksh." explained Grace, Mwora FFS.

Similar finding of female farmers' preferring female extension agents for being more sensitive to women's time constraints were reported by Deu et al. (1997) and Njoroge (2004). Further probing with concerned facilitator revealed that the ground rules[71] of paying a fee in case of missing, or coming late to a session were put down by the group themselves (FFS facilitator, 2006, personal communication). Some other male facilitators, however, did seem sensitive to women's time and duties. Participant observation in two FFS sessions, where the facilitator was a male, mothers were asked to feel free to leave in case they needed to prepare lunch for their kids. To further illustrate, below a male FFS facilitator notes that women come late because of their duties on a male participant complained about women coming late to the session:

[71] A review of the ground rules revealed that the attendance policy was very strict which led some to drop out because of the accumulation of penalties. The ground rules, according to the concerned FFS groups were put together by female and male participants. One female participant maintained that, "We had put the ground rules all together. No one puts them alone. I like the rules … not done as per the ground rules, you'll have to bear the results because you are the one who agreed on these rules".

What are the problem faced by Kizingo FFS?
"Women coming late to the FFS," a male participant replied.
"It is because they need to prepare for kids going to school," added the male FFS facilitator.

For male farmers, most were neutral[72] about the gender of the facilitator with some preferring a male facilitator: "I would choose a man. A man, in case of presenting and demonstrating farming practices can comfortably do that. A lady might not really do that; they are soft," explained Ezekiel, Mwora FFS.

In conclusion, most women interviewed in the Mbonbonyi community preferred male extension agents with few preferring women extension agents and fewer being gender neutral. Men, in general, were more neutral about the gender of the facilitator than women were, with a few preferring a male facilitator. It should be noted that most of the men and women interviewed only had experiences with male extension agents, despite that there are a number of female extension agents present in the district. This might be attributed to the fact that most of the communities worked in were remote.

5.8 Other Limitations in the FFS

The problems below reflect practical interests as well as strategic interests of men and women, the two of which are not mutually exclusive. For example, addressing men's practical interest of integrating cattle production in the FFS program addresses women strategic interest of decreasing their workload in local agriculture. The more the men, especially men who are living in the community, are included in the FFS programs, the

[72] It was felt that maybe the gender of the researcher influenced the men's reply.

more these men become involved in local agriculture where more labour is required (FGD with women). Further, the limited FFS's program consideration to the biophysical conditions and labour requirements of local agriculture, financial limitations, drought, focus on maize production, lack of male participants, impact of human disease, marketing, and funding are all issues that need to be addressed. .

5.8.1 Limited gender sensitivity

The FFS program ground working exercise, monitoring and evaluation scheme and the focus on Swahili as the language of instruction were inappropriate for the inclusion of female-headed households and the less educated elderly farmers. Further, the lack of addressing power dynamics between men and women in the FFS groups hindered women's political participation, and sometimes participation in the FFS. For men, the focus of the FFS on subsistence crops was a mismatch to their agricultural roles, which are focused on income generation. Below is an in-depth description to the limited gender sensitivity in the FFS program as articulated by the farmers themselves.

For men

The FFS program in the Taita Hills was biased towards women's roles in subsistence farming, which are irrelevant to men's roles in local agriculture. The focus on subsistence crops could be attributed to the dominance of women participation as well as the difficulties of including an FFS program relevant to male's roles[73]. Hence, men were, for the most part, excluded from the FFS in Taita Hills. When interviewed, almost all male FFS participants expressed major interest in including a livestock component in

[73] Other factors resulting in a focus on subsistence farming FFS are explained in the following sections, especially section 5.8.3.

FFS, as illustrated by Bernard (a Mwora FFS participant) below when asked how the FFS program can be improved: "Learn more about dairy farming. I would like to learn about how to carry out dairy production."

In addition to male participant interest in learning about livestock production, male non-participants, as well, expressed an interest in learning from FFS about livestock rearing, as expressed by Boniface, a non-participant in the Mbonbonyi community, when asked what he learned from the Mwora FFS: "I was waiting to see if the Mwora [the local FFS in the community] people cared to get goats or poultry, so that I could start managing like them, like the Mwora people, like copying from them, but not."

Women also demanded the inclusion of livestock issues in the FFS program, illustrating, as explained earlier in Chapter Four, Section 4.3.2, women's adoption of male roles. Below, a focus group discussion with the Mwora FFS articulates the interest of women in integrating livestock issues in FFS, which according to these women is inherent to the mixed farming system in the community:

> "There is a need to incorporate livestock production in the FFS program, and not only men but also women have interest in livestock production. Ladies are also interested, like Joyce here has a cow. So many people here have cows, when you refer to someone as a farmer, it is taken as farming in the *shamba*, but it should be when the farmer is doing both livestock and crop production."

Integrating livestock into the FFS program, however, is hardly an easy task. Experimentation with livestock is not feasible, especially because livestock is very expensive. Additionally, learning about various disease treatments as well as different feed types requires a long period of time, as well the lifecycle of livestock is considerably

longer than that of crops (FAO Regional FFS Advisor, 2006, personal communication). Hence, livestock FFS focus on feed quality issues (FAO Regional FFS Advisor, 2006, personal communication). The Mwora FFS did include cattle feed issues in the program, such as the importance of the zero grazing method in preventing soil compaction by cattle grazing on the farm.

In addition to livestock rearing, as explained in Chapter Four, Section 4.3.3 on males' roles in farming, men were held responsible for agro-forestry, which included timber and fruit production. Below, Ezekiel commented on the necessary inclusion of agro-forestry in FFS:

> "Trees, agro-forestry FFS. I would like to learn about that, especially mango grafting ... I am very interested in learning about fruit production and the timber trees."

An agro-forestry FFS, as the case with livestock FFS, requires a longer duration than a crop FFS would need. The duration would depend on the time required for the trees to be harvested.

For women

Female-headed households were excluded from participation due to the methods used in forming FFS groups. These methods included asking the local administration to form groups or convince existing group, and by announcing FFS in public *barazas*, as was the case with many of the FFS visited. Both methods, failed to include female-headed households. Below the regional FFS advisor for FAO explains that such exclusion of female-headed households is common in FFS in SSA, in general:

> "The most vulnerable people won't attend *barazas*, they would be left out. It is a problem we are looking into dealing with. There are problems in picking people because FFS are based on voluntary participation. We do not push them up to participate. If they [female-headed households] are doing casual labour, half a day [in the FFS] is a lot."

Despite the omission of female-headed households when an FFS group was formed some of the facilitators were not aware of such discrimination in FFS, as illustrated below:

> *Single mothers where are they?*
> "They are not isolated; it is their own decision."

This lack of awareness on the part of the facilitators on using other methods to recruit female-headed household participants has the unintended outcome of perpetuating their exclusion.

Other factors that resulted in the exclusion of, and learning difficulties for, female participants were related to using Swahili as the language of instruction in FFS and the focus on taking notes. Two of the elderly female participants in the Mwora FFS, as explained by the FFS facilitator and some FFS members, dropped out because they were uncomfortable taking notes and understanding Swahili. Further, a thorough translation of farmers' notes revealed that women's notes were not as clear and complete as men's notes, with some of the womens' notes being hardly meaningful, according to the research assistant. Hence men, who are often more educated than women (CDA, 2001a), were privileged in understanding what the facilitator was saying and writing. Indeed, a facilitator stating that "men are usually faster than women. Women take time to complete a task. They are usually slower than men" illustrates this unintended outcome of focusing

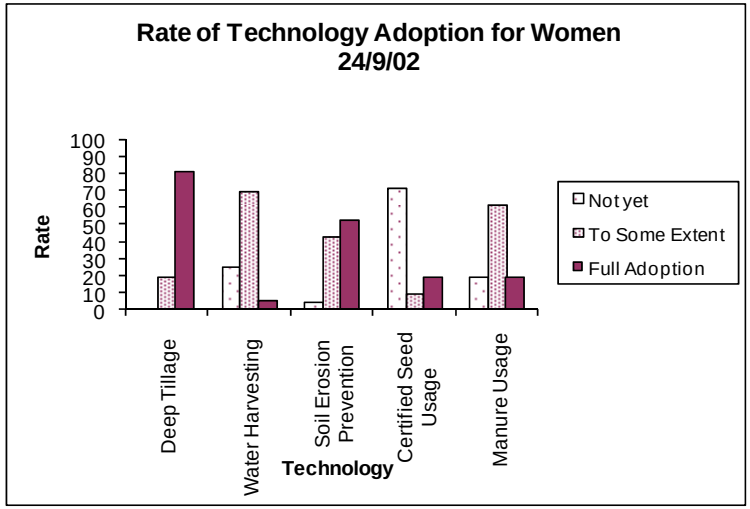
on note taking and Swahili. To illustrate further An FFS facilitator reported that it was very difficult to communicate with a group of elderly women:

> "I had difficulties with the Vuria group; they could neither speak English nor Kiswahili. In FFS, it is important to communicate effectively; this is why we use so many skills in communication. But the Vuria participants are a group of dancers. It was very hard to have an FFS with them. Illiteracy rate was very high. That is were extension becomes very hard."

Further, most of the FFS participants (75%) have attained upper primary level education with only 12% of the participants being illiterate (Mweri, 2005). The use of Sawahili (the language of instruction in schools and not in the local communities) limited the participation of women, mostly, who were incoverstant with Sawhili.

The use of Swahili in FFS was partially due to the constant shifting of extension agents between provinces. These facilitators are not conversant with the local mother tongue. Further, it was noted that some names for endemic species and other local agricultural terms differed even between Mgangeh in the high potential area, and Kishamba in the medium potential area, making communication more difficult due to regional dialects.

In addition to cases of women drop outs, other cases of gender insensitivity revealed gender bias towards men, in which limited consideration was given to female roles and male dominance in groups. Female roles were given little consideration in the stage of monitoring and evaluation in FFS, which used standardized forms, the results of which are depicted in **Figure 5.1**.



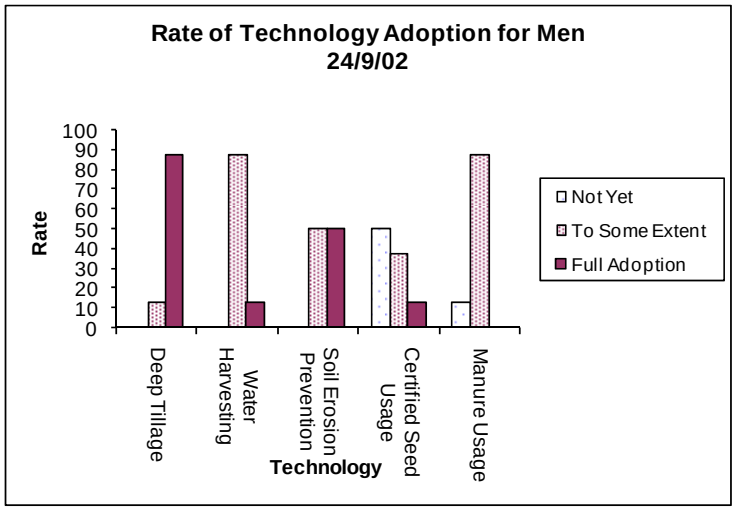


Figure 5.1. Gendered adoption rates of technologies learned about in the FFS of the Taita Hills. The data concerns 30 participants from the Mwora FFS. Note the absence of the female specific roles from the evaluation criteria, which are as well learned about in the FFS. These roles include making sure ready seeds are available for the season, planting of cassava and pigeon peas and seed preservation. The higher adoption rates for male farmers could be attributed to the fact that the roles used in the evaluation are male roles. Source: CDA raw Data.

Figure 5.1 shows the criteria used in evaluating the FFS technology adoption rates, including deep tillage, water harvesting, soil erosion prevention and manure usage. Two of these technologies, water harvesting (such as digging furrows under terraces) and soil erosion prevention (such as building terraces) are perceived as exclusively performed by men, with deep tillage and manure usage to be performed by both. Female specific roles, such as planting of cassava in an oblique way at the distant end of the terrace to reduce crop competition, seed saving, and seed preservation, although included in FFS program are not included in the evaluation criteria. Soil conservation and water harvesting, the male related roles, are equally important to insuring seed availability (a problem in the community as explained in Chapter Four) and planting of drought resistant crops, the female related roles. Excluding these criteria from the evaluation not only skews the adoption rates to the favour of men (as shown in **Figure 5.1**), it also dismisses the relevance of drought resistant crops and seed availability to the local agriculture.

Along the same lines, Njoroge (2004) in her study on gender and innovations in FFS in the Rift Valley Province reported a bias towards male innovations in the initial, groundworking stage in FFS. Despite the fact that women constituted the majority of FFS participants, men's innovations at a 55% rate took precedence when identifying farmer innovators by male facilitator who dismissed some of the women's innovations as unimportant[74]. Women innovations in the Mbonbonyi community were practical (such as the use of a local tree's bark as a source of a dye), while male innovations were rather

[74] The focus on male innovations might be attributed to the fact that the innovations, as explained in the TOT Manual, need to be particularly related to "water harvesting/soil and water conservation in the drylands of sub-Saharan Africa", which is mostly related to male roles as explained earlier.

technical (such as building cages for scaring baboons away). Further, Njoroge's (2004) study revealed that women's innovations were falsely registered as those belonging to the husbands because as owners of land they believed in being entitled to the innovations.

Equally important were the cases in which women's voices were marginalized with facilitators being passive, or further unaware about underlying gendered power relations. Despite that women in the Mwora FFS, for an example, refused the beekeeping project, as explained in a gender specific FGD and in a mixed FGD on gender relations in FFS, below:

> "The beekeeping issue ladies opposed it. The ladies did not want that project." (Notes on News Print FGD on Gender Relations).

> "Ladies did not want bee keeping because they were scared from it. [Getrude said:] I almost got beaten, why don't I want beekeeping. Men became so angry. In the end, it became something we have agreed on. Men told us, if you don't want beekeeping, then we will split, you will go out. So, we decided to take it up, although none of us attended the beekeeping lessons. Only Phidilia and Doreen had to scare baboons away, they were there once, but they did not listen. We wanted poultry… All the ladies opposed beekeeping all of them. Decided not to break up, let the men do what they wanted." (Female Participants FGD).

In these cases the facilitator carried on with the lessons on beekeeping, disregarding that women were absent from the beekeeping sessions and if present were inattentive (FGD with women in the Mwora FFS, all the women's notes lacked notes on beekeeping). The power imbalances in the group and the facilitator's passiveness resulted in using the microcredit fund, usually given to FFS after their graduation, on a subject that was of limited benefit, in terms of learning, to the concerned female farmers.

5.8.2 Limited consideration to local people's vulnerability to drought

Vulnerability to drought and occasional flooding had considerable impact on the FFS site but unfortunately little impact on the FFS program. More specifically the program lacked an adequate focus on irrigation and drought resistant crops, as well as failed to include men in the program who are responsible for digging irrigation furrows. Exclusion of men from the program dilutes the essential focus on increasing labour productivity in rural areas (FGD; Minnis, 2006). Any small changes in the local agriculture would be better than the status quo, and the FFS were not engaging in this necessary process for change. Below is an excerpt, on the food situation in the Taita/Taveta district during the month of September, 2005, five years after the introduction of FFS as the main extension method in the Taita Hills area. The citation shows that 32% of the population requires food relief in the district, and around 14,000 of those who need this relief did not get it:

> "The food situation in the district is still bad, as most farmers have depleted all their food stocks. The long rains harvests were very small and cannot sustain the Taita population for a long period of time. Around 82,000 people are suffering from food shortages and require assistance. The GOK is targeting to assist around 68,000 with famine relief people district wide. The situation is expected to deteriorate between now until the next expected harvests in December/ January 2006. Drought recovery seed will also be required to the assist the poor resource farmers particularly those in the lower zones where the crop performance was bad." (MoA, 2005).

The limitations to production in the Hills have been constant despite the introduction of FFS. More specifically, the sole focus on maize, or subsistence farming and the local weather conditions have been, and still are being reported, as the major constraints in the

local agriculture (AMREF, 1998; Vogt & Wiesenhuetter, 2000; KARI, 2005, 2006; Mweri, 2005; ASCU, 2006; Chapter Four). The FFS program and hence site did not address the food crisis in the district, which is evident by the fact that most of the FFS participants during the drought periods failed to produce on the FFS site (FFS DANIDA Reports, FFS CDA Reports, FFS MoA Reports). Hence the crop yields, labour and learning opportunities were wasted due to drought, limiting the ability of the FFS to transform the status quo of dependence on food aid, malnutrition and famine (Chapter Four). Some of the participants, as reported by Mweri (2005), left their homes completely due to hunger in search of jobs elsewhere. Some other FFS participants opted to repeating their trials for the following season (FFS DANIDA Reports; Mweri, 2005).

Extensive focus on maize and subsequent male exclusion

> "It was apparent [in the Taita/Taveta district] during interviews that 90% of the farmers concentrate their efforts and resources on maize whether or not the crop is profitable… there is need for thorough extension education on diversification of food production if food security, environmental conservation and poverty alleviation goals are to be met." (CDA, 2001a, p. 62).

Despite the intended focus of the FFS program on the diversification of food production enterprises in the area, as illustrated above in the recommendations of the groundworking report prior to the establishment of FFS in the district, most of the FFS in the region had maize as their main learning topic.[75] Below, an FFS facilitator explains that groups would always choose maize as the main learning topic:

[75] Note that an FFS group, which stays together over two growing cycles until graduation, focuses on/chooses two crops. Almost all the groups chose maize as a crop to learn on with, some choosing maize for both cropping cycles (CDA, 2002, 2003, 2004,2005,2006).

> "Almost the program was all maize and beans even if taught about vegetables... two cycles in Mora started with maize and then beans. Usually the main topic would be maize, and beans the minor topic, vegetables after beans."

Facilitators were passive to the farmers' choices despite their knowledge, in some instances, that the maize crop would be a total failure in certain areas. For example, an FFS facilitator in his monthly report to CDA reports the following:

> "The crop [maize] was planted late and suffered severe moisture stress. While the group went through most maize husbandry techniques the crop was a total failure as it tasseled at an abnormally low height. The soils were bad too for the crop and the area generally is unsuitable for maize. However, farmers learnt that PH_1 was a better option compared to local." FFS in Kishushe Monthly Report[76].

Research institutions collaborating with FFS, as well, insist on learning about maize in FFS despite their awareness about maize's limited suitability to the area. In 2006, KARI ranked maize production in ASAL areas as the fourth research priority besides acknowledging that maize in ASAL is ill-suited, but is the staple food crop. Hence the sustained focus on more research in the hope of developing drought resistant varieties (KARI, 2006). In fact, one of the 18 sub-divisions in KARI, the Maize Improvement Program, "seeks to assemble and evaluate maize germplasm, and develop varieties that are resistant to abiotic …, and biotic … stresses of the ASAL areas" (KARI, 2006, p. V). Further probing into KARI's research agenda and its persistence despite failure revealed that the GoK policy as well as farmers preferences were the driving forces for maintaining the maize focus in FFS.

[76]The FFS in Kishushe were not visited. The FFS in Kishushe, however, belong to the same agro-ecological zone that FFS in Mwatate belong to, which were visited.

> "Kenyans think maize is equal to food... In the coast insisting we want to grow maize… At policy level we want to mystify the focus on maize… So like take another enterprise sell the produce and then get maize. It is cheaper to buy maize then to grow it. The story on the coast is insist on growing maize," explained the extension coordinator in KARI.
>
> *But then why you give out seeds for FFS farmers to try?*
>
> "If people demand maize, KARI is told to bring the resistant varieties. Because of political system and socio-cultural issues... The GoK tells KARI give us the right maize, you are not working hard. Trying to talk to Kilimo [MoA],for revitalization of the farmer training center. When take farming, take it as a business. Stop shouting as a business; grow to sell, and then buy maize. Grow cotton; sell it, and buy maize," added the extension representative in KARI.

