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GENDER, LAND OWNERSHIP AND FOOD PRODUCTION NEXUS IN MBEERE DRYLANDS, KENYA: IMPLICATIONS ON HOUSEHOLD FOOD SECURITY

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Abstract:
Land ownership gives an individual the confidence and dignity required to be active in society. Indeed, land ownership and rights are important for effective utilization of farmland for food production to alleviate food insecurity and revitalize household welfare and national development. While the foregoing is the ideal situation, the reality is that culture and gender dictates who owns land especially when customary laws seem to override any legal and policy provisions regarding land ownership, access and control. In particular, women are largely land caretakers, with men owning most of the land, titled or otherwise. Based on the foregoing, this paper sought to identify gender and land ownership structures in the context of dryland farming and their implications on household food security in the Mbeere drylands of Embu County. It utilized both qualitative and quantitative methods of social investigation and concluded that while many factors combine to determine food production and food security, inadequate access to and control of land and related resources by women in the Mbeere drylands is significant. Consequently and given the environmental and cultural milieu on which land is utilized, measures have been proposed to augment dryland farming and alleviate food insecurity in the Mbeere drylands.

Keywords: Drylands, gender, land rights, food production, food security

1. The Mbeere Drylands of Embu County

Mbeere drylands posit largely below average human development indicators that can partly be explained by unreliable weather patterns, aridity, soil moisture deficiency amid high thermal stress (Republic of Kenya, 2009a). They cover an area of 2,092km^2,

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about 80% of which is arable and the rest being largely water bodies in the form of dams along the River Tana. They hold a population of roughly 220,340 people by 2008 and hence a density of about 105 people per km² (Republic of Kenya, 2009a; 2009d), which is sparsely distributed and spread in approximately 37,036 households, about 30% of which are female-headed. In general, the females are more than males in the Mbeere drylands, with the ratio being 9:10 as at 1999 (Republic of Kenya, 2009b).

The population is mainly concentrated around major market centers like Ishiara, Siakago, Kiritiri and Karaba and around water sources such as rivers and dams, where irrigation farming and fishing take place. The rest of the drylands is predominated by dryland farming and livestock rearing as informed by the aridity of the area (Republic of Kenya, 2009a; 2009b). The foregoing is a push factor for rural-urban migration particularly for males in search of employment opportunities as women largely remain in the rural areas. This is suggestive of the prevailing gender division of labor and resource ownership including power.

The Mbeere Drylands have a bimodal but unreliable pattern of rainfall, which ranges between 640mm and 1100mm annually, with most parts receiving average rainfall of 550mm per annum. This rainfall pattern and amount is typical of semi-arid areas of Kenya and hence conducive for dryland farming. There is however climatic variation in the drylands especially towards the south eastern parts informed by proximity to Masinga, Kamburu, Kiambere and Kindaruma dams along the Tana River that form Kenya's Seven Folks Hydro-Electric Power Project (Republic of Kenya, 2009a; 2009b).

About 50% of the population live below the poverty line ($1 a day), with the major economic activities being dryland and irrigation-based farming of various crops such as maize, beans, cow peas, watermelon and green grams. In addition, horticultural crops, miraa (khat), tobacco, cotton, livestock rearing, bee-keeping, small-scale entrepreneurial activities and fishing are also carried out. Moreover, exploitation of natural resources including charcoal burning, quarrying and sand harvesting among others, form part of the economic engagements (Republic of Kenya, 2009a).

From the foregoing exposition, it can be deduced that the Mbeere drylands are disadvantaged in more ways than one particularly with regard to food production and hence the perennial food insecurity in the area. An intervention measure in this particular case would be to come up with strategic options including policies and their implementation to enhance the ability to produce food.

2. Gender, Land Ownership, Use and Food Production

In Kenya, there are glaring gender inequalities as a result of unequal access to education and training, credit facilities, job opportunities and