While KARI blames the GoK for the focus on maize, the GoK blames the FFS program for its lack of focus on marketing issues, as described below by the Extension and Management Coordinator in Kilimo House:

> "There is a cultural attachment to maize and the FFS program is not assisting the farmers to change enterprises, to show them that they should change. The farmers end up not adopting new options… It is because some external factors not in place, like the availability of markets. If the enterprise promoted is not marketable, even if FFS is a good approach, the enterprise will not receive fruits. The market should be in place. Important factor is marketing … go beyond, let us move to more than subsistence production."

While, the GoK blames the FFS program, as illustrated above, FAO, who are responsible for introducing the FFS program to the Coast Province, had a non-interference policy, as illustrated below by the Regional FFS Advisor at FAO:

> "We do not force millet on them. If learning goes on well, that is the important thing... Not interfere with the crop; the crop they choose…we want the field schools to impact them personally, like empower them, leave the choice to them."

Irrigation

In the Taita Hills, the FFS program's notion for best practices in water management, as reported by Rockstrom et al. (2003) on water conservation in SSA, FFS Training of Trainers' (TOT) Manual, Farmers' FFS Notes and interviews on leaning in FFS, is restricted to increasing the amount of water stored in the soil profile. More specifically, the best practices taught in the FFS include deep tillage, terracing, planting Nappier along terraces, digging water furrows under terraces for harvesting rainwater, as well as ridging (i.e., putting soil at the base of the crops). As explained in Chapter Two, however, crop failure is mainly a result of dry spells rather than the cumulative amount of rainfall. Collecting water for later irrigation of crops, and livestock, during the dry spells is the only route for escaping dry spells (Rockstrom et al., 2003).

When addressed, storage systems for supplementary irrigation concerned the FFS belonging to areas receiving less than 600 mm of rain in the Coast Province at large. In Bamba, Kilifi district, some FFS focused on water jars (**Figure 5.2**) and pan water harvesting, the latter which was used for uphill irrigation using a pump and a drip irrigation kit (**Figure 5.3**).

Dina Najjar

Figure 5.2. Rainwater harvesting using a water jar in Bamba FFS. Water is collected from roof.

Dina Najjar

Figure 5.3. Surface runoff harvesting for a small catchment area (3 ha). The runoff is harvested and stored in a farm pond. Then, the water is pumped uphill for irrigating vegetables.

Along the same lines, in the Taita Hills, representative farmers belonging to areas receiving less than 600 mm of rainfall per year participated in workshops on water harvesting. The FFS participants from areas receiving above 600 mm were excluded from such workshops. Areas receiving above 600 mm of rainfall, as well experience crop failure due to dry spells; water stress is not restricted to very arid areas. In other words, the risk of crop failure due to water stress is underestimated. More importantly, addressing that water stress was limited in the FFS program. To illustrate, below is an

abstract from a farmer led facilitator report, on problems encountered in his FFS, which shows that rivers are perceived to be the only method for supplementary irrigation under rain fed conditions.

> "Problems for last season was [sic] drought, and there is no river there."

In addition to the limited focus on storage systems for irrigation, limited funding allocated to irrigation projects is another weakness to addressing the high risk of crop failure associated with crop-water stress. Most of the FFS met in the Taita Hills when asked about the limitations of FFS mentioned the lack of funding to water pumps and irrigation kits. According to these farmers, a water pump is necessary especially during drought, when the water level drops below the river banks, making irrigation by gravity impossible (interviews, FFS facilitators' reports). The FFS network, as a result, has worked on writing funding applications to obtain water pumps to be used by FFS in the Taita Hills interchangeably:

> "The problem here is draught, it is the main problem, and as chairman of the network I send proposals here and there to get water pumps to irrigate the *shambas*. We can improve very much; at each location get two pumps; can become very much better. Need more training on irrigation, and people especially those not participating learn through field days … micro enterprise funds can enable us to get the pumping machine and we are having a meeting on the 26th. When we get this micro enterprise it will help us a lot," Explained Japheth, the chairman of the FFS network.

Along the same lines, an FFS group in a focus group discussion emphasized the efficacy of obtaining pipes and irrigation pumps: "this will change our lives through not depending on rainfall irrigation. Not need to wait for the rains" (Cheleka FFS FGD).

5.8.3 Human disease

The impact of HIV/AIDS on FFS was particularly evident during funeral times where the activities in the entire community are suspended for seven days. Cases of illnesses, especially those resulting in funerals, in the communities of the Taita Hills had considerable impact on the FFS participants' attendance, as shown below using several sources (MoA and CDA FFS reports; interviews; FGD):

> "The absenties [sic] we have had were because of illness and burials of close relatives." (MoA FFS Report)
>
> "No class due to funeral." (CDA FFS Report)
>
> "It is not good to have an FFS from the same family. Every time someone dies no one comes to the FFS session … Problems as a family when have deaths; they are all absent. It is better if the FFS members were not from the same clan. In case of deaths cases there will be some attendance," explained a farmer FFS facilitator.
>
> "There are many funerals around and that is a problem for attendance … Death is interfering... People are dying week after week and can't work and have to mourn and can't work," Cheleka FFS FGD.

Death of FFS participants is another area where the impact of disease on FFS was manifested. For example, the Mwora FFS lost three participants to disease, including its secretary who was young and worked in Mombasa. His wife is now sick, implying that HIV is a potential cause for his death. "He was a big loss to our group; he used to work in Mombasa as a treasurer in a certain company," said Jerrita. Human resources in FFS are lost probably due to HIV/AIDS.

Despite the impact of funerals on FFS attendance, the program included limited consideration to addressing HIV/AIDS. In particular, the program missed out noticeable

opportunities for HIV/AIDS sensitisation. A review of participants' notes belonging to extension-led and farmer-led schools revealed that the implications of farmers' health on production were discussed in the field schools, and that these notes were recommendations of a balanced diet and exercise. Nonetheless, HIV was absent from the notes which are usually a duplicate of what was on the newsprints during the FFS session.

5.8.4 Marketing issues

The FFS program lacked adequate, even essential, focus on marketing. Minnis (2006), among others, maintain that poverty alleviation in SSA is achieved through an investment in informal economies, in this case, income generation related to microfinance projects, FFS. As such, the FFS program capacity to facilitate income generation was very limited due to the heavy focus on subsistence crops, instead of income generation enterprises, such as vegetables, livestock, poultry and beekeeping. In addition to the focus on subsistence crops, maize and beans, as explained in Section 5.8.2, in the Mwora FFS, when learning on Farming As A Business (FAAB) the program lacked a practical component. Even when there was a chance to apply the FAAB skills and knowledge, such as when the groups learn on producing vegetables, there was little provision to marketing and transport of produce. In particular, no efforts were made to link farmers to the market. Indeed, almost all of the twenty FFS groups, identified the lack of market as an obstacle faced in their FFS, as illustrated below:

> "Need to get a ready market instead of selling locally. Sell the whole to one person instead of selling locally." (Cheleka FFS, FGD).

> "Market is a problem. If you are not well established it is hard to expand on your FFS projects. It is easy to make money from your project if the market is good." (Chap Chap FFS, FGD).

> "Marketing is a problem in our FFS. In the field school plant a lot of vegetables and end up with a loss. At first used to take the product to HPC[77]. The HPC used to collect the produce from farmers. Now it is closed. It is no longer in use." (Mbonbonyi FFS, FGD)

> "The problem is the market … we want to sell *jomla* (in bulk) not to individual people," (Mora FFS, FGD).

Further, marketing issues were left to the FFS network which did little to provide market for the FFS groups. An FFS group, below, explains that due to this limited role, they left the FFS network:

> "We kept paying our contribution every month. When we produced vegetables, they did not market our produce; we had to sell locally for cheap. We left the network because we were not benefiting," (Mwora FFS, FGD).

After graduation, each FFS is expected to join the FFS network and pay 100 Ksh on a monthly basis to the network. The network's roles are to market the produce of the FFS in the Taita Taveta district and to provide technical advice for farmers in the district. The marketing responsibilities are, so far, hardly attained due to the lack of storage places, including cold rooms for vegetable storage, a vehicle for transport of produce (Interview with chairman and secretary of the FFS network) and secure tenders (FFS network meeting). Further to the lack of adequate infrastructure and skills for marketing the FFS produce, the FFS network had no representation from the Taveta area. The FFS in Taveta

[77] The Taita HPC, the Taita Horticultural Produce Co-operative Society, opened in 1990 as a Kenyan, German governmental project with the purpose of developing the horticulture sector in areas with horticultural potential. In 1992, it became a registered cooperative with the aim of increasing yield through provision of a credit scheme consisting of pesticides, fertiliser, equipment and seeds; collect produce and transport produce from farmers to Mombasa. The center closed due to bad management (Farmer interviews; Vogt & Wiesenhuetter, 2000). Many farmers when interviewed, particularly farmers in the upper areas, emphasized that they would like the HPC to open up again, especially for marketing their produce.

were completely excluded from the FFS network: none of the network members represented Taveta FFS as well none of the Taveta farmers attended the network's meetings (Interview with secretary of network). This was attributed to the difficulties faced by representatives from Taveta FFS of travelling all the way from Taveta to Wundanyi, where the Network is based.

5.8.5 Other funding issues

In addition to limited funding to the much needed irrigation projects, some in kind funding would have made many differences in the FFS learning program. More specifically, many farmers were unable to attend seminars and workshops due to poverty, even though the prices for attending were perceived to be low in the standard of the local people. An FFS facilitator below explains that some farmers refrained from attending a workshop on marketing due to the lack of money:

> "There are agricultural workshops in August. The farmers have to pay registration fees to participate in these workshops (10Ksh) and the rest is paid like transport. Yet, you will still find people who can not afford that."

5.8.6 Land to learn on

There was very limited consideration to the ideal site selection criteria in the groundworking stage. More specifically the availability of site was almost the sole criteria for choosing an FFS site. In most of the cases the FFS site was crown land appropriated by the government for particular use such as cattle dipping, primary school, or communal land. Ideally a site is selected because it is close to a public gathering place, such as a school, church or social center, is suitable for the crops to be studied and is easily accessible (CDA, 2001b).

The ideal criteria for choosing a site were never a guide for the twenty FFS visited, this had the unintended outcome of limiting the practices and crops that could be grown and learned about. The sites were unsuitable in terms of soil fertility, irrigation requirements, accessibility and/or proximity to a public place. To illustrate, some FFS in FGD emphasized that their FFS site was inaccessible and had to gather manure from far away places to the site. Others mentioned that the site is too rocky and deep tillage, terraces or planting Nappier along the terraces become difficult tasks. Some other FFS maintained that because the site had no nearby river they were not able to learn on vegetable growing (such as Cheleka and Mbonbonyi FFS), which some FFS adopted as a group income generation activity (such as Vuria and Ndoria FFS).

Nonetheless, few FFS did meet the ideal site selection criteria, unintentionally though, as shown below (Mwora FFS; Lumweri FFS).

> *How is the site chosen?*
> "The land was left idle and was not used by the nursery schools." (Lumweri FFS, FGD).
> *Any site selection criteria?*
> "Every village has community land. The Mwora people from Mbonbonyi then they would farm on Mbonbonyi community land. It was just like that... We did not choose the site because there is water or because it is flat." (Mwora FGD).

Other FFS met some of the criteria such as a flat, fertile, and accessible site (such was the case with Wutessia FFS, CHAP CHAP FFS and Boilwa FFS). It should be noted that the FFS site, despite its deviation from the ideal site conditions, were similar to the farmers' farm conditions. In other words, many farms were rocky, infertile or sandy, and had no access to a water body.

The insecurity of maintaining an FFS site to learn on was another site related problem encountered in the twenty FFS visited. The FFS site was often taken away from the participants because the landowner, often a participant, dropped out from the program (Buyu, 2002; Mweri, 2005; personal observation), the land is communal land and is to be retrieved by the community (such was the case with the Mwora and Bolenyi FFS) or participants were not paying the rent for the site belonging to a non-participant (such was the case with Mullika and Ndoria FFS).

In most cases resulting in site transfer, at the time of site transfer, the participants had crops on the site; accordingly, some opted to transplanting the crop. For example, an FFS in Bamba transplanted cassava when they were asked to leave the site by the landowner. Crops as well as soil erosion structures such as terraces, which often take a long time to build and form, were lost when an FFS site was switched. Participants had to build these structures again, as illustrated by Cheleka FFS below:

> *What are the problems faced in your FFS?*
> "Because of the topography, we are experiencing severe soil erosion and losing the soil fertility. As a result, we want to dig channels. There is a lot of soil erosion on our FFS… We have dug these channels in the old FFS. But the owner decided to sell the *shamba*, and we had to move out. We shall be digging the channels soon."

5.9 Summary

The FFS program's intentions of strengthening research linkages between farmers' interests and research institutions were indeed exemplified by research activities addressing local problems in pest issues. The participants in the FFS were, for the most part, elderly women; hence, the FFS in the Hills were more likely to be on subsistent

crops, given the women's roles. The program lacked the essential focus on including men in the FFS program by developing programs that are congruent with males' roles. So far, the livestock FFS and silviculture FFS's, both of which are related to men, programs are not well developed to be practically implemented in FFS. When men were involved in FFS, the roles for men and women were an extension to their roles in the community, such that men fulfilled political and social roles in the FFS and women fulfilled the role of producing food for their families, particularly female-headed household who in some cases further found the FFS site as a source of income. Women were marginalized in FFS due to focusing on male innovations, male roles in evaluation of adoption of FFS technologies and maintaining the status quo of gendered power relations. The FFS program faces many problems as identified by the respondents, lack of adequate focus on marketing, funding for attending workshops and on irrigation skills and technologies being the prominent examples. It was observed that addressing maize failure was hardly attained and quite to contrary was perpetuated by the research agenda adopted by the GoK and KARI. In effect, attachment to maize is purely cultural and is deeply engrained in the food production system which includes the farmers, research institutions and the GoK, or the MoA.

CONDITIONS FOR LEARNING IN THE FFS

6.1 Introduction

As outlined in Chapter One, Objective Three, this research seeks to understand how conducive the learning conditions in the FFS were to facilitating transformative learning. Because the conditions are abstract, the following chapter operationalizes the ideal learning conditions, as outlined by Mezirow (2000) in Chapter Two, in an FFS context. The chapter then moves to assessing the learning conditions using the operational definitions as a framework for such assessment. The conditions for learning in this research refer to the learning conditions with which FFS are facilitated in, rather than the ideal dialogical conditions between adults per se[78]. The conditions concern local people (participants and non-participants), government workers (extension agents and extension coordinators at the national level) and research organizations (both local and transnational). The history of extension in the Hills and the FFS policy, including aims of specific inbuilt FFS steps, which mandates collaboration and interaction between farmers themselves, research institutions and MoA will guide the operationalization of the ideal conditions.

[78] Sinclair and Diduck's (2001) operationalization of the ideal conditions conducive to transformative learning in an environment impact assessment as well referred to the conditions between various stakeholders and organizations, rather than dialogic conditions between adults per se, as outlined by Mezirow (2000).

6.2 Evaluating the Conditions of Learning

Three conditions were found to be especially relevant for this research: provision of accurate and complete information, freedom from coercion, and openness to others' points of view. The rest of the conditions were indirectly related and are addressed in the discussion of the three aforementioned conditions. The FFS setting meant that greater awareness of the context of ideas is same as provision of accurate and complete information. Besides, an equal opportunity to participate in various roles of discourse is, in the FFS setting, interpreted to be synonymous with freedom from coercion. Finally, the condition of willingness to seek agreement is understood to be the same as openness to alternative points of view.

6.2.1 Accurate and complete information

In the context of FFS accurate and complete information refers to provision for context specific data, rather than provision of the data itself.[79] This data is generated on the FFS site or facilitated for adoption in the local biophysical, social, economic and political conditions for concerned farmers, with outcomes expected to pertain to changes in some degree to all of the four conditions (Khisa, 2003; Mweri, 2005; Gallagher et al., 2006; Duveskog, 2006). The criteria used for evaluating this condition are: Did the learning processes in the FFS accommodate the local conditions? Did the

[79] The aim of FFS is to enhance farmers' ability in decision making which translates beyond transferring of data but to generating context specific data, which, refer to Chapter One, is not available on the spot but needs to be generated in the local conditions (Deugd et al., 1998; Rolling, 2005).

information/skills and other learning acquired change the gender specific roles and roles in general in the community[80]?

Following is an evaluation, with a particular focus on meeting the above criteria, while differentiating between the FFS in the high potential area and FFS in the medium potential area. These two areas encompass most of the FFS visited in the Hills, with the exception of Boilwa FFS which belongs to the low potential area of the Hills. The reason for considering the two areas separately in evaluating the condition of provision for context specific data is that the context specific conditions, encompassing gender specific roles and biophysical as well as economic conditions, in the high potential area differ from those in the medium potential area, as illustrated in Chapter Four. Hence, handling each of the areas separately is required when evaluating the two criteria of accommodation for local conditions and changes in roles.

The first criterion of whether the learning program accommodated for the local conditions will be evaluated by examining the match between the learning concepts and the local conditions themselves in the two areas. The match between the concepts learned about and the local conditions is further evaluated by examining the usefulness of the learning outcomes, as articulated by the concerned farmers themselves.

Learning concepts in the FFS program mainly focused on soil fertility and pest management. The FFS's program was fixed, or facilitated the adoption of the same technologies, which mostly focused on IPM and soil fertility management, in the high potential and medium potential area, despite that the biophysical conditions, including

[80] This evaluation of changes in roles criterion pertains to gender analysis using Moser Framework, whereby the outcomes of the development projects are evaluated according to changes in roles.

climatic conditions and crop types, as well as the social and economic conditions differed between the two areas. In fact, using pesticides and fertilizers is economically unjustifiable on subsistence crops of maize and beans, the focus of the medium potential area, but feasible on income generating vegetable production, the focus of the high potential area (refer to Chapter Four, Section 4.2; Orr, 2003). The adoption of the IPM concept and soil fertility management from an Indonesian context, in which the FFS has originated in (Rolling & Fliert, 1998), is potentially the underlying reason why the concepts are a fit in the high potential area but a misfit in the medium potential area. The Indonesian smallholder rice context is similar to the high potential smallholder vegetable context, such that both agricultural systems use pesticides and fertilizers, practice irrigation and are a commercial types of agriculture. This context is incongruent with the medium potential area where farmers do not invest in artificial pesticides and fertilizers, refrain from irrigating their crops (mostly due to the lack of water) and focus on subsistence type of agriculture.

To illustrate the mismatch between the FFS learning concepts and the agricultural context in the medium potential area, farmers in the medium potential area seldom elaborated on pesticides, fertilizers and associated practices in interviews and focus group discussions as being useful. The IPM in the subsistence areas does not imply a judicious use of pesticides (Chapter Four; Orr, 2003), as it was facilitated in the FFS in the medium potential area (farmers' notes and interviews); rather, IPM entails a sole focus on cultural and mechanical practices as well as on biological control (Orr, 2003). Further, soil fertility seldom involves organic fertilizer (Chapter Four; Orr, 2003); rather, enhancing soil

fertility in the medium potential area entails the use of animal and green manure. In addition to the irrelevant investment in chemical control measures, on the FFS site in the medium potential area, the adopted Indonesian-IPM concept was hardly applied. More specifically, the concept of economic threshold, under which no spraying is feasible, was not practiced despite farmers' notes indicating that the concept was covered. To the contrary, all the farmers notes indicated the recommendation of spraying when an insect was identified as a pest—*wadudu ma adowi*.

On the other hand, the soil fertility and pest management concepts along with the associated technologies were relevant to farmers in the high potential area. The IPM concept of reducing pesticides and incorporating other cultural and mechanical methods for pest control was relevant. To illustrate, farmers in the high potential area deemed these practices useful in reducing the cost of production, mitigating for the pesticides-related health hazards and marketing agricultural products, as articulated by Jacqueline, Agnus and Lilian, from Ndoria FFS: "AESA helped us in reducing the production costs. Through that program, I learned these are insects which can be killed physically, reducing the chances of buying chemicals."

> "The most beneficial thing I learned about is how to make local, traditional medicines to control pests and diseases on crops. This is very beneficial because it reduced the cost of production. Also, if you used traditional medicine, then there is market for your produce. Further, the natural control methods have no negative impact on humans, after the last treatment, if you consume the product, you will not be affected... I see the future as people switching from the agrochemicals to herbal medicines."
>
> *Are there any differences between Regina and IPM?*
> "Regina [a seed company] wanted to show their product through FF. It has no relation to IPM.

> "IPM is better … when we use the IPM method, there is no need to wait. Regina seed you need to wait to consume the product."

Further, most farmers in the high potential area emphasized the usefulness of learning about the correct, hence effective usage of pesticides:

> "At the beginning, I could not tell whether the condition was related to a pest or a disease. Hence, I used to get chemicals that do nothing, like I would buy the wrong chemical. Now, however, I have the knowledge as a result of FFS for detecting the pests from diseases. If I see blight disease, I will go and buy the right medicine. I might have black rot, but the aphids were destroying the crops instead. Now, I know which pest to control," explained Jacqueline, Ndoria FFS.

Similar benefits of increased vegetable safety due to the adoption of IPM were reported by male farmers as a beneficial, FFS outcome, as illustrated below by the chairman of Ndoria FFS:

> "At first I used to protect crops from pests through chemicals. When I joined, the FFS I discovered that I can use IPM method, which is not harmful to human beings. When I used the chemicals, I had to wait longer before consuming the produce. Now I spray using local chemical and eat sometimes without waiting."

Nonetheless, in the medium potential area pesticides for the control of post-harvest pests, a technology introduced in the FFS, is reported by concerned farmers to be beneficial in limiting losses to the LGB pest, the most threatening post harvest pest (refer to Chapter Four, Section 4.5.5). Hence, post-harvest pest control was of particular relevance to the farmers in the medium potential area, since the crops, maize and beans, require storage as opposed to the more perishable vegetable crops in the high potential area.

The focus on local innovations in the FFS was evident particularly at the Mwora FFS in the medium potential area. The FFS program considered these innovations and facilitated their dissemination by identifying the farmer innovators and incorporating the facilitation of the innovations by innovator farmers themselves to their peers in FFS and other FFS as well as non participant farmers, through field days and public *barazas*. Most of these innovations, however, were not innovated on the FFS site as the program's objective entails (CDA, 2001a,b; Mweri, 2005; Duveskog, 2006). Rather, these innovations were previously generated and when such innovations were an FFS outcome, they were generated on individual farms rather than on the FFS site. When asked, all the FFS groups denied that any innovations were generated on the FFS site, indicating that there was no provision for the generation of innovations, but only for their dissemination.[81] The exception was the collective community innovation of a wooden baboon trap in the Mwora FFS.

The participatory technology development trials (PTD), are supposed to result in innovating technologies in the local conditions (Mweri, 2005; Duveskog, 2006). The trials in FFS in both areas, however, were predetermined and included a comparison of non-productive and productive farming methods, further illustrating the absence of the provision of conditions for generating innovations.

In addition to disseminating local innovations, which are context specific, the FFS program accommodated for the local biophysical conditions by considering that farmers were farming in several agro-ecological zones. Farmers own land in several agro-

[81] The local innovations in the Mwora FFS, such as paraffin and ash, ash and pepper, neem and other bitter herb concoctions as well as weather prediction and changing the sex of paw paw trees from male to female, were not created through the FFS, rather they were identified and disseminated through the FFS.

ecological zones, as explained in Chapter Four, and therefore learning was not restricted to learning about agriculture in the FFS area. For example, despite that the Mwora FFS was located in the medium potential area, learning about agriculture in the low potential area did occur. Farmers in the Mwora FFS reported on learning about the use of Omo and water for termite control in the low potential area.

In conclusion, the information in FFS was accurate and complete with regards to soil fertility and pest management in the high potential area but incomplete and inaccurate for farmers participating in FFS in the medium potential area. The information was restricted to being transferred rather than generated as is the intent of the FFS program. Whether the source was predetermined technologies or local innovations, the technology was transferred not generated through PTD and AESA as is the intention of the program.

The overall FFS program goes beyond immediate profit gains and individual benefits to building social capital, engraining long lasting change in the lives of the FFS participants and their communities (Gallagher et al., 2006, FAO FFS Advisor, 2006, personal communication). As such, evaluating the change of roles resulting from FFS could be attributed to the provision of accurate and complete information that would induce such changes. The following section evaluates the second criteria of changes in roles resulting from the FFS program.

Women, mostly, in high and medium potential area, reported an increase in their productive activities and, consequently, decision-making authority in their own families. As well, these women reported on gaining of communication skills, as illustrated below.

For some women, certain FFS activities provided a first-time profit generation and money contribution to their families:

> "I was very happy to make money; It was the first time," said Mercy, Mgoro Village Group FFS.
>
> "I can contribute money to my family now. Hence, I am more involved in decision making in the family," explained Agnus, Ndoria FFS.
>
> "I feel more comfortable now in communication. I can comfortably address people. We used to receive visitors in the FFS. And, I would take them around, showing them the control methods. Before, I could not do that freely, but once I joined the FFS, I had to do that," explained Lilian, Ndoria FFS.
>
> "I have really changed because of the FFS. I could talk freely, and I am more confident in my decision making. I could tell others on how to solve problems and could ask others," explained Aster, Ndoria FFS.
> *Did your family and community notice this change?*
> "The family members noted the changes. I happen to sell products and get something. As a result of the FFS, we have more food," answered Aster, Ndoria FFS.
>
> "Teaching in a group or in a *baraza* I can confidently do that. Even at home, now I can freely exchange decisions with my family members. I never used to address people in a big crowd. Now, I am able to address people in a big crowd. This was the first group that I ever joined with many members, big group. They would listen to me ... I can address a big crowd, now," explained Agnus, Ndoria FFS.

The last quote by Agnus exemplifies a change with respect to her role in the social realm: addressing a crowd in a public *baraza* for disseminating the FFS learning. For female farmers in the medium potential area, the women became, as well, more confident in public speaking and more involved in decision making on the farm. Such as the case of Mercy, from the Mwora FFS, who asked her husband to plant beans with her:

> "I tell him plant beans with me; men in the FFS plant beans. Eventually, he did," said Mercy, an FFS participant.

For male farmers, in both high and medium potential area, their social and political roles were sharpened as a result of attending seminars and workshops as well as for handling leadership positions, especially the chairmanship (refer to Chapter Five, Section 5.7.2). Below, the chairman of Ndoria FFS explains how his social network of friends, which he had learned from, has expanded due to participating in FFS:

> "By joining the Ndoria FFS group, I had opportunities to attend seminars and trainings. I met different friends from different areas. We shared our problems and learned from each other."

Additionally, as illustrated in Chapter Five, Section 5.8.2, male farmers facilitated in the FFS and applied for funding to obtain water pumps, exemplifying another area in which men enhanced their social and political roles, respectively, in FFS. A change in male roles, however, distinguished the FFS in the medium potential area from the high potential area were male roles were enhanced rather than being changed. Men became more involved, and in most cases involved, in subsistence farming in the community, as illustrated below:

> "Men didn't used to like digging; now they do digging in the FFS and on their farms too," explained a lady in a FGD with Cheleka FFS.

> "He used to be focused on drinking alcohol and sit idle; after FFS, he became involved and busy with farming," explained, Boniface, Bernard's son, Mwora FFS.

> "I used to idle; I never focused on farming until I joined the FFS," explained Hagaii, Mwora FFS.

> "After FFS, I gained this dignity. I have respect because I now have something to do. I do farming, attend seminars and people consult me for advice in their farming," explained Japheth, the chairman of the Mwora FFS.
>
> "He still doesn't go to church, but now he is more involved in farming, after the FFS," explained Marry, Winston's wife, Mwora FFS.
>
> "I learned from women on how to preserve seeds, and now I use that myself [seed preservation is usually a female role]. You add bitter herbs in the granary to repel pests," explained Hagaii.

Further, the women and the men, in the medium potential area of the Mwora FFS, adopted additional social roles on the collective level for the betterment of their community's physical environment and food security. More specifically, the FFS group provided concerned farmers a new sense of collective agency, such that individual members, due to adopting an FFS-group identity, felt responsible for protecting river banks by planting trees. Below Japheth, the group's chairman, explains why the Mwora FFS decided to plant trees along the river bank, which according to a FGD with the Mwora FFS acts as an example to the community:

> "The trees present on Mora FFS are Grivellia trees. We have planted them last year for soil conservation and because we wanted to get fresh air," explained Japheth, Mwora FFS.
>
> *So why did you plant trees?*
> "We have decided to plant trees to prevent flooding... When it rains water floods, and we get sand deposits. When plant the trees, you direct water, no floods. We used to cultivate till the end of bank, but here on the FFS site, we have left an allowance for water to flow. Therefore, water will move and won't rise," Mwora FGD.

This responsibility extended into the domain of food security by disseminating the FFS learning, which increases production, in *harambeh* and in farmer-led FFS as well through disseminating innovations that pertain to enhancing food security, such as seed preservation methods, as explained by Jerrita, the farmer innovator, below:

> "Many farmers tried to apply this method but they ended up adding too much of paraffin, and their seeds failed to take up. Only very few droplets of paraffin are needed to be mixed with ash. The seeds will stay for two seasons, as opposed to one season when you use Acetylic Super. Also, if you wanted to eat the seeds you cannot because there is paraffin in there. It is poisonous. You can't eat it. This way you will make sure that the seeds are going to be used for planting, and you won't eat all your seeds. Rains will come and you will have your seeds ready."

6.2.2 Freedom from coercion

The second condition for learning of relevance to the FFS is freedom from coercion and is considered in this research to mean the level of farmers' participation in FFS. More specifically the criteria for evaluating/operationalizing this condition include the following questions: Was there an equal opportunity for farmers to be involved in the FFS program[82]? Were the farmers in FFS being impacted by each other? the facilitator? Or, other stakeholders?

Whether the farmers had an equal opportunity to participate in the FFS is based on the fact that some farmers get excluded from participating in development programs, FFS in this case. Reasons for participation or exclusion from the FFS program are better understood from several FFS's perspectives. Hence, this first criterion is evaluated using empirical evidence derived from the twenty FFS visited in the Taita Hills. Chapter Five,

[82] In other words, were there farmers who were coerced into being excluded from the FFS program?

Sections 5.5 and 5.6 had already addressed whether there was an equal opportunity for farmers in the Taita Hills to be involved in FFS with empirical evidence, generally, indicating a bias towards the involvement of groups and female farmers belonging to male-headed households and a bias against the inclusion of female farmers belonging to female-headed households and male farmers. Hence, there was an unequal opportunity to participate in FFS in the Hills.

The second criterion on whether farmers in FFS were impacted by each other is evaluated in the learning sessions and decision making and farmer leaders' influence. Power imbalances, especially in a mixed group context, may hinder learning in FFS, as well provide an opportunity to resolve these imbalances, as seen with the case of Mercy who asked her husband to become more involved in farming. The impact of power imbalances between the male and female farmers was minimal in the learning sessions, however, proved prominent regarding decision making about FFS issues. With respect to leadership impact, it was deemed beneficial to have strong leaders in the group for the group to stay together and learn. These leaders were mostly men, especially that commonly women expected the men to be leaders as illustrated in Chapter Five, Section 5.7.2.

During the learning sessions women and men stressed that in the FFS they could speak freely (as articulated by Doreen below), share roles equally (as illustrated in Chapter Five, Section 5.7.2 and by Ezekiel below), ask and answer questions and share jokes, which was especially emphasized by women.

> "I say my voice was heard. When we are learning, then it happens I have a point to contribute. Then, I go ahead and say that point, and people will

> listen to what I have to say. And, people may even agree with me. We respect each others' opinions. Exp: Someone will say let us not wait for the meeting day. Let us all meet on this day. We will all agree on a certain day," explained Doreen.
>
> "We do the planting together … some people would be making holes, other people would be putting manure in holes and some other 3 people putting seeds. People would join me and won't start arguing. Also I feel that whatever I say in the FFS the participants listen to me," explained Ezekiel.

To further illustrate the limited impact of power imbalances during the learning sessions, Ezekiel, Grace and Violet, below, emphasize that farmers seldom take orders:

> "Farmers were interested in learning, and especially learning by doing things practically, very much interested indeed. Like the issue of crop observation. I know maturity date, flowering date and growth stages for maize. We used to do things often after agreeing together. We don't take orders. Because if take orders and if something goes wrong, then we will all blame that particular person," said Ezekiel.
>
> "Farmers decide on what do themselves. They do not wait for orders. If they wanted to plant or do weeding, they will go ahead and do that," explained Grace.
>
> "The farmers did not wait for anyone to direct them about doing anything. Even if *moalimo* comes he will join us … he would say just continue," explained Violet, ex Mora FFS.

On the other hand, as illustrated earlier gendered power imbalances (in Chapter Five, Section 5.8.1), more specifically male farmer control over decision making, hindered women's participation, in and benefit from the micro credit system. When the microcredit's learning topic was to be chosen by the group, men had full control over the subject. Further, men manipulated women's position into compliance by threatening to break up the group into two sub-groups in case the women kept refusing the bee keeping

project. Additionally, during the four-month field work period, another case of male dominance in decision making took precedence. In particular, men solely decided, despite that the beans were planted, harvested and threshed collectively[83], that the harvest goes for individual consumption instead of selling the harvest in bulk, which the ladies strongly advocated for, as Jerrita emphasizes below:

> "The men are a bit authoritative. They feel superior because, see, right away they decided that all the beans should be shared. Us, the ladies, are saying that we want to sell the beans, but men are opposing that. They want the two bags to be shared for individual consumption," explained Jerrita.

In addition to the area of gender imbalances the leader farmers' relationship with other farmers is another area where power imbalances exist. Hence, potentially control and influence may stem from these leader farmers in the FFS groups, especially the administrative figures, such as the chief, sub-chief and FFS chair holders. The presence of strong leader farmers in the FFS, and the control they had over the group, however, proved to be essential for the sustainability of the FFS. Below Japheth, the Chairman of the Mwora FFS, emphasizes the importance of strong leadership for the maintenance of the Mwora group:

> "We have a beekeeping project and we have been together for 6 years… It is because people in the area have strong confidence in me. This is why we are still strong and together."

Further, an FFS facilitator to avoid the collapse of an FFS group in which leadership was absent adopted the leadership role, as illustrated below:

[83] Note that usually men seldom plant, harvest or thresh beans in the community.

> "I had to interfere. The group was farmer-led, with no strong leadership to keep the farmers together. I had to interfere, otherwise it will break down. Extension is vital to FFS, it is building close links with farmers," explained Mwacharo.

In some other instances, however, farmers were over dependent on leader farmers and expected them to take full control over the FFS, as illustrated by the chairman of Ndoria below:

> *What are the challenges Ndoria faces?*
> "Once people appoint you as a leader, they cannot decide what to do. They have to consult you all the time. They can not do anything without you."

It is important to note here that the FFS had ground rules that required electing a chairperson every two years. In instances where leader farmers imposed unwanted control over their respective groups, they were ruled out from the coming elections, as illustrated by an FFS farmer below:

> "Ohhhh, when X was the chairman, he was so tough—very, very strict. We did not vote for him the next time; instead, we voted Y as chairman."

Hence, the provision for elections in FFS limited unwanted control by the leader farmers on the participants.

The third criterion[84], for evaluating the freedom from coercion condition, of whether farmers in FFS were influenced by the facilitator is based on the fact that facilitators are used to being treated and were viewed as experts during the precedent T & V approach for agricultural extension (Hamilton, 1998; Duveskog, 2006), which had been a main extension method until the introduction of FFS, 8 years ago, in the Hills. Power

[84] The criterion of whether or not the facilitator manipulated or controlled farmers in FFS is evaluated mainly using the case of the Mwora FFS for the fact that the only data that could address this question was acquired mainly from the Mwora FFS.

imbalances between the participants and the facilitators, hence, potentially exist. Further, the word facilitator has no matching translation in the local language. In fact, the facilitator is called *moalimo*, teacher in English. Adopting this discourse indicates a potentially top-down relationship in which the facilitator is the expert/teacher for the student farmers. In effect, facilitators were in full control of the technologies presented in the FFS (through the predetermined PTD trials), what was discussed in the FFS (through dictation of notes, which were exactly the same for all involved participants) and in some instances imposed crops to be grown on the FFS (like the rice experiment in the case of the Mwora FFS). Despite the FFS objectives and FFS facilitators' training, farmers were treated as students rather than co-learners and therefore infantilized in some instances. The piece below illustrates a situation in FFS in which farmers' learning was hindered by imposing a crop for which farmers were regarded as laborors:

> "The rice was for my own research purposes," explained the facilitator.
>
> Even one of the respective FFS farmers said, "We were not allowed to do AESA on the crop; only the facilitator does that."

There was a hidden research agenda that farmers provided mere labour for. As a result, the farmers ignored the trial, and the rice dried out.

"We were told someone will come and do the weeding and the irrigation. We did not choose to plant the rice," one FFS farmer said.

Consequently, all the FFS members said that they did not learn anything about rice, except for how to plant it.

Despite the fact that farmers were treated as students in most of the learning sessions, local knowledge is inherently valued in the FFS program, through the focus on farmers' innovations, as illustrated in the previous section, as well as through using questions as a main method for facilitating learning, which many facilitators maintained is what makes an FFS an FFS. However, the answers to the questions which were asked such as, "How can I avoid soil erosion?, How can I increase production?", were discussed and dictated[85] to the farmers which proved to be the exact, same answers in the farmer led participants' notes. This intact note transfer is an indication that the answers to the questions, as well as the questions themselves, were predetermined despite providing space for discussing and constructing answers. Further, the notes in general were predetermined and were identical for all participants in the same FFS (FFS participants' notes). Another area that illustrates the note taking's shortcoming is impeding women in the FFS from learning effectively, or as effectively as men (refer to Chapter Five, Section 5.8.1).

Further, the facilitators, such as the fish production and the reproductive health facilitators, who did not attend any training on FFS methods were not necessarily more controlling than the trained facilitators. To illustrate, attending several FFS-RH sessions proved that a facilitator despite her lack of training engaged farmers in lively discussions, as opposed to another untrained RH FFS facilitator whose sessions were rather top-down (i.e. lecturing style). Additionally, an FFS facilitator when asked about how the untrained

[85] Many farmers explained that the facilitator emphasized note taking of anything that gets written down on the news prints.

fish facilitators facilitate FFS maintained that it is the closeness to the farmers, rather than being trained in FFS is what legitimizes extension efforts:

> "The fish facilitators are not trained. But people done this extension daily with community know how to handle them and facilitators are the closest people to the farmers," explained Mwacharo.

Alleviating farmers' position from FFS students to co-learners depends on the attitude of the facilitators, as well as on the attitude of the farmers themselves. A facilitator below explains his philosophy of perceiving farmers as co-learners in the FFS:

> "In FFS we get what farmers know and what extensionist know and pull it together."
>
> A female farmer from Vuria FFS, when asked by the research assistant "what did the facilitator teach you?" answered, "I teach him too."

The quotations above prove that some facilitators were open to farmers' participation in discussions. Indeed, many farmers maintained that the facilitator often solicited the participation of the quite people in the group and encouraged farmer-to-farmer discussion, as illustrated below by Winston:

> "The facilitator has a good way in teaching. Because, when someone happens not to understand, he used to ask other farmers for explaining. He would always ask those who did not understand to ask other farmers who understood for further explanations," explained Winston.

Nonetheless, given that the notes were the same (for participants and respective farmer-led FFS participants), the farmers' discussions seem to be bounded by what the facilitator had put on the newsprints or have said.

Examining the criterion of whether or not other stakeholders have an impact of farmers' involvement in the FFS[86] is based on the fact that the organizations which collaborated with FFS have a certain level of control over the learning especially that these organizations provide the in kind funding of seeds, biological control, facilitator training (such as RH FFS), among others, hence affecting the level of farmers' involvement in the FFS program. In effect, farmers' involvement ranged from being active research collaborators to technology receivers to mere laborers. To illustrate, farmers were research collaborators when organizations sought the FFS farmers input on the specific technology under research (such as the case of finding the most adaptable maize seeds with KARI and evaluating the effectiveness of releasing maize-pest parasitoid with ICIPE, refer to Chapter Five, Section 5.2). In other instances, farmers were technology receivers in the cases of promoting certain crops (such as PCCS's amaranth FFS in the lowlands, refer to Chapter Five, Section 5.4.3) or agricultural packages (such as Regina Seed Company in the high potential area). In one case, farmers were perceived as mere labourers (such as the rice experiment in the Mwora FFS). Nonetheless, whether the farmers participated as co-learner, labourers or technology receivers, the farmers' research agenda[87] was not incorporated into the program. The research agenda was rather predetermined by the concerned NGOs.

[86] The criterion of whether or not the other stakeholders manipulated or controlled farmers in FFS is evaluated using the case of the Mwora FFS for the simple fact that most of the data that could address this question was acquired from the Mwora FFS.

[87] The Mwora FFS farmers in the Mbonbonyi community expressed in a FGD a research interest on examining soil types in their communities and issues related to soil fertility. They more specifically want to know which crop grows best in which soil.

Hence, farmers were subject to coercion by being excluded from the FFS program, marginalized in decision making, learning through dictation and predetermined PTD and adopting an imposed research agenda.

6.2.3 Openness to others' points of view

The third condition of relevance to this research is how responsive the program was to other stakeholders' points of view and how responsive it was to farmers' interests, as outlined in the limitations section. Given that the exit strategy for the FFS program is to devolve extension services to farmers this condition as well concerns how open were the farmers to each other. The specific criteria for this condition are: How open was the program to other stakeholders' points of view? To farmers' interests? And, how open were the farmers to each other's points of view?

There is a clear link between FFS program, MoH, Forest Department, NEMA, MoA and KARI. The MoH is a stakeholder because HIV/AIDS is rampant in the Hills and as illustrated in the Chapter Four, Section 4.5.1 profoundly limits production, with many farmers leaving their farms fallow due to labor constraints. The Forest Department is a stakeholder in FFS because of the dominant agro-forestry type of agriculture (i.e. integrating trees with crops) in the Hills. The NEMA is a stakeholder because agricultural expansion and burning are the most prominent threats to the conservation of the 13 remnant patches in the Hills (Newmark, 2002; NEMA, 2005). Given that farmers are in the mosaic between these remnant patches, their practices, the focus of the FFS program, profoundly impact the status of the forests[88]. The ministry of agriculture is a stakeholder

[88] Githiru and Lens (2004) in a study conducted on conservation in highly fragmented African forests, including the Taita Hills that has 13 remnant patches with an average size of 0.04 Km^2 (Newmark, 2002),

because the MoA's staff implements the FFS project in the Hills. The KARI is a stakeholder in the FFS program because as outlined in its central mandate it seeks to involve farmers in its research trials. With FFS being the dominant extension method in the Hills, KARI is indeed involved with farmers through FFS (Extension Representative in KARI, personal communication, 2006).

Nonetheless, the minutes of meeting of the Taita Taveta headquarter meetings revealed limited dialogue and consultation between the FFS program coordinator and the departments of health, forestry and environment in the district.

Openness to the ministry of agriculture, however, was evident, such that CDA was open to the MoA's advice on sharpening the marketing component in the FFS program, which was later included in the AIV FFS program (as explained in Chapter Five). Additionally, the FFS facilitators have monthly meetings chaired by the district representative in which facilitators discuss their monthly reports, including progress, such as field days, farmer recruitment and identification of farmer innovators, and constraints faced in FFS, such as drought, attendance and transport (CDA minutes of meetings, 2005, 2006).

The program's use of KARI's research results was notably limited indicating weak collaboration between KARI and FFS, despite the heavy involvement of KARI in FFS's maize, sorghum and beans trials, as explained earlier in the condition of freedom from coercion and in Chapter Five, Section 5.2. To illustrate, the planting of maize and beans in pure stands was incongruent with KARI's findings on the optimal intercropping *Mbili*

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found that activities around these fragmented forests such as agro-forestry maintain the essential connectivity between forest patches and reduce edge effect (e.g. parasitism and predation).

method of production (KARI, 2005). The *Mbili* method, which means two in Swahili, entails intercropping one row of maize with two rows of beans. This method is superior to the lone stand method, which is practiced on the FFS site, because of the small plot sizes in the hills (farmers' interviews). Additionally, the planting of two rows of beans decreases the competition between the maize and bean crops for light (KARI, 2005) as well as breaks the pest and diseases cycles (Chui & Nadar, 1983 in KARI, 2005; Tungeni et al., 2002 in KARI, 2005). Besides the cropping pattern, pest control is another area where the information transfer between KARI and FFS was lacking. Extension agents advise farmers to burn maize stalks as a control measure against the LGB, which hides in the maize stalks for the coming season. A study conducted by Farell et al. (1996), in collaboration with KARI, revealed that burying maize under 15 cm of soil for two weeks remarkably decreases the pest population. Hence, burning, a major threat to the remnant forests, and soil fertility, a major limitation to production, are avoided by burying rather than burning the maize stalks. This information on the alternative burying method was not disseminated to the FFS, despite that the research, the Farell et al. (1996) research, was conducted in Wyndanyi, one of the Taita Hills districts.

Given the fact that the FFS policy aims at addressing problems identified by the farmers themselves, how responsive the program was to the farmers' points of view is addressed by the evaluation of whether farmers' interests, as articulated by the farmers themselves in Chapter Four, were met through the program. Further, the outcomes are situated within the Women in Development / Gender and Development (WID/GAD) discourse as a continuation to gender analysis (as identified by the Moser Framework).

The FFS program intended to provide a forum through which farmers themselves work on combating desertification and alleviating poverty[89]. This is, according to the FFS policy, attained by conducting PRA in the initial ground working stage of the FFS in which farmers identify their constraints and practical opportunities to implement for overcoming these constraints. Later, farmers on an ongoing basis monitor and evaluate their progress. An integrity gap in policy implementation, however, was observed such that farmers were not involved in the earlier stages of the program as well did not monitor their progress on an ongoing basis.

Foremost, the ground working report was a selection process for the identification of cohesive groups (CDA, 2001a), rather than being a PRA exercise as is the mandate of the FFS policy. The FFS program, rather, had predetermined technologies and concepts for adoption (refer to the first condition on provision for accurate and complete information), as well as predetermined criteria for monitoring and evaluating the FFS community development (refer to Chapter Five, Section 5.8.1), with the notable exclusion of the non-participants, mostly single-headed female households. Hence, the program inherently had limited potential in addressing the community's strategic needs, as identified by local farmers themselves.

Illness, alcohol abuse, climate change, female heavy workloads, bad roads, lack of markets and lack of access to credit were not discussed in the FFS, rather a sustained focus was on technology transfer despite that the program was open to addressing the

[89] Particularly, the FFS goal is "[d]eveloping and implementing community initiatives that emphasize the sustainable management of natural resources targeting food self sufficiency, income generation and poverty alleviations" (CDA, 2001b).

communities' strategic needs, as outlined in the FFS policy and by the extension representative in KARI below:

> "In FFS the concerned farmers should get training on topics that relate to issues other than technologies. These are topics, like for example talk about AIDS… The FFS approach is for enhancing the farmers' livelihoods. That's the whole thing."

Using the GAD/WID policy analysis tool as outlined by the Moser Framework in March et al. (1999), the FFS approach and hence impact is mixed between the GAD approach in the mixed FFS groups and WID approach in male- and female-homogenous groups. In the Mwora, a mixed FFS, context, in which men became more involved in farming, the FFS addressed men's strategic needs of breaking free from alcohol abuse. Further the FFS, did lead to the empowerment of women through expanding their roles into the social realm of public *barazas* and community work and political realm in decision making at the household level. However, addressing women's strategic needs of breaking free from performing heavy workloads and contributing to political roles at a non-household level, such as acquiring a chair person position in the presence of men, was hardly the case. Hence, addressing women's strategic needs was not met through the FFS program due to the powerful social limitations, such as women's role of caring for the kids and male refusal to be in groups chaired by women, limiting women's role in FFS (refer to Chapter Five, Section 5.8.1).

On the other hand, homogenous groups in which gender relations are absent exchange of roles did not occur. Women felt incompetent in conducting male roles, such as the digging of irrigation channels (Chapter Five; Mweri, 2005). In these groups the

impact of FFS, however, was limited to anti-poverty through income generation activities, such as selling of beans and maize produce or vegetables in the high potential area. To illustrate, some female- and male- homogenous FFS groups stayed together for income generation, from the FFS-site produce:

> "The FFS supplies vegetables to secondary school … We talked to the committee members of the school and got the tender... It has been 4 years since we have been marketing together." (Isuwiryo FFS FGD).

The third criterion, regarding how open the farmers were to each other's points of view, is premised on the fact that farmers themselves disseminate the FFS information and facilitate other FFS. After their graduation, farmers establish new FFS and join the FFS district network. The farmer-led school and network are expected to increasingly replace the MoA extension services, thus following the program's exit strategy (Khisa, 2003; Mweri, 2005; Gallagher et al., 2006). Because the farmers will in essence be teaching each other, the openness of the farmers to each others' points of view is of relevance to the sustainability of learning through FFS.

The relationship between the FFS participants and the non-participants is crucial for institutionalizing FFS as an extension method led by the farmers themselves (i.e. for the sustainability of the FFS). This relationship on the part of the non-participants proved to be mixed between soliciting consultation from the FFS participants to dismissing their knowledge. The FFS participants' stand, on the other hand, is mixed between social activism for recruiting non-participants in their respective, farmer-led FFS to feeling incompetent in facilitating FFS.

Many non-participant farmers, often neighbours to the participants, solicited information from the FFS participants, as illustrated below:

> "My neighbour planted beans on an area, and the beans did not take up. She asked me, Jerrita what is the reason. So I went and tried to check the problem. I found snails on the ground. I told my neighbour to open the land again. The small snails got exposed to the sun and died. And, when she planted again, the beans took up," (Mwora FFS FGD).

> "The person I taught saw that my potatoes were doing very well I told her what I have used," explained Ester, Ndoria FFS.

Nonetheless, some non-participants were resistant to learning from the FFS participants. Such that, many participants when asked whether they tell other people about what they have learned in the FFS, emphasize that no the non-participants will not listen to them:

> "I do not show anybody about how to plant etc. Because, if I try to show on how to plant in rows, they will ignore me and say it is time consuming," explained Bernard, Mwora FFS.

> "The neighbours around will not want to be shown. They say God is the one who provides for all. Whether you plant in lines or not … it is God's will. They got this mentality," explained Joyce, Mwora FFS.

A gendered pattern in the dissemination of the FFS technology was observed. Such that, female-FFS graduates were more likely to solely transfer the FFS learning to their family remembers, friends and/or neighbours, as illustrated below. The following quotes below reveal the narrow group of family, friends and neighbours that female participants tend to disseminate the FFS learning to:

> "I have taught my family members .... My husband and my children, I would teach them by demonstrating to them," explained the chairlady of Intec FFS.

How many people did you teach other than your husband?
"Two people apart from my husband they are doing raised beds now," explained Lilian, Ndoria FFS.

"I taught one other person [other than her family members]," explained Ester, Ndoria FFS.

On the other hand, male-FFS graduates were more likely to facilitate new FFS (e.g. the case with the Mwora FFS, Cheleka FFS, and Bolenyi FFS), despite the dominant presence of women in the respective FFS. Facilitating FFS for men constituted an employment opportunity (interviews with male facilitators in the Mwora, Ndoria and Cheleka FFS). Most men who facilitated FFS emphasized income generation[90] as an incentive, as illustrated in the example below:

Why did you decide to facilitate another FFS?
"To raise income that is why I am facilitating another one... Because I have graduated, I am the *moalimo* in that school," answered a male participant, Cheleka FFS.

The openness of the non-participant farmers to the farmer-facilitators' skills and knowledge, especially when facilitating FFS, was limited by the mentality that MoA extensionists are more knowledgeable and trustworthy for facilitating FFS and for giving extension advice. To illustrate, despite the widespread of FFS in the Taita Hills area when asked about constraints faced in local agriculture most of the farmers stressed the need for extension visits by the MoA extension personnel, as illustrated in Chapter Four, Section

[90] An extension-led FFS receives 46,800 Ksh when it was formed, while a Farmer-led FFS receives 23,400 Ksh. "Farmer led FFS get to get half of the funding because the farmer is within a walking distance from the field school… In the end the farmer is volunteering and it is a sort of a token," explained the FFS specialist in CDA.

4.5.9. This mentality was shared by the FFS participants themselves, as articulated by Jones below:

> "There is a need for more extension staff, so that the extension officers reach more groups.
> *Do you consider yourself an extensionist?*
> "Yes, I take myself as an extension officer, but I am not like the MoA staff."

To further illustrate, below Ezekiel, a male FFS participant, explains that extension personnel are more competent to facilitate FFS than farmer FFS graduates:

> *Why need more extension staff why not farmers educate more farmers?*
> "I say Mora people are also *moalimo*. Yet there is need for more staff from MoA. Because they underwent training, they could have more knowledge than farmers. Unlike us, we were only trained in the field, a *moalimo* can move out to other places and learn more. Moving out to new places makes someone know new things which one did not know."

Along the same lines, farmers that graduated from farmer-led FFS felt that they could not facilitate FFS because they were not trained by MoA facilitators, as illustrated below by the chairlady of Intec FFS:

> *Did your group start a new FFS?*
> "No we were told that we can not start an FFS because our teacher did not go for college. Rather, our teacher was trained by someone [FFS graduate]."

Along the same lines, some non-participants had limited trust in the skills of the farmer FFS graduates, as articulated by Agnus below:

> *Will you start a new FFS yourself?*
> "I can not start an FFS group. People need to see the agricultural officer with me. People rely on the agricultural officer, and it is difficult for me to start an FFS group," explained Agnus, Chap Chap FFS.

6.3 Summary

This chapter illustrates that information given in the FFS was accurate and complete in the high potential area but not in the medium potential area. Further, the program did not accommodate for the generation of innovations on the FFS site, as outlined in its objectives. Instead, the technologies on the FFS site were predetermined and profoundly influenced by the original Indonesian FFS context. This chapter shows that some farmers were excluded from the FFS program, and that others were subject to coercion. In effect, the FFS impact was mostly limited to anti-poverty and had limited impact on addressing farmers' strategic interests (such as gendered power relations), despite its objective of addressing farmers' interests. Instead, farmers' needs were predetermined by research organizations and facilitators. Finally, this chapter suggests that devolving extension services to farmers is impeded by the prevalent mentality of dependence on the government extension services.

LEARNING OUTCOMES IN THE MWORA FFS: COMMUNICATIVE, INSTRUMENTAL, EMANCIPATORY, EMPOWERING AND TRANSFORMATIVE

7.1 Introduction

Using a transformative learning framework, this chapter describes the learning outcomes for concerned farmers in the Mbonbonyi community of the Taita Hills. As such, the chapter considers the learning outcomes at an individual level, then moves to considering the learning outcomes at a broader community level. At the individual level, the FFS learning outcomes were classified into instrumental and communicative learning. When relevant, these outcomes were further classified at the societal level into empowering and emancipatory outcomes. Additionally, and when possible, the chapter identifies factors that limited the actualization of these learning outcomes into changes in behaviour at the individual and, when relevant, the community level. Based on these learning outcomes, the chapter then identifies collective transformations in meaning schemes and perspectives. The transformations in meaning schemes are indentified using three criteria: epistemological changes, social responsibility and autonomous thinking. Transformations in perspectives, however, are inferred rather than concluded.

The empirical evidence is based on the Mwora FFS. Mwora is the focus because it provided the richest dataset, with the Researcher having spent three months collecting data on FFS outcomes related to the participant and non-participant (of all genders, generations, and economic status), at both the individual and societal level. The data is based on interviews and focus group discussions with 24 Mwora FFS participants and 49

non-participants, in addition to farmers' notes, farm visits and participant observation of local events, such as food aid distribution and cattle grazing. The non-participants included the participants' neighbours and family members as well as elders in the community. The data is presented using farm photographs and direct quotes representative of the majority opinion or learning outcomes.

7.2 Instrumental Learning

Instrumental learning is learning how to control the environment for improving performance (Mezirow, 2000) – of agricultural productivity in this case. Instrumental learning, grounded in transformative learning theory and pertaining to the FFS outcomes, included obtaining skills and information, and determining cause-effect relationships. Instrumental learning in the Mwora FFS resulted in greater capacity for dealing with the external world. Participants became more confident in trying new crop varieties and innovating solutions for problems encountered on their farms, such as using diluted milk to control aphids on vegetables.

7.2.1 Obtaining skills and information

The data revealed several sub-themes related to skills and information discussed below. These sub-themes were soil fertility, water management, pest management, personal health, diversification of farm enterprises, environmental stewardship, farming as a business, and communication skills. These sub-themes were identified through the interviews with facilitators and farmers on learning occurring in the Mwora FFS. The obtaining of skills and information by the FFS participants mainly occurred through note-

taking, practical application on the FFS site, and dialogue with the facilitator and other farmers.

Soil fertility

Lessons on soil fertility in the Mwora FFS program included a soil nutrient component and a topsoil conservation component. The skills and information earned on soil fertility in Mwora FFS are summarized in **Table 9** below. The columns reveal skills and information earned, how they were learned and emerging behavioural outcomes. The data was derived from interviews and focus group discussions with the FFS participants. Almost all the Mwora respondents identified earning such skills and information on soil fertility in three main ways: practical application, note taking and dialogue with facilitator. The changes in behaviour are identified by all of the 24 respondents, their family and neighbours and elders in the community, and further verified through farm visits presented as photographs. The gender of the participants had no impact on learning the skills and information or on the respective methods of learning. However, resultant changes in behaviour were impacted by gender relations. To illustrate, when rearing cattle was the responsibility of a male farmer whose wife attended the FFS, the husband dismissed his wife's advice on stall feeding which reduces soil compaction, opting instead for the on-farm grazing method.

Table 9 Learning about soil fertility issues in the Mwora FFS

Soil fertility	Skills	Method of learning	Changes in behaviour
	Contour plowing	Practical application [91]	Common[92] **(Figure 7.1)**
	Forming terraces	Practical application and notes[93]	Common **(Figure 7.2)**
	Proper spacing	Practical application and notes	Common but on parts of the farm for maize and beans planting **(Figure 7.3)** and on the entire farm for pigeon peas separation from the rest of the crops planted **(Figure 7.4)**
	Deep tillage	Practical application and notes	Common **(Figure 7.1)**
	Using animal manure in planting holes	Practical application	Common
	Information	**Method of learning**	**Changes in behaviour**
	Burning removes soil fertility	Dialogue with facilitator	Few adopters (**Figure 7.5)**
	Grazing animals on farms leads to soil compaction	Dialogue with facilitator	Changes in behaviour observed in case the person responsible for the cattle is an FFS participant (**Figure 7.6**)
	Soil color reflects fertility	Dialogue with facilitator	Can determine soil fertility from soil color

Source: Interviews and focus group discussions with the Mwora participants and the Mwora FFS participants' notes and farm visits.

[91] Through PTDs on the FFS site.

[92] Mercy explains how learning practically on contour plowing in the FFS facilitated the adoption of contour plowing on her own farm: "Yes I learned about contour plowing, and, now, I do contour plowing. Before Mwora, I did not do contour plowing. I do that on the whole block because I have actually learned about it".

[93] When notes were reported as a method for learning, measurements were often involved, such inter-crop distances and inter-row distances, slope measurements for building terraces and depth of tillage. According to most of the Mwora participants they would refer to these notes later when practicing, facilitating or teaching other FFS participants and family members on perspective technologies.

Dina Najjar

Figure 7.1. Contour ploughing and deep tillage on participant's farm.

Dina Najjar

Figure 7.2. Terraces built as a result of participating in the Mwora FFS. Almost all the FFS participants had terraces on their farms.

Dina Najjar

Figure 7.3. Proper spacing restricted to 2-3 terraces (1/8 an acre) on a participant's farm, representative of most of the participants' farms.

Dina Najjar

Figure 7.4. Planting of pigeon peas and cassava at the edge of terraces on a participant's farm, representative of most of the participants' farms.

Dina Najjar

Figure 7.5. Burning of sugarcane leaves on a participant's farm.

Dina Najjar

Figure 7.6. Cow feeding on participant's farm, left to graze on the farm by the participant's husband.

In addition to gender relations determining behavioural changes, the characteristic of the resource itself determined changes as well. For instance, soil fertilization is specific to individual farms; whereas topsoil conservation has a more collective component. Such that, farmers who did not have terraces or practiced contour plowing on their farms had their topsoils carried away to neighbouring fields. Consequently, FFS farmers' behaviour was focused on social action in the case of soil conservation, but not in the case of soil fertilization. Farmer Field School participants solicited a change in farming practices in their community, emphasizing soil conservation, as articulated by Hagaii who said, "I tell them if you want to fight hunger … conserve your topsoil layer." Jerrita echoed this:

> "I teach them [neighboring farmers] by telling them if your *shamba* is very steep, plant grass along terraces and even dig trenches to control soil erosion … because once erosion is on your neighbor's *shamba*, it will affect you too. I need to make sure my neighbors too have trenches so that we both won't suffer."

Conflicting factors such as heavy workloads, for both male and female participants, restricted the adoption of proper spacing to a portion of the farm. Additionally, planting in proper spacing requires three people to be working at the same time, which further restricted its adoption. Women in the Mwora FFS, however, formed groups to work simultaneously on each other's farms.

Burning is another area in which changes in behaviour were confined. Despite the participants reports on learning that burning leads to a decline in soil fertility, on farms in the lower zones most FFS farmers practiced burning of maize stalks, which is thought of as a haven for pest rodents. The common practice of burning may be attributed to the fact the green manure decomposes at a slower rate than animal manure, which might explain why most FFS farmers depended mainly on animal manure for fertilization. Hence, information alone on the negative effects of burning proved inadequate.

For the non-participants, similarly to the participants, heavy workloads limited the adoption of proper spacing in planting. The non-participants, however, reported the lack of skills for such a task as an additional contributing factor, despite learning from the FFS participants that planting in proper spacing increases yields. Planting skills were acquired only in FFS, despite the willingness of the FFS participants to teach these skills to non-participants. The non-participants also resisted believing that manure enriches the soil with a commonly held belief that manure burns their crops **(Figure 7.7)**.

Dina Najjar

Figure 7.7. Farm yard manure left on a non-participant's farm without any use.

Water management

Similar to soil fertility, skills and information resulting from Mwora FFS on water management are summarized below in **Table 10**. The columns in the table reveal the skills, method of learning and emerging behavioural changes as identified by most of the Mwora respondents. Some of the skills were identical to the skills obtained for soil fertility management. Contour plowing and deep tillage, in addition to conserving the topsoil layer, aid in moisture retention allowing water to percolate instead of running off. Learning and the respective learning processes in the domain of water management were common for both men and women, with the exception of digging water furrows. Female participants reported learning practically how to dig water furrows, a practice which is

usually done by men in the community, during the FFS sessions. On the other hand, men did not[94] report on learning how to dig water furrows.

Table 10 Learning about water management issues in the Mwora FFS

Water management	**Skills**	**Method of learning**	**Changes in behaviour**
	Contour plowing[95]	Practical application	Common
	Forming terraces	Practical application and notes	Common
	Deep tillage[96]	Practical application and notes	Common
	Planting in ridges	Practical application	Common (**Figure 7.8**)
	Digging of trenches	Practical application	Female-oriented (**Figure 7.9**)
	Predicting weather	Dialogue with farmer innovator	Increased confidence in planting time
	Irrigation in boxes	Practical application	Governed by water availability (**Figure 7.10**)
	Information	**Method of learning**	**Changes in behaviour**
	Dry planting	Dialogue with facilitator	Limited [97]
	River corridor protection/restoration	Dialogue with facilitator	Common
	Other irrigation methods	Notes	None observed or reported

[94] Further, female participants reported that building water furrows was initiated by the male participants themselves:
"Japheth initiated the idea of trapping water from the intake and digging irrigation channels, and we teamed up for trapping water from the intake," explained Jerrita.
[95] Ploughing along the terrace, according to the Mwora farmers and FFS facilitator, would prevent water from eroding soils. Rather, rain water will percolate deeper into the soil.
[96] Deep tillage, according to the Mwora participants, as opposed to shallow tillage, allows for rain water to percolate deeper into the soil rather than being waster as surface runoff.
[97] Limited by the increasingly unreliable pattern of rainfall (refer to Chapter Four).

Figure 7.8. Planting of sweet potatoes in ridges on a participant's farm.

Dina Najjar

Figure 7.9. Water channel dug by women during the Mwora FFS water project.

Dina Najjar

Figure 7.10. Box irrigation, an FFS method, on a participant's farm.

At the community level, some elders reported an increase in irrigation in the community as a result of Mwora FFS, as articulated by Hope and Jerrita below:

> "When I came back, I have noticed a change in agriculture in the community. More and more people are trapping water from the intake and using box irrigation [a Mwora FFS irrigation method, refer to **Table 10** above], since the initiation of Mwora FFS," said Hope.
>
> "The community benefitted from us trapping water from the intake. The furrows passed through their farms. In the beginning they opposed the project; they didn't want the channels to pass by their farms. Now they benefit from the water," said Jerrita.

Pest issues

Pest issues in the FFS program consisted of learning about insects, weeds and baboons, as outlined in **Table 11** below. The columns reveal skills and information

earned, how they were learned and emerging behavioural outcomes. The skills and information were articulated by most of the Mwora participants. Obtaining skills and information about pest issues and the respective learning processes were similar to both men and women. Changes in behaviour, however, were gender specific. Men who participated in Mwora FFS collectively expanded their agricultural roles into practicing post-harvest seed preservation methods, which most women already did but using new methods after the FFS. Women participants used chemicals in controlling weevils in maize after the introduction of FFS in the community, as articulated by Hope's husband: "The fact that my wife now uses *dawa* [chemical] to preserve seeds is a result of FFS. Before she was not used to doing that."

Table 11 Learning about pest issues in the Mwora FFS

Pest issues	Skills	Method of learning	Changes in behaviour
	AESA	Practical application	Common[98]
	Building baboon traps	Practical application[99]	Stopped using baboon traps because the baboons got acclimatized to the cages
	Early and multiple weeding	Practical application	Common
	Post harvest pesticide application	Practical application and dialogue with other farmers and facilitator	Common
	Preparing natural pesticides for preharvest treatment	Dialogue with other farmers	Common

[98] Adapted not adopted as it was exactly taught in the FFS.
[99] Collective action was also observed with regards to building baboon cages. The FFS provided a place for collective action on building a baboon trap. Participant and non participant farmers as well as the FFS facilitator built the baboon cages together.

	as well as for animal (cattle and poultry) and plant diseases		

	Information	**Method of learning**	**Changes in behaviour**
	Pests on maize and beans	Notes, observation and dialogue with others	Common
	Weed names and uses	Notes	Common
	Early harvesting	Dialogue with facilitator	Limited
	Baboon behaviour	Observation[100]	Pairing of men and women for scaring baboons away

Some of the local cultural methods conflicted with the FFS learning. To illustrate, the FFS method of using the Actellic Super pesticide on the maize harvest (**Figure 7.11**) was not adopted by farmers that had a granary (**Figure 7.12**), with the commonly held misconception that storing maize cobs above the fireplace repels the maize pests (Farrell et al., 1996; personal observation, 2006).

[100] To some farmers baboons were not common in their areas, contrary to the FFS site which is a baboon area. Hence, they experienced learning on baboons as a result of the FFS. For example, Ezekiel observed that, "actually baboons are like men; they are very clever; they even attack you and beat up ladies. They don't fear ladies." In another example, Jones observed that, "the way to scare baboons is to do it silently; don't shout at them; they will not leave."

Dina Najjar

Figure 7.11. FFS method for storing seeds. The maize seeds are shelled, sun dried and mixed with Actellic Super, then stored in bags.

Dina Najjar

Figure 7.12. Local method for preserving maize cobs and planting seeds. Maize cobs are stored on top of the fireplace, with a common held belief that the cooking fumes will kill storage pests.

In some other instances, there were no impediments per se for changing ones behaviour with regards to pest control. Rather, the learned skills were adapted to suit individual farmers. To illustrate, the FFS participants did not adopt the AESA skill, of picking a single plant and observing insects and weeds on and around that plant, rather, they became cognizant about pest and beneficial insects and weeds and took initiative to control or conserve respective pests and weeds on their farms. To illustrate Jones below emphasizes the importance of indentifying weeds on his farm and the impact of such learning on his behaviour, such that he now refrains from uprooting the entire Mexican marigold plants on his farm:

> "Mukango" is the black jog; "Mamboleo" is the coach grass; "Lukuku" in the nut grass … I learned how to identify the weeds.
> *Why do you need to identify weeds? What did you learn about the importance of that?*
> "I need to identify weeds because some of them are beneficial to the crops. For example, the Mexican Merigold if I find some on the *shamba*, I will not uproot all of it. I make sure I leave some on the *shamba*."

Changes in behaviour on pest management were spread to the non-participants. Especially, during the field day held on the Mwora FFS site, as reported by Lillian below:

> "I learned from the field day about how to detect beneficial and harmful insects; this way I can crush the harmful insect and leave the beneficial insect on the farm."

Additionally, learning by non-participants from the Mwora participants on pest issues that led to changes in behaviour occurred by dialogue, as explained by Ana:

> "I learned from Violet [Mwora FFS participant], on how to control the maize stalk borer, by adding chilli pepper and wood dust on the infected crops."

Personal health

Farmers in the Mwora FFS obtained information, outlined in **Table 12**, on issues that would enhance their personal health. The columns reveal skills and information earned, how they were learned and emerging behavioural outcomes. Personal health issues were often discussed during the FFS sessions, when talking about medicinal uses of weeds, the importance of good health for adopting farming as a business, and the health implication of grazing cattle along river banks. The information outlined in **Table 12** were reported by almost all the male and female participants in Mwora FFS. Non-participants did not report on learning from the participants on personal health issues.

Table 12 Learning about health issues in the Mwora FFS

Health issues	Information	Method of learning	Changes in behaviour
	Medicinal uses of weeds	Notes and dialogue with other farmers	N/A[101]
	Medicinal uses of honey	Dialogue with facilitator	None observed or reported because the group is yet to harvest honey
	Boiling river water before drinking it to kill harmful pathogens	Dialogue with facilitator	N/A
	Grazing animals along the rivers leads to pollution of drinking water	Dialogue with facilitator	Limited
	Need to wait for three months before using maize seeds treated with Actellic Super	Dialogue with facilitator	Common

[101] There is insufficient or a lack of relevant data from which to draw conclusions.

Diversification

Farmers in the FFS obtained skills and information, as outlined below in **Table 13**, which allowed them to diversify their sources of food and income. The columns reveal skills and information earned, how they were learned and emerging behavioural outcomes. The skills obtained with respect to crops were mostly oriented towards growing these crops. Obtaining skills, however, for using such crops, especially rice and sorghum which were new crops for many farmers, was absent from the FFS program in Mwora.

Table 13 Learning about diversification in the Mwora FFS

Diversification	Skills	Method of learning	Changes in behaviour
	How to plant sorghum	Practical application	Limited to a small portion
	How to plant cassava	Dialogue with the facilitator	Common, male-oriented
	How to plant rice	Practical application	Aversion from planting rice because the rice trial failed
	Beekeeping	Practical application	Limited, Female-oriented
	Cattle production	Dialogue with other farmers	Common

The skills pertaining to the theme of diversification in Mwora FFS, as outlined in **Table 13** above, were reported by both men and women in Mwora FFS. Diversification was a theme stressed in FFS sessions as well as in public *barazas* and FFS-related workshops, due to the constant failure of maize. Changes in behaviour related to this learning were common to both men and women farmers with the exception of cassava planting. More

specifically, men expanded their agricultural practices to include cassava planting. A prominent example was the case of Bernard who planted half his farm with cassava after becoming an FFS participant (**Figure 7.13)**:

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Figure 7.13. Participant's shamba planted with cassava occupying over half of the farm's area.

> "Yes, I did know that cassava was drought resistant from before; however, I did not know how to plant it, until I participated in Mwora. Like the spacing is 3 x 3. I did not know that from before."

Another area in which gender had an impact on changes in behaviour was the case of beekeeping. One female FFS participants, Jerrita, reported that she wore the honey harvesting kit, despite the unfeminine nature of such task, as illustrated below:

> "I also developed skills on how to harvest the honey with the protective clothing because initially ladies usually fear bees. Now, however, I can

> comfortably harvest honey... I can just go to the hives and do the harvesting."

Further, the beekeeping topic itself underlying gendered power relations determined the outcomes of learning on the topic. Women, for the most part, did not want to learn beekeeping, rather the beekeeping topic was imposed on them. Nonetheless, even for men the beekeeping topic was insufficiently covered. Consequently, learning about beekeeping ranged from null in the case of female farmers to being very limited in the case of male farmers, as illustrated by Ezekiel, "I Feel like I didn't get a lot of it. I cannot really remember." The topic was covered for three sessions, which most men considered insufficient to learn beekeeping. Further, some attributed this shortcoming to the failure in harvesting honey, despite a three year period since the beehives were started.

A third area in which changes in behaviour had a gender component was the area of cattle production. Most of the men, who participated in FFS, had recently arrived from cities. These men reported that as a result of FFS they took interest in farming and got dairy cattle, which they have gained knowledge on rearing through Mwora FFS, "I learned from Japheth that if your cattle were sick, then it is best to boil the bark of the Mwora tree and give it to the cattle," explained Jones. "I learned from the facilitator that the *Makamaka* [the black jog] weed is feed for cattle. Initially, I did not know that *Makamaka* could be fed to cattle," explained Ezekiel.

All the FFS participants reported a change in behaviour with regards to planting more of the drought resistant crops, such as sorghum, cassava and pigeon peas. Sorghum was a crop introduced to some farmers in the FFS. Some of the Mwora participants lacked

the skills for growing sorghum and had little knowledge of sorghum, as illustrated below by Hagaii and Jones and by Getrude's son, respectively:

> "No, we are not used to sorghum. It is not our food. I did not know how to plant if from before."
>
> "Like the sorghum, I learned that sorghum is drought resistant not easily affected by the sun, even cassava. Before Mwora I knew cassava is drought resistant but not sorghum. I did not really know if it is resistant to drought."
>
> "My mother did not plant sorghum before. She got the seeds from Mwora and planted them on the farm."

When participating in the FFS, concerned farmers grew sorghum on their own farms because they were given the seeds by the facilitator for trial. Only a small portion, however, of the farms were planted with sorghum (**Figure 7.14**).

Dina Najjar

Figure 7.14. The little sorghum planted on a participant's farm, representative of most of the participants' farms.

The sorghum crop, however, was planted on the participants' farms not for its drought resistant value, but so that birds would be attracted to the sorghum instead of the maize cobs.

The FFS farmers reported that they planted more of the drought resistant crops because in the FFS they were simply told to do so, as explained below by Rose and Mercy, respectively:

> "After Mwora I had more of *nchugu* [pigeon peas] and cassava. Before Mwora I had very few *nchugu* and cassava."
> *What happened that made you change?*
> "Actually we were told we should be planting drought resistant crops in Mwora, so that if the rains were not enough, we would have some food security…
> *Before Mora didn't know that?*
> "No I didn't know that it is good to have more cassava and pigeon peas on the shamba."

> "After Mwora, I plant more pigeon peas. At least, I am assured of harvesting pigeon peas; if I fail to harvest maize. Nowadays we plant more because of these drought resistant crops.
> *What happened in Mwora that you have planted more?*
> We were actually taught in Mwora that we need to have more of those crops on our farms. Before Mwora I had very less of cassava and pigeon peas. *Nchugu* I had but cassava I had very little. Nowadays I have lots."

Despite reporting on increasing the amount of drought resistant crops on their farms, most[102] FFS farmers still planted more than half of their farms with maize, perpetuating dependence on food aid (personal observation during the period of food aid distribution by world vision), as illustrated below by the Mwora participants Mercy and Gladinus, respectively:

[102] With the exception of Bernard who planted more than half his farm with cassava.

How is the trend in harvesting maize?
It has been more than three years since we have been failing.
Have you harvested something else in those years?
No I have been failing with both maize and beans ... I harvested cassava in small quantities and also some small amount of sorghum. I had to buy food from the *doka* (shop) or go without food if I had no money. World Vision giving people relief food is a saviour. Suppose you plant and fail, then, you are forced to get relief."

How many years fail?
It is quite some years now can not really tell I rarely harvest. Maybe this relief food saves people so much."

Environmental issues

Learning about environmental issues in FFS entailed gaining information, consequent individual changes in behaviour, and collective action. The columns in **Table 14** reveal the information, methods of learning and emergent changes in behaviour related to learning about environmental issues in the Mwora FFS, with gender impacting none of the three criteria.

Table 14 Learning about environmental issues in the Mwora FFS

Environmental issues	Information	Method of learning	Changes in behaviour
	Grazing cattle along river banks leads to soil compaction	Dialogue with facilitator	Limited
	Cultivating up to river banks causes soil erosion[103]	Dialogue with facilitator	Common

[103] "Trees hold the soil on the river banks, without which erosion occurs," explained Japheth.

Breaking or removing stones along the river banks causes bank failure	Dialogue with facilitator	Reported but none observed
Cutting trees along river banks leads to desiccation of water and changes the course of the water body	Dialogue with facilitator	Collective action planting trees on the FFS site and in the *harambeh* (community work)

Individual changes in behaviour centered on refraining from cultivating up to the river banks, as illustrated by Japheth, “I have a farm in Jossa near a water source. Before the FFS I used to cultivate up to the river bank; now, however, I keep an allowance,” explained Japheth.

Grazing cattle along the river banks, however, remained common, despite reporting on learning about the adverse effects of such activity. Collective action related to learning about environmental issues was fostered through the collective FFS identity, as illustrated in Chapter Six, Section 6.2.1. The Mwora FFS participants planted trees along the river banks collectively, and in the *harambeh* they further initiated planting more trees along the river banks. The social action itself similar to the issue of soil conservation stems from the ecological nature of the resource, namely protecting water bodies, which requires the non-participant change in behaviour as well.

In addition to an enabling FFS environment, this heightened degree of environmental responsibility towards protecting the watershed arises from the linkages that farmers in the Taita Hills make between trees and rain, as illustrated in a focus group discussion with Mwora FFS:

> "Trees attract rainfall. Where there are trees, there is rainfall. See, in the upper areas it rains because there are trees. In Voi it doesn't rain because there are no trees ... You should not cut trees because they attract rainfall," (FGD, Mwora FFS).

Furthermore, the FFS participants felt a heightened degree of responsibility to prohibit others from cutting trees and grazing their cattle along river banks. These values were institutionalized by incorporating them into bylaws:

> "We have it as a bylaw now. People should not cut trees along river banks and not graze their cattle along river banks or cultivate all the way up to the river banks."

In effect, however, the non-participants and the participants themselves left their animals to graze along the river banks (**Figure 7.15**), especially on the Mwora site which is communal land (personal observation; elders' FGD).

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Figure 7.15. Participant's son grazing his cow on the FFS site.

Elder Judah below explains that the FFS site is subject to exploitation because it is communal land, and that farmers, including the FFS participants, are not decorous with respect to restricting access of their cattle to riparian areas:

> "People are still grazing their cattle along the river bank and worse people are their cattle on that block [FFS site]. The FFS participants themselves are also grazing on that block. The participants and any other person who got cattle and no grazing area would simply take the cattle to the FFS site because it is community land. There is no way to stop that. I am trying to see if people can stop grazing their cattle along river banks. I do not like it. It is not right to graze along river bank, but its in vain even participants do that."

Learning about farming as a business

Farmers obtained skills and information on farming as a business in the FFS; the learning and the process for such learning were gender neutral and are illustrated in **Table 15** below. The columns indicate the skills, methods for learning such skills and consequent changes in behaviour. Despite obtaining skills and information on marketing issues for farming as a business, no efforts were made to link Mwora FFS with the market, such as transport and tenure, as explained earlier in Chapter Five, Section 5.8.4.

Table 15 Learning about farming as a business in the Mwora FFS

Farming as a business	**Skills**	**Method of learning**	**Changes in behaviour**
	Cash book	Through notes	Common[104]
	Information	**Method of learning**	**Changes in behaviour**
	Sell only when have enough	Dialogue with the facilitator	Common
	Search for ready market	Learned practically	Women focus on the local market in the community and men of market outside the community [105]
	When plant, plant with the aim of selling	Dialogue with the facilitator	Common
	Timing the market	Dialogue with the facilitator	Common

[104] Similar to AESA, cash books were adopted not adapted per se as it was facilitated on in FFS.
[105] Discussed earlier in Chapter Five, refer to section 5.7.1.

Out of the 24 Mwora participants interviewed none reported that they use cash books[106]. However, most of the participants reported being more cognizant about how much they planted and how much they got from their planting, as a result of the FFS, as articulated by Bernard: "I do not use cash books, but I know how much I have planted by head. I can estimate better how much I have planted and how much I got, after the FFS." All the participants maintained that as a result of FFS their on-farm production have increased and hence they were able in some cases to sell their produce of food crops. To further illustrate, Hagaii emphasizes that as a result of FFS, more people are selling their produce: "The change that I have noted as a result of FFS at the societal level is the issue of FAAB. People are selling these days. Like take Bernard, he did not use to sell his produce before. Now he always sells his beans."

Another observed change in behaviour which was gender neutral as well was the issue of timing the market. The FFS participants maintained that timing is very important for profit making, as illustrated by Japheth, Jerrita and Hagaii, respectively, below:

> "In general marketing is the most important thing in FAAB and timing is part of it. Now I am planting vegetables in the *hyparenyi* (swampy area) zone. When no one is harvesting vegetables, I would be. It would be perfect for the market."
>
> "In FAAB timing in important. For example, if no one is planting and there is drought and you are near a river. You plant and irrigate your crop."
>
> "Now I am planting maize, when the season really has not started yet. No one is planting now. I can sell whatever excess I get and fetch a good price."

[106] Cash books denote a table in which farmers record an input for the cost of producing (seeds, fertiliser, pesticides, vegetable seedlings etc) and the output of the money generated due to selling. Subtracting the input from the output constitutes the profit. (Mwora FFS farmers' notes).

Communication skills

Gaining communication skills through Mwora FFS proved to be gender specific, with women gaining presentation skills, and men learning to make decisions in a group, as illustrated in **Table 16**. The columns describe the skills, methods for learning such skills and subsequent changes in behaviour.

Table 16 Learning about communicating in the Mwora FFS

Communication	Skills	Method of learning	Changes in behaviour
For men	Collective decision making	Deciding on collective issues in FFS	Male-oriented, less quarreling when taking collective decisions
For women	Presenting infront of crowds	Addressing FFS group especially when presenting of information related to AESA	Female-oriented, getting involved in more groups, choir and community work

Almost all men in Mwora FFS reported that making decisions in the FFS on collective matters, such as marketing, resulted in gaining the skill of group decision-making and subsequently led to less quarreling between group members. On the other hand, most of the female participants in Mwora, and in many other FFS as illustrated in Chapter Six, Section 6.2.1, reported on gaining confidence in addressing big groups of people as a result of talking in front of the FFS group, especially when presenting AESA findings. Many of the Mwora FFS female participants recalled that they used to be very shy before joining the FFS. As a result of obtaining communication skills many of these women became more outgoing and involved in groups, as illustrated below by Grace's daughter:

> "I have noted some changes in my mother. Before the FFS, she used to be shy, afterwards, she became more involved in the community like in the

> church choir. Also in forming groups for farming [which as mentioned earlier women did that for practicing accurate spacing learned on in FFS]."

7.2.2 Determining cause-effect relationships

Determining cause-effect relationships also related to the sub-themes of soil fertility, water management and pest issues. The determination of such relationships, however, did not occur through note-taking, but through reflection and doing things practically. The respondents identified the meaning-making process in FFS, AESA, the discrepancies between the FFS site and their own farms, and problem solving as the main catalysts for reflection for determining cause-effect relationships. Further, during focus group discussion with 14 of the active Mwora members, research *(utafiti)* on determining cause-effect relationships, was mentioned as a main method for learning in Mwora.

The most prominent outcome, for both participant and non-participant farmers and the community as a whole, for determining cause-effect relationships, is the identification of a variety of maize that is suitable for growing in the community as illustrated below:

> "I learned that PH1 does the best. It is because it produces the most and in the shortest period of time," explained Jones.
>
> "Before I used to buy 511, or anything that is sold in the shop. Now, I know from the field day that PH1 does best in our area… On the field day the maize crops were on the ground, and I could tell that PH1 had the most cobs by comparing to the other trials," explained Madeline, non-participant in the Mbonbonyi community.

Japheth, below explains how he learned by determining cause-effect relationships on an ongoing basis in the FFS:

> "You think how to plant while perhaps saying I will use this pesticide and this seed ratio. Then you go and do it. Then you think about the type of the

> variety you have used and how you are going to make the spacing and planting. For all these judgements you will have reasons. Then you think about the future of the plants, if they are growing well, if they are infected with insects, which type of insect, then you think about what to do next. Continuous think and then you do. That's how I learned," said Japheth.

What Japheth describes above is the AESA method in FFS. In AESA farmers spend a growing season observing the crop and its surroundings. This includes observing the maturity date of the crop varieties, determining beneficial and harmful insects, and monitoring the growth of the crop. All of these AESA-related activities require the ability to determine cause-effect relationships. Similarly Grace and Ezekiel below illustrate determining cause-effect relationships through AESA:

> "I had to think is this a bad or good insect. Like if it was a bad insect; If I saw it feeding on the crop, like see holes on the leaves or something. Or if it is a good insect like if I saw it eating a bad insect."

Ezekiel below, reports on learning through determining cause-effect relationships due to the discrepancies between the FFS site and his own farm:

> "I had to think all the time. On how can I apply what I am learning on my own farm. Like what are the differences and similarities between my farm and learning on FFS and how can I got about that."

Hagaii below illustrates using cause-effect relationships for resolving the problem of ant pests on beehives. This problem resulted in learning about the way the pest is destroying the bee population and in concluding that the application of wax is an effective control method:

> *Why didn't you harvest yet?*
> "Once we came to check on the beehives, and we discovered that there were some black ants that entered the hives. The black ants started feeding on the combs and the bees moved away. The ants ate the larva of the bees.

> The larva and the eggs were eaten up. When the larva died, there was a bad smell. Because when went there we could get the smell from the hives.
> *What did you do about that?*
> After realizing the ant problem, we put wax on the wires, like on the hanging wires, prohbiting the black ants from reaching the hives... Eventually we discovered that putting wax really works."

7.2.3 Instrumental competence

Because they developed skills and sharpened problem-solving abilities, especially related to determining cause-effect relationships, most of the Mwora FFS participants reported an increase in self confidence in working with their natural environment, which according to Mezirow (2000) pertains to instrumental competence.

Ezekiel and Bernard, respectively illustrate how they apply PTDs, practiced on the FFS site, on their own farms: "Before planting a new variety I test it." said Ezekiel. "After FFS, I had this trial plot over here. I get new varieties; I test them first, weigh the produce, and compare it with other varieties. I do that to see whether or not I should plant these varieties in the next season." Bernard did indeed try new bean and cassava varieties on his farm. The bean variety which did best on a previous trial, was planted during the season of the researcher's field work.

Jerrita below explains how she was encouraged by other farmers in FFS who tried things on their own to try things on her own as well:

> *So what did u learn from other people?*
> I heard Jafet saying certain tree is used to control new castle disease ... I learned from Amina Machila from Demboi in Kilifi when you see a chicken dizzy pluck the feather at the back of the tail. This will help the chicken become active. I gained this courage of experimenting. I do things on my own; I experiment."

On a different occasion, Jerrita explains how she succeeded through experimentation, in changing the sex of a paw paw tree from male to female, the latter which fruits are more palatable and marketable:

> "The fruits were hanging from the male pawpaw tree. I decided to try, to put a stick in the pawpaw tree, and turn it into a female pawpaw. The best fruits are the female fruits. Instead of cutting the male part down, I learned to put a stick in it, and it worked."

In one case, instrumental competence, led to a heightened ability for autonomous thinking. Jerrita below emphasizes that through the FFS she gained an autonomous way of thinking. Such that she uses soil moisture as an indicator for planting rather than the traditional planting season:

> "I can think deeply as a result of Mwora, and I can decide to do my own things without being directed by anyone. For example, at present I go to the *shamba* and do land preparation, see moisture in the soil, it is not season for planting, but I am planting. When time comes for planting, I will have maize at another stage than others. I will harvest early enough in September, and when it rains in October; I will also plant again. I can think in that way now."

7.3 Communicative Learning

Communicative learning grounded in the theory of transformative learning and pertaining to this research refers to understanding the meaning behind the words, i.e., abstractions, and evaluating the authenticity and the qualifications of the speaker (Mezirow, 2000). The communicative learning outcomes were identified from individual interviews with Mwora FFS participants and through an in-depth understanding of the cultural roles and values. Further to communicative learning, communicative competence was sharpened for the participants through their participation in FFS. Communicative

competence is the process through which one learns in the communicative learning domain; this process is sharpened as the learner negotiates meaning instead of passively accepting the meaning of others on an ongoing basis (Mezirow, 2000). Communicative competence refers to the ability of harnessing meaning for oneself about what is being communicated to the learner instead of acting on, or passively acquiring the meaning of others (Mezirow, 2000). Communicative competence pertaining to the FFS outcomes in the Mbonbonyi community was manifested through harnessing meaning for oneself on what is communicated to the learner by the society and the culture in place as a result of participating in FFS. This included the donor mentality, and the (lack of) male role in local agriculture respectively. Communicative competence was manifested in three domains, reinventing the meaning of donors (for almost all the male participants), rethinking the role of men in agriculture (for one female participant, Mercy) and becoming more competent in getting desired responses from people (for two of the male participants Japheth and Hagaii).

7.3.1 Abstractions

Abstractions into gendered values occurred on themes learned about in the instrumental learning domain, supporting that instrumental and communicative learning are not mutually exclusive, as articulated by the theory. Cultural roles determined both the values that abstractions pertained to and the behavioural outcomes of such learning. **Table 17** describes gendered values learned about, what was learned about these values and, when data is available, consequent changes in behaviour. The male-related column for values learned about in FFS reflects values that pertain to the societal and political realm,

such as hunger, women's contribution to agriculture in the community and the importance of labour. The female-related column for values learned about, on the other hand, reflects values that pertain to the household level such as the importance of agriculture in attaining self-sufficiency. Note that the changes in behaviour column pertaining to men reflects behavioural changes at the political and societal level of fighting hunger and facilitating FFS. For women the changes in behaviour column reflects their increased ability to provide food and shelter for their families at the household level. All of these outcomes are congruent with the male and female roles in the community.

Table 17 Communicative learning about gendered values through abstractions in the Mwora FFS

	Values	What was learned	Changes in behavior
For men	Labour	Is not a waste of time	More involved in farming
		Women are smart	Learning from women on seed preservation methods
	Hunger	Poor soil fertility is a leader cause for hunger; a maize monocrop contributes to hunger	Recruiting non-participants for facilitating FFS with a focus on soil erosion prevention and diversification
	Roles	Women work hard and are active	N/A
	Donor mentality	The program aims at facilitating life long skills which is important	Recruiting non-participants for passing these skills

	Values	What was learned	Changes in behavior
For women	Roles	Women can depend on themselves through focusing on agriculture	Increased ability to fulfill the women's roles of providing food and shelter for their families

Some men reflected on how baboons contribute to hunger (Winston), on soil fertility (Hagaii) and diversification (Japheth):

> "Baboons are destructive to the crops. They also eat chickens. They contribute to hunger or food shortage," said Winston.
>
> "I learned that soils are very important. The soil layer is very thin. You have to be very careful. You must build terraces and plant Nappier, otherwise you will definitely go hungry."
>
> "We plant more of the drought resistant crops. We had rough times before the FFS; we learned from that."

These male-related learning outcomes led to an increased commitment to farming and a commitment to fighting hunger in the community, as articulated by Japheth and Hagaii below:

> "The change I have seen in me is commitment to the *shamba*. Before I was committed but I did not know the importance of the *shamba* to produce more crops or cereals. I did not know the importance of producing more."
>
> "I tell them. If you shell remove hunger in you and in your community, join the FFS. Your *shamba* will produce more; consequently, you will be able to sell. You will protect your soils and do early weeding and early land preparation."

In the case of women, however, communicative learning in the realm of abstractions was limited to one domain, to learning about the importance of self-sufficiency, as illustrated below by Jerrita and Grace, respectively:

> "I learned that women are the ones who do the farming in the community. I even tell my daughter not to depend on her husband for the upkeep of her family. If you focus on agriculture, you will not go hungry neither will your family."

> "I learned that women do most of the farming. Men leave to towns, and they do not know, or even ask about how their families are doing. A woman has to farm."

Learning about values pertaining to the household level is of direct relevance to these women's roles in the community. Indeed all the Mwora female participants maintained that production has increased as a result of FFS, and consequently they are able to sell their produce. Thereby, according to these women, they are now more competent in fulfilling their roles of providing food and shelter for their families.

7.3.2 Evaluating the authenticity and qualifications of the speaker

Evaluating the qualifications of the speakers occurred through the evaluation of female qualifications by men and male qualifications by women as well as through evaluating the authenticity and the qualification of the facilitator, as illustrated below in **Table 18**. The rows in **Table 18** pertaining to the men describe the male criteria for evaluating the women and the authenticity of the facilitator. Note that evaluating the authenticity of the facilitator falls within the significance that the local culture puts on trust. Corruption in Kenya is widely spoken about and people are careful of who to trust. Male farmers in Mwora attributed the closure of the HPC to corruption (*fisadi*). Further,

on several occasions, many chairmen of FFS groups deemed mistrust held by the group towards them as a problem faced in their respective FFS. In context of such culture, learning on the authenticity of the facilitator was deemed relevant by men for seriously considering what the facilitator had to say in FFS. Similarly for women, as illustrated in **Table 18** in the rows pertaining to women-related outcomes, they evaluated the qualifications of the men and of the facilitator. Women, however, did not report on learning about the authenticity of the facilitator, they were more likely to evaluate the facilitator according to his teaching approach and human skills, such as being kind, caring and in general whether or not he was a 'good' facilitator.

Table 18 Learning about the qualifications and authenticity of the speakers in the Mwora FFS

	Values	**What was learned**	**Changes in behaviour**
For men	Evaluating the qualifications of women	Women are smart	Learn from women on how to preserve seeds using bitter herbs
	Evaluating the authenticity of the facilitator	The facilitator is right—what he says works	Trusting what the facilitator has to say

	Values	**What was learned**	**Changes in behaviour**
For women	Evaluating the qualification of men	Men are like small kids in planting beans	N/A
		Men know better Swahili	N/A
		Men are authoritative	N/A
	Evaluating the qualifications of the facilitator	The facilitator is the man of the people	N/A

The facilitator is a good man	N/A

7.3.3 Communicative competence

The ability to negotiate meaning for oneself instead of acting on those of others was reported by both men and women as an FFS outcome. To illustrate, Japheth below illustrates that through the FFS, he learned about different types of personalities; consequently as the group leader he knew how to convince people according to their personalities:

> "In the FFS. I learned leadership skills. Now, I know the strength and weakness of each person in the group. I know how not to upset the group members and how to convince them if there was a certain issue we need to discuss together."

Bernard, similarly, confirms that as a result of the FFS he is now more able to negotiate meaning in conversations:

> "After the FFS now, I can take information from people comfortably. Like the way I ask questions about farming. I can get information without them realizing that."

Furthermore, Mercy, as shown in Chapter Six, illustrates that due to the male involvement in farming in the Mwora FFS, negotiated with her husband his lack of contribution to farming. Mercy consequently convinced her to contribute to the household-related activities related subsistence farming. Further, a common communicative competence outcome for almost all of the male participants in Mwora FFS is related to reconsidering the donor stereotype, which is widely held in the community, from one of financial

dependence to the gaining of life long skills, as illustrated earlier in the male-related abstractions domain of communicative learning.

7.4 Empowering and Emancipatory Outcomes

The instrumental and/or communicative learning obtained in the FFS led to changes at the societal and the individual level which were either empowering or emancipatory. The outcomes were empowering when the resulting changes in behaviour did not challenge hegemonic normative concepts in the society and were emancipatory when the changes in behaviour indeed challenged normative ideologies in the community (Mcdonald et al., 1999).

The empowering outcomes were especially pertinent to the female participants in Mwora such that participating in FFS helped them obtain skills that have led to fulfilling their traditional roles in the community, as illustrated earlier, in the communicative and instrumental learning domains. Hence, the female-related outcomes did not challenge the status quo. Even when, apparently, the outcomes did challenge the status quo of, for example, women digging water channels, a task usually done by men, the heavy workload pertinent to women was not alleviated. Quite to contrary, women had an increased load after being involved in the FFS, as illustrated by a female FGD with ten of the female, Mwora participants:

> "Since we joined the FFS, we found out that now we have a lot of work. We didn't used to have as much work before the FFS. The workload has increased. Most of our time is dedicated to our time in the house and to the FFS."

The emancipatory outcomes of the program that challenged normative ideologies were on both the societal and the individual level, and in some instances, the changes at the social and individual level were concurrent. At the individual level the heightened degree of social responsibility as a result of FFS, drought recurrence and opportunities for social action in *barazas*, field day and farmer innovation technology dissemination, as illustrated in Chapter Six, Section 6.2.1, resulted in social action on oppressive limitations to agricultural production. The success of social action for resulting in social change was dependent on the level of instrumental and communicative competence of concerned FFS farmer and the severity of the issue. To illustrate below, a non-participant farmer explains that Jerrita, wanted to show her how to preserve seeds using paraffin and ash:

> "Jerrita told me that she has got a way to preserve planting seeds for the next season. She said she would show me. She would make sure to make herself available to show me. I am yet to see."

The above quote illustrates that Jerrita was competent in convincing this female non-participant to consider the innovation of seed preservation. This particular innovation was widespread in the community (interviews with non-participants). Additionally, the issue of having planting seeds available during the planting time emerged as a persistent problem in the community, as illustrated in Chapter Four, Section 4.5. Hence, the communicative competence of Jerrita and the perceived threat of planting material availability in the community facilitated the adoption of this innovation. Additionally, at the individual level, emancipatory changes pertained to overcoming the mythical invincibility of drought, pests and hunger in the community, especially for participant farmers. Particularly, the instrumental learning gained on issues of water management,

pest control and soil fertility management facilitated the emancipation from the normative ideology of leaving pest control and soil fertility management to God, or to the rains, with a widely held belief that 'rains cure everything' and food aid ideologies which perpetuate victimization and subsequent dependence in the Mbonbonyi community.

On the collective level, emancipatory outcomes were gender specific and related to men breaking free from the stereotypic male role of alcohol abuse and idling in the community. This outcome revealed that the individual change in behaviour of male involvement in farming is concurrent with the social change of introducing a male role in agriculture in the community, which as well related to the non-participant male farmers. Hence, the individual change in male involvement in farming was concurrent or synonymous with social change. The nascence of this male role in subsistence farming is a result of the combination between the collective disorienting dilemma, related to dwindling resources, climate change and subsequent hunger, as illustrated in Chapter Four, Section 4.5.4, and the obtaining of skills and information for taking action on this disorienting dilemma through agricultural *barazas* and FFS. In addition to a male change in farming at the community level, the FFS had other emancipatory outcomes at the community level.

The FFS site had access to water, hence during drought the participants were able to harvest maize and beans, which sometimes were sold to the non-participant members in the community. Additionally, during the vegetable learning cycle many non-participants emphasized benefitting from the Mwora FFS vegetable projects. Both aforementioned

points are illustrated by Helen and another female non-participant in the Mbonbonyi community below:

> "The community benefitted from the Mwora FFS produce. You can buy the produce locally, instead of having to go here and there. One time, the Mwora people planted vegetables. The vegetables here are rare to find. You have to go to Wyndanyi to get some. I was very happy to buy cabbages and *sukuma* (kales) locally."

> "Those people at Mwora have water. They can harvest during drought. I sometimes buy beans from them when I fail to harvest."

In addition to the fact that the FFS produce has contributed to a heightened level of food security in the community, the FFS site, which was still being planted up till the time of the researcher conducting field work, acted as an incentive for practicing best agricultural practices in the community, such as using manure in holes and early land preparation, among others, as illustrated in the quotes below:

> "I learned on how to use manure in planting holes, in maize. I myself do use manure in planting holes. My *shamba* is just next to the Mwora FFS site," said Agnus, non-participant.

> "People around here, when they see the people on the Mwora site doing land preparation, they would start doing the same as well," said another female non-participant.

> "The people around here wait for us to start land preparation and they would start as well. Because they would know that the rains are near from us. Because we have *mama* Getrude [the lady farmer innovator who can predict weather from the sun, refer to Chapter Three] with us, the rains should be near," explained Jerrita, Mwora participant.

7.5 Transformative Learning Outcomes

Transformations in the meaning schemes related to farming were observed for most of the FFS participants. This transformation in meaning scheme concerning farming

was identified using three criteria grounded in the theory of transformative learning: a change in meaning making, autonomous thinking and social responsibility. Such that, respectively, most of the Mwora FFS participants (male and female) changed the way they make meaning in farming due to adopting the meaning making processes in FFS of PTD and AESA (e.g., they now try varieties on a trial plot and new pest management practices on their farms); Mwora FFS farmers became more independent thinkers in the way they think about their farming (e.g. wearing honey harvesting kit, despite being unfeminine and adopting agricultural roles, despite being unmasculine) and the group identity gave the Mwora participants a new social responsibility (e.g., fighting hunger, by preserving planting seeds or facilitating FFS, and conserving the local watershed by planting trees).

A transformation in meaning perspective for men, however, may be a potential outcome of FFS. To illustrate, men who have participated in the FFS were more likely, and in some cases likely, to give land to their daughters.

> "Yes, I do give my daughter and her husband land if they needed a piece of land to farm on; that is not a problem. Some men don't take importance of women, not given them land but it's a must," emphasized Japheth.
>
> "Definitely, girls should inherit the land like them like boys *lazma kabeesa* (definitely for sure)," said Mwambogha.

Some men, mostly non-participants, however, strongly opposed the idea of their daughters inheriting land:

> "If you got married in Mgangeh, would you come down here and farm in Kishamba," asked Boniface, non-participant.

> "No no no that is not good. The government tried to legislate that. See women would become strong, and would say I don't care if I divorce. I will have a piece of land awaiting me on my fathers' land. That is not good," emphasized another non-participant .

Hence, compared to the non-male participants the male participants have revised their worldviews, because gender roles and rights are assimilated from the culture since the onset of childhood. This change in worldview may be an indication of perspective transformation.

7.6 Summary

In summary, most of the learning occurring in Mwora FFS was in the instrumental learning domain with gender, roles and premises, having a profound impact on learning and behavioural outcomes. Communicative learning was limited and was mostly male-oriented. Indeed, most male participants when asked if they had to think deeply in the FFS maintained that they did to see how they could fight hunger in the community, answer questions when asked in the FFS and/or present to other people. Women, however, with the exception of Jerrita (refer to respective having to think deeply example in Section 7.2.3), maintained that they did not think deeply in FFS; rather, they just worked as a group and did whatever was there to be done.

This limited critical thinking, a requirement for communicative learning, on part of the women may have contributed to the limited female-related communicative learning outcomes, which in turn may be attributed to heavy workloads. If a human is responsible for fetching water, firewood, cooking, washing clothes and utensils, taking care of the children and the grandchildren and in many cases producing income for the family by

being a casual labourer (refer to Chapter Four, Section 4.3.2 and **Table 5** and **Table 8**, female weekly and daily calendars, respectively), then critical reflection might not be of concern or might be limited by their daily activities.

It was evident that gendered power relations were not resolved in the FFS. At the level of gender roles, the emancipatory potential of the Mwora FFS was restricted to the male farmers. The emancipatory potential of the FFS for breaking free from oppressive social ideologies and bonds on the agricultural level, however, pertained to men and women, participant and non-participant farmers, for overcoming drought, hunger and yield losses to pests in the community.

Finally, a transformation in meaning scheme for both male and female FFS participants with regards to farming was the ultimate outcome of Mwora FFS. This was manifested by a change in meaning making, autonomous thinking and social responsibility, all of which are in the farming domain. Further, that chapter revealed a potential transformation in meaning perspective or worldview for male participants.

CONCLUSIONS

8.1 Introduction

The purpose of this research was to explore whether transformative learning is occurring through participation in the Farmer Field Schools (FFS) in the Taita Hills, Kenya. The study is based on an understanding of the evaluation of the FFS program in the Hills which have been in place for nearly a six-year period, and the data reported were collected in an intensive four-month study period in 2006. The study examined the learning conditions in the FFS, on the FFS site and beyond, the gendered learning outcomes, at the individual and the societal level, and the underlying processes (gendered values, FFS's learning processes and the nature of the resource learned about) for such outcomes.

The research used a case study approach to understand the complex learning outcomes with a particular focus on a mixed group in the Mbonbonyi community in the medium potential area of the Hills. A wide variety of methods for data collection was employed: focus group discussions with concerned farmers (both gender, of different generations), individual interviews (with participant and non-participant farmers, family members, neighbors, NGO and government officials), mapping (farm transects and resource flow maps), participant observation (in FFS sessions, farm work and other community activities) and document review (NGO and government reports on FFS and FFS farmers' notes). The study examined the processes for learning and outcomes of the FFS in the Taita Hills following the five objectives below:

1. to understand the characteristics of the local agricultural systems

Key findings: The research examined two types of agricultural systems in the Hills: the subsistence and female-oriented agriculture in the medium potential area and the commercial type of agriculture, which is more likely to include male farmers in the high potential area. In both areas women did most of the agricultural work with men more likely to be in towns, or, when staying in the community, to be involved in masonry work and cattle production. Female-headed households are increasing in the Hills due to male-outmigration and are increasingly adopting male-related roles. The gendered practices and roles in the Taita Hills are captured by an FFS facilitator below:

> "Farming in Taita constitutes majorly of women (80%). The men leave everything to the women. A woman wakes up at 5 o'clock, milks the animal, sells the milk, goes back home, gets some animal feed, looks for the children, goes to fetch water, gets the firewood, starts thinking about supper and goes to bed at midnight. A man wakes up wherever, maybe at 8 am. He does little work. He is usually employed elsewhere as a casual labourer… The husbands stay in Mombasa. They come home once per year from Christmas to Christmas. In the meantime, the entire household activity is left for the women."

Subsistence agriculture in the study area included the integrated farming of maize, beans, cassava, pigeon peas, sweet potatoes, fruit and fodder trees and shrubs and grasses in addition to the rearing of cattle and chickens. Commercial agriculture in the upper area focused on vegetable and fruit production with the purpose of selling the produce in Mombasa. The research offered a temporal analysis of extension system in the Hills, with a focus on FFS. The FFS program was introduced in 2001 as the main extension method employed by the GoK and development NGOs in the Hills with the aim of fighting hunger, especially in the ASAL regions, and empowering communities to address their

own developmental problems. Yet, six years after the introduction of the FFS, many limitations to agricultural production in both the biophysical and societal realm remain unresolved. The limitations to agricultural production in the Mbonbonyi community, as identified by the respondents, are associated with a number of interdependent factors: climate variability (particularly erratic rainfall patterns, resulting in drought, flooding and consequent crop failure); HIV/AIDS (at both the household level, which often leads to leaving land fallow and late planting for the seasons, and at the community level, which leads to the loss of agricultural knowledge and a one-week hold on agricultural labour every time a death occurs in the community); lack of markets and poor infrastructure (limiting the transport of agricultural produce) and the limited male contribution to the local agriculture (mostly due to alcohol abuse).

2. to consider gender specific needs with implications for the FFS program

Key findings: Women constituted 81% of the FFS participants (Mweri, 2005). However, single and divorced mothers constituted few of these participants as they were limited in their ability to participate in the FFS program with many reporting that they were not invited to participate in the FFS program. This was found despite the fact that single mothers and divorced women represented almost third of the head of households in the Mbonbonyi community, 87% of women in the FFS were married (Mweri, 2005). Women in the FFS, mostly in the single-sex female groups, emphasized their preference for more men to be involved in the program and in local agriculture at large because specific tasks, such as digging water channels and carrying stones are “meant for men”. Most of the female respondents in the Mbonbonyi community preferred working with male extension

agents, contesting the common perception of female farmers in SSA preferring to work with female extension agents (e.g. Ezumah & Domenico, 1995; Due et al., 1997; Percy, 1999a; Evers & Walters, 2000). Men in the FFS preferred learning about income generating topics, with a particular preference for cattle production. Male participants in the Mbonbonyi community and many other FFS communities stressed the importance of learning about irrigation technologies and the importance of obtaining funding for the purchase of water pumps, with some indicating that water pumps will indeed change their lives. Both men and women emphasized access to markets, funding and a permanent FFS site as essential factors for enhancing the FFS program.

3. to assess the conditions for learning

Key findings: The conditions for learning revealed that the ability of the program to foster the generation of local innovations was limited, mostly due to the predetermined, Indonesian, nature of the program. The program focused on transferring technologies, or, at best, verifying technologies related to soil fertility and pest management, with some technologies being irrelevant to certain areas. Further, the program lacked the focus on addressing societal issues impeding agricultural production such as HIV/AIDS, attachment to maize, alcohol abuse and heavy female workloads probably due to the limited, and late, involvement of concerned farmers in defining and addressing problems limiting their agricultural production. The program rather focused on the technical, and biophysical, aspects of farming. Learning conditions were less than ideal due to coercion. Farmers in the FFS were subject to coercion due to the predetermined research agenda imposed by concerned NGOs and the Government of Kenya, use of Swahili as the

language of instruction in FFS (which limited the FFS benefits for women, with some women dropping out due to their limited understanding of Swahili), male control in decision making and facilitator control over the learning topics and discussions. The exit strategy of the FFS project, which entails devolving extension services (advisory services and facilitation of FFS) to farmers themselves, is challenged by the mistrust between farmers and their dependence on governmental extension services.

4. to understand the individual learning outcomes for involved farmers in a mixed FFS

Key findings: The learning outcomes in the Mwora FFS were mostly in the instrumental domain, with communicative learning being mostly male-oriented. Female participants reported not having to think deeply in FFS, with male participants reporting on learning about the importance of agriculture in fighting hunger and the significance of acquiring skills, rather than money, from donor organizations. The need of independence on the part of women, due to erosion of male-related family roles, facilitated the empowerment of women in acquiring skills and information in the FFS for increasing production and selling produce. With men, however, the need for an occupation, due to unemployment and alcohol abuse, facilitated the FFS outcomes of becoming FFS facilitators and developing a nascent male-related interest in farming. In the mixed, FFS participants, both male and female, acquired the knowledge and skills they had previously lacked due to the restriction of gender roles. To illustrate, men lacked the skills for planting cassava and beans; hence, they learned how in the FFS. Women who lacked communication skills acquired or sharpened their communication skills in the FFS. At the societal level, the

male outcomes were emancipatory while the female outcomes were empowering, mostly due to the heavy workloads imposed upon these women and the social expectations of fulfilling these workloads. Finally, the participants in Mwora FFS experienced transformations in their meaning schemes (of changing their ways in evaluating and initiating farming practices, becoming more autonomous, independent thinkers, and becoming more responsible towards their society and environment by fighting hunger and limiting soil erosion and watershed degradation), with the male participants potentially experiencing transformations in their meaning perspectives.

5. to determine whether the selected FFS activities promote broader community thinking about sustainable agriculture.

Key findings: The FFS outcomes in the Mbonbonyi community did result in enhancing the food security for the farmers in the Mbonbonyi community. Almost all participants and some non-participants, as a result of the Mwora FFS, are more cognizant about pests on their farms and are more involved in replenishing the fertility of their soils, hence increasing production. Additionally, the participant farmers increased the area planted with drought resistant crops on their farms. Further, the participant farmers in the Mbonbonyi community, as a result of acquiring a new sense of agency, are now less likely to cultivate up to the river banks; rather, they plant trees along the river banks. Due to the FFS focus on farmer-to-farmer extension, FFS participants actively sought a change in behavior from the non-participants through facilitating FFS and through passing on innovations, especially for preserving planting seeds. Additionally, the FFS contributed to the formation of a nascent male role in the local agriculture that even the non-participant

men have adopted. Finally, the FFS may potentially lead to the erosion of patriarchal attitudes which perpetuate the exclusion of women in decision making, land inheritance, among other injustices, evident by the new male acceptance of inheritance rights for their daughters.

8.2 Scholarly Implications

This research contributes to knowledge in three domains: research on agriculture and food security in SSA, Participatory Research and Extension (PR&E) outcomes and processes and the validity of transformative learning in a non-Western, collective and non-academic context. In the agricultural domain, the research examined the impacts and adaptations related to HIV/AIDS and climate change in the local agriculture of the Mbonbonyi community. Farmers in the Mbonbonyi community stressed that HIV/AIDS and climate change undermine food security. According to these farmers they are limited in their ability to save planting seeds for the coming season as a result of HIV/AIDS and unreliable rainfall patterns. People are consuming their own limited food reserves and that of their affluent neighbours, and thus depleting the seed reserve, due to physical weakness. This failure to save planting seeds often results in late planting and in many instances in dependence on food aid.

The research offered empirical evidence indicating that mitigating for climate change and food shortage is indeed little addressed by a green revolution with a focus on the use of artificial fertilizers and pesticides (Pretty, 1995; Percy, 2005; Rolling, 2005). The on-farm diversity of soils in addition to the moisture and soil fertility gradients, the

heavy female workloads, poverty, male and youth unemployment and labour limitations induced by HIV/AIDS require a focus beyond the blanket applications of fertilizer and pesticides. Further, this research considered the impacts of HIV/AIDS at the community level where research is needed. Most research related to HIV/AIDS and agriculture considers the impact of HIV/AIDS at the household level (Guerny,1999, 2002; Jayne et al., 2005). The findings indicate that funeral expenses and labour limitations are incurred to the community at large, and that the threatened food security of the affected households impacts their neighbors' food reserves as well.

In the agricultural extension domain, the study offered evidence that experiential learning is crucial for the generation of innovations and adoption of productive technologies. Farmers sharpened their instrumental competence due to their participation in an experiential program of the FFS and became confident in trying new options for overcoming problems on their farms. Despite that the FFS technologies were promoted using several extension methods over the years, these technologies were more likely to be adopted when experiential learning occurred about these technologies. Further, the non-participants reported that due to their lack of skills needed for applying some FFS technologies, they refrained from practicing them, despite their knowledge that such technologies would increase their agricultural production.

Most of the literature on FFS is centered on South-East Asia. The literature about SSA is very limited (Berg & Jiggins, 2007). This study offers empirical evidence on the impacts and effectiveness of FFS in Kenya. Even more significantly, this research offers a new perspective for understanding and facilitating agricultural extension outcomes,

conditions for learning as wells as monitoring and evaluation. Hence, this research contributes to providing a framework for the understanding of the social interactions and learning processes that occur during and as a result of Participatory Research & Extension (PR&E) where much research is needed (Rolling & Jiggins, 1998; Rolling & Wagemakers, 1998; Leeuwis, 2004; Berg & Jiggins, 2007). The research proved that female farmers were limited in their ability to experience emancipatory learning and that the use of Swahili impeded their benefit from the program on an equal basis with men. The study proved that farmers valued experiential learning and dialogue for sharpening their instrumental and communicative competence, which in turn led to transformations in the way they practice their farming and their roles in the community. Finally, the study showed that the FFS farmers are less valued than the extension agents by the non-participants, because the extension agents were thought to have more formal education than the FFS farmers. The research offered an original way for looking at extension outcomes: communicative and instrumental (at the individual level) and empowering and emancipatory (at the societal level). The research operationalized ideal learning conditions in FFS, which include openness to farmers' needs since the onset of the FFS program and provision for relevant technologies, as identified by farmers themselves.

The third domain to which this research contributes to is to the theory of transformative learning. This research looked at transformative learning at a group level which is beyond the transformative learning described by Mezirow (1981, 1994, 1997, 2000). The research findings indicate that the collective transformations in meaning schemes were triggered by objective reframing, rather than subjective reframing, or

critical self-reflection. To illustrate, participant farmers seldom reported on critical self-reflection on their beliefs and worldviews for changing the way they made meaning in farming and behave in their community. Rather, these farmers reported acquiring new skills and information that helped them readdress limitations to agricultural production in new ways: facilitating FFS, protecting watersheds, controlling pests and trying new crop varieties and agricultural practices. Additionally, if indeed men experienced transformations in meaning perspectives, then the trigger for this transformation was objective reframing as well. More specifically, men moved to a societal level of fighting hunger in the community, rather than critically self-reflecting on their own values or worldviews. This supports the findings of Herber in Taylor (2000) whereby men who experienced racism focused on combating racism at the societal level, rather than assessing their own meaning perspectives.

Furthermore, the research findings indicate that learning in the Mbonbonyi community—instrumental, communicative and transformative—did not involve rational discourse. Indicating as noted by Belenky and Stanton (2000) and Schugurensky (2002), among others, that rational discourse is more likely to be a process for learning in Western, academic contexts. Besides, individual transformations were concurrent with societal change, opposing the theory which argues that societal transformations are a result of individual transformations (Mezirow, 1994, 2000; Taylor, 1998; Merriam & Cafarella,1999). A new role for men in farming was concurrently created due to a group of men's involvement in farming. This may be attributed to the context of the disorienting

dilemma of unemployment, drought and recurrent hunger which is at the societal rather than the individual level of a personal life crisis.

Moreover, the study offers empirical evidence on the links between learning, social action and social change where much research is needed (Mezirow, 2000; Taylor, 2000, 2007; Sinclair & Diduck, 2001; Schugurensky, 2002). As indicated by Daloz (2000) and Schugurensky (2002) social action in the Mbonbonyi community was indeed triggered by a social reality susceptible to change, opportunities for committed action and a supporting social environment. The social reality susceptible to change was engrained in hunger, recurrent drought and unemployment. Opportunities for committed action were mediated by the FFS group's identity and occurred through the inbuilt FFS steps of farmer-to-farmer extension and farmer-led FFS. Lastly, the supporting social environment was due to the gendered mixed status of the group, where male farmers collectively adopted female roles enabling a societal transformation and consequently became more involved in farming and less inclined to abuse alcohol.

Further, the research illustrates the impact that culture has over learning catalysts, outcomes and processes which much transformative learning research seems to lack a focus on (Merriam & Cafarella 1999; Taylor, 1998, 2000, 2007). The context of the disorienting dilemma (e.g unemployment and related alcohol abuse), the nature of the learning processes (other than rational discourse) and learning outcomes (impacted by roles and societal constraints) offer an in-depth understanding of the cultural forces acting on learning.

Finally, the research supports the concurrent outcomes of transformative learning as outlined by Mezirow (2000). These outcomes indeed included a change in meaning making, autonomous thinking and a heightened sense of environmental and social responsibility. Farmers involved in FFS, consequently, on an on-going basis test new crop varieties and pest control measures, adopt agricultural roles that are unacceptable socially (such as harvesting honey and digging water channels for women and farming practices in general for men) and are more involved in protecting their soils and watershed and in soliciting similar action from the non-participants.

8.3 Implications for the FFS Program

The following recommendations are based on gaps in the program identified by both the researcher and the respondents. The recommendations are outlined according to the chronological order of the FFS phases. Concrete suggestions for overcoming the identified constraints are provided.

The program needs to:

-Strengthen research relationships with KARI and the forestry and livestock departments. This might be achieved through a better dissemination of relevant research findings, which were conducted by KARI and other NGOs or governmental institutions, to concerned farmers. The partnership with the forestry department is crucial for research on indigenous timber trees, where “there is little known about the specific types of timber trees,” explained the District Forester. The focus on local timber trees is crucial for gradually replacing the exotic plantations of Grivellia, Eucalyptus (*Mkongo in Kitahita*)

and Cypress in the Hills with native trees, such as *Kirumbutu* (*Melia volkensii*) which provide corridors for connecting the thirteen remnant patches (Rogo & Oguge, 2000; Newmark, 2002).

-Make the HIV/AIDS component inherent to the FFS program, not only to the few schools that have completed all the FFS phases. This could be addressed by involving farmers in identifying constraints to their own agricultural system, rather than performing a regional TOT for facilitators through which the FFS curriculum is prepared. The concept of Human Ecosystem Analysis (HESA), which is adopted in FFS in Cambodia provides a potential model for facilitating the awareness and realization of HIV/AIDS prevalence and impacts on local agricultural production which extends beyond the infected household to the entire community (Guerny, 2002; Chhaya et al., 2004).

-Focus on forming mixed groups. The researcher found that mixed groups formed when the participants knew each other before participating in the program, with almost all mixed groups' members belonging to the same clan. The study offers empirical evidence that a mixed group, in which the number of male participants is almost equal to the number of female participants, context challenges the culture in place in the direction of reinforcing human rights, equality and democracy.

-Involve the FFS groups in the research agenda by having the groups indentify their own constraints and research solutions to these constraints at the onset of their respective FFS. Farmers in the Mbonbonyi community, who expressed a desire to learn about the relations between soils types, soil fertility and suitable crops, might achieve a better match between the biophysical characteristics of the local agriculture and the type of crops grown.

- Accompany the identification of constraints phase with gender analysis as suggested by Percy, 1999b and by the facilitator from Plan International below:

> "Divide the flip chart into 24 hours. Each group will have seven members. Why is it that women work more? Challenge them from there. Are there any duties that they can share? They will realize that we really give our women a lot of work to do."

Indeed, the researcher found that men came to realize the unjust amount of work imposed on women after performing the gendered daily and weekly calendars.

-Overcome the resistance to learning that maize is ill-suited to the local environment. This realization could be actualized by providing a cognitive conflict to farmers and a change in the research agenda of KARI and the MoA away from maize towards drought resistant crops or crops that could generate income for buying maize, as articulated by the KARI extension representative in Chapter Five, Section 5.8 and Rose from Mwora FFS below:

> "I would change the cropping system… Maize, beans, maize and beans the whole time growing that in all the FFS. Some people want maize and beans. Only that others want vegetables. I want vegetables … Plant crops for sale not only food crops, but vegetable growing... They say that it [maize and beans] is food. They have the mentality that maize is our food crop and beans; thus, should plant them."

Farmers in the Hills are used to crop failure and dependence of food aid. The growing of drought resistant crops may provide a cognitive conflict contesting the status quo of crop failure.

-Focus on drought resistant crops and related technologies on the use of the drought resistant crops (such as cooking methods and recipes). The researcher found that despite the fact that some farmers planted sorghum, they lacked the skills for using the crop and

opted for using sorghum as a bird repellant to protect their maize crops, rather than as food.

-Focus more on water management issues especially water storage structures that could be used for supplementary irrigation during dry spells. Some FFS in Bamba facilitate technologies related to water storage, not only harvesting (the case in the FFS of the Hills), such as water jars and farm ponds.

-Include a composting component in the FFS. The researcher found that farmers in the medium potential area, especially the non-participants, refrain from using manure because it “burns their crop”. Composting the manure, however, will prevent that. Because farmers usually own one cow, composting can be practiced on a collective basis. Further, in the high potential area, farmers and facilitators reported the lack of manure and the prohibitive cost of artificial fertilizer as an impediment to agricultural production. Hence, a focus on green manure, and composting, which was lacking in the FFS in the high potential area, would be of profound benefit for concerned farmers.

- In monitoring and evaluation, consider farm visits and an in-depth behavioural assessment to gain a full understanding of the program’s impact. The research findings indicate that farmers, in some instances, did not adopt FFS technologies as they were taught; rather, they modified the technologies to suit their own needs. Further, despite that some farmers claim that they do not burn the crop residue; a farm visit, however, proved the contrary. Additionally, consider female roles in monitoring and evaluation activities, such as seed preservation methods and skills and practices related to planting cassava and beans.

-Encourage farmers to facilitate FFS, especially the farmers who have graduated from farmer-led FFS with a focus on female farmers for an inclusion of women at the societal level in community development.

8.4 Final Thoughts

It was clear that the conditions for learning for men differed than those for women. Women were limited in their ability to experience emancipatory learning due to the program's sole focus on instrumental learning and the societal roles and expectations. Agricultural extension should focus on societal transformations that include issues of streamlining the inheritance legislation that enable rural women to access land, reducing female workloads and involving women in political roles beyond the house-hold levels. Empowering women to generate income and become more efficient in producing food does little to addressing their vulnerability to HIV/AIDS and heavy workloads. Aliber and Walker (2006) in their study on the impact of HIV/AIDS on land rights in Kenya reported that, due to insecure land tenure, women were obliged to offer sexual services to sub-chiefs when begging for land, risking contracting HIV/AIDS. Hence, giving women equal inheritance rights contributes to addressing their vulnerabilities to HIV/AIDS. Further, this study proved that a mixed group setting provides a platform for challenging the status quo of gender-related workloads into a male participation in agricultural production.

Finally, collecting data on transformative learning is hardly an easy task. More research needs to be done for innovating methods that could reveal transformative learning. For example, transformative learning in this research was identified using

tangential findings that were not relevant to the research per se. Asking men in the community whether or not they would give their daughters land revealed a potential perspective transformation for the FFS participants, which was not confirmed. Most of the research done on transformative learning is not definite, but inferential (e.g., Simms & Sinclair, 2008; Marschke & Sinclair, 2007). How researchers can employ methods (and what kind of methods) to confirm a perspective transformation remains a challenge in need of much research.

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Appendix I Interviews and Focus Group Discussions Guide

I- Interviews and Focus Group Discussions with Elders

How did agriculture in the community change over the time? (Often the history of agricultural extension was discussed here).

What is the impact of FFS on the community? Any changes in farming behaviour? If so, for who (FFS participants, non-participants, or both)?

What are the challenges faced in the community in agriculture?

What is the impact of human disease on agriculture?

Are there gender specific roles in the community? What are they? Did these roles change over time? If so, how and why did they change over time? Did the FFS have an impact on these changes in roles?

II- Interviews with FFS Participants:

A. Introductory Question

1-How would you describe your roles and responsibilities on the farm?

B. I would like to ask you a few questions about your involvement in the Farmers Field School Project.

2) Could you describe or give some examples of the various ways you participated in the FFS process?

-experiments

-small group discussions

-asking for technical advice

3) Why did you decide to join the FFS program?

4) What are your main concerns in local agriculture?

5) What did you think about the level of local farmers' involvement in FFS?

6) Do you feel that your interests in the program were adequately addressed? If "yes", please explain. If "no", please explain.

7) Did you feel that your voice was heard in FFS activities? If "yes", please explain. If "no", please explain.

C. I will now ask you questions that deal with learning outcomes that you may have experienced as a result of your involvement in the FFS program.

8) Through participating in the FFS program, what did you learn about ecological/environmental aspects? Please explain.

9) What did you learn about pest issues? Please explain.

10) What did you learn about soil fertility issues in FFS? Please explain.

11) What did you learn about water management issues? Please explain.

12) Through your involvement have you learned anything about sustainable farm management? If so, what have you learned?

13) Through participating in the FFS program, did you gain an increased understanding or a new understanding of the technical aspects of farming? If so, could you please explain?

14) Through participating in the FFS program, did you gain an increased understanding of the role of women in farming? If so, please explain.

15) Through your involvement in the FFS program, did you learn from other farmers? If "yes", could you please explain?
16) You may have talked about this already, but is there anything else that you learned as a result of your involvement in the FFS program?
17) Did the FFS activities force you to think critically?
18) Did the way you perceive yourself, your community, and your environment change through participation in the FFS program? If "yes", please explain. And Did that affect how you behave? If "yes", please explain.
N.B. This question was asked as above but also mostly was asked as: Did the way you behave change as a result of FFS? Almost always got this response: You mean at the farm level? Ans: I mean at any level, the farm and the personal level.
19) As a result of your participation in the FFS activities, were there any new skills developed? If "yes", what were those skills?
20) Has the management practices on your farm change at all as a result of participating in the FFS program? If "yes", please explain.
21) Did/do you disseminate what you learned through your involvement in the FFS program? If "yes", please explain. How and who was/is your target.
22) Do you think there are differences between what you learned and what you wanted to learn? If so, what are these differences and why do you think you were not able to learn them?
23) How would you describe the relationship between the participants and the facilitator?
24) What could be done to improve the FFS program?
25) Do you have any other comments about FFS or about this survey?
26) Could we meet again at a later date after I have had time to review my notes so that I can ensure I understood all you had to say? If so, when will be the perfect time for you?

D. Another round of interviews:

27) Did learning continue after FFS? If "yes", what did you learn?
28) During our PRA, you said that disease in humans is a problem in the community? What is the impact of human disease on agriculture? Is it contributing to a failure in agriculture? If so, please explain.
29) Did you learn anything about weeds in FFS?
30) What did you learn about beekeeping?
31) What did you learn about farming as a business "FAAB"?
32) Did you learn anything about sorghum growing?
33) Did you learn anything about rice growing?
34) How would you see the impact of Mwora on the community? Did the community benefit from Mwora? If so, please explain.
35) Did you learn anything about baboons in Mwora?
36) What did you learn about Calishia? Did you do it or not on your shamba or in the Mwora site?
37) What did you learn about terraces? What did you learn about contour plowing?
38) Did you diversify more of your crops as a result of Mwora? Please explain.
39) Think critically and changes in behaviour (way you see the environment)? (2nd attempt)

40) What are the roles of men and women in the community? Do the roles differ in Mwora FFS? If so, please explain.
41) What did you learn about harvesting in Mwora?
42) How would you describe the relationship between gender in Mwora?
43) Why aren't all the farmers in Mwora?
44) Can ladies inherit land? What do you think? Should they inherit land? Please explain.
45) Would you prefer a woman or a man facilitator?
46) Teach other people when come to buy?
47) Why hasn't ever the chairman or the secretary position been filled by a woman? Why is it that this year both vice chairman and vice secretary are women?
48) Did you visit other FFS? If so, what did you learn from them?
49) What are the ground rules for the Mwora group?
50) Do you fail on your shamba? How often? Please explain.

III- Interviews with the Non-participants:
1* Did you learn anything from the Mwora people in the community?
2* What is the impact of human disease on agriculture in the community?
3* Did you see changes in the community as a result of Mwora?
4* How did the community benefit?
5*Who helps you on your farm? How big is your farm?
6* Are there any gender specific roles in the community?
7* Can women inherit land? What do you think?
(The questions that follow were asked for the non participants during our first and only interview and for the participants during our third interview. The following questions are accompanied by a farm visit. The questions are held on the farm unless the only farm was in the lower zone.)
8* How big is your farm? Who does the title deed belong to? (If the woman was divorced, widowed, or a single mother, then she would be asked if she had any problems in accessing land after divorce or death of husband).
1-Do you plant any vegetables?
2- Do you have terraces, lay trash, or/and have trenches on your farm?
3- Do you do early land preparation?
4- Do you do dry planting?
5- How many times do you weed? Do you put soil at the base of the crop? Please explain.
6- Do you perform deep or shallow tillage?
7- Do you perform crop rotations or intercropping? What type of crops do you plant?
8- Do you control pests on your farm or look out for crops on your farm?
9- Do you store your seeds from season to season? If so, how do you store them. Do you plant certified seeds? If so, which of the seed types do you prefer?
10- What type of spacing do you use while planting? How many seeds per hole?
11- Do you sell any of your produce?
12- Do you use manure while planting?
13- Do you burn on your farm?

(Most would say no because it is illegal to burn. But during the farm tour, I would notice burning patches. They would answer there was too much debris and had to burn it.)
14- Do you compost?
15- What are the challenges that you face in farming?
16- When it is dry, do you irrigate from your house to save some of the crops?
17- When do you harvest or what are the indications you use for harvesting?
18- Do you keep records of how much you sold, planted, got etc.
19- Do you plant sweet potatoes in ridges?

IV- Focus Group Discussions with the twenty FFS

How did the group form?
Why did the group decide to join FFS?
What keeps you together as a group, many FFS have dissolved?
What are the most important things you have learned in FFS?
Have you learned anything on your own without the intervention of the facilitator?
How would you describe your relationship with the facilitator?
Any innovations as result of FFS? Prior to FFS?
Have you seen any changes in your behaviour and others' behaviour as a result of FFS? If so, can you please explain?
Do you teach other people about what you have learned in FFS? If so, who and how?
What are the problems faced by this FFS?
How can FFS become better?

V- Focus Group Discussions Topics with Mwora FFS
Table 4 Topics Discussed in Focus Group Discussions with 14 Members of the Mwora FFS, 6 Men and 8 Women.

Mwora Focus Group Discussions	Times Discussed
Seasonal calendar, community map and community walk	1
Gender specific problems in agriculture	2
Daily calendar	1
Weekly calendar	1
Solutions to gender specific problems	1
Crop values	2
Sustainable agriculture	1
How did learning occur in Mwora FFS	2
Gender relations in FFS	1
Collective action as Mwora FFS	1
Individual action as Mwora FFS members	1
How did the community benefit	1
How did the learning spread	1
Impact of FFS on the community	1
Comparing and contrasting agriculture before and after Mwora FFS	1
Comparing and contrasting roles and activities of Mwora farmers with the non-participant farmers	1

Note: These topics were addressed on newsprints in gender-segregated groups, afterwards each of the two sub-groups presents to the other group, and further discussion goes on.

Appendix II Verbal Script for Oral Consent

UNIVERSITY OF MANITOBA

Natural Resources Institute
70 Dysart Rd,
Winnipeg, Manitoba
Canada R3T 2N2
General Office (204) 474-7170
Fax: (204) 261-0038
http://www.umanitoba.ca/academic/institutes/natural_resources

Research Project Title:

Rethinking Agricultural Extension in Diverse and Risk Prone Areas: A Comparative Case Study in Kenya

Researcher: Dina Najjar

My name is Dina Najjar, and I am a student at the University of Manitoba. I am conducting research in Kenya about farmer field schools programs, and I am interested in recruiting farmers participating in farmer field school programs to participate in my study.

I will read you a description of the study; this should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask.

The purpose of this research is to investigate learning occurring in farmer field schools programs. I am studying what is learned and how it is learned. I am also looking at gender specific needs for learning and extension advice. I also want to determine if learning in FFS can contribute to the development of sustainable agriculture in the community.

Your participation in this study will take the form of a series of not more than three personal interviews, which may last for approximately 1-1.5 hours over a two to three weeks period. In addition to focus group discussions, walks in the community, and mapping exercise. I would like to obtain a more complete understanding of the learning that you may have experienced in the FFS program and get your views on the FFS program and how it can better suit your needs. I will take notes through our discussion. All information you provide will be treated as confidential, and you will not be identified by name in any report or publication resulting from this study. I will use a coding system in my notes to keep your name separate from the interview notes. No one will have access to your name or coded interview data other than my supervisor and myself. Raw data will be completely destroyed when they are no longer required. After we have finished an

interview and after I go through my notes, I will re-visit you to provide you with the opportunity to change, modify, or omit any of your comments if you so desire.

I will provide concerned NGO with a copy of my thesis project that details my findings and recommends how the farmer field school program may become better suited to your needs and aspirations.

Agreeing to participate in this study, by giving your verbal consent, indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. You may contact me, the principle researcher, Dina Najjar 1-204-xxx-xxxx, or my supervisor John Sinclair 1-204-xxx-xxxx.

This research has been approved by the University of Manitoba Joint Faculty Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 1-204-xxx-xxxx, or e-mail margaret_bowman@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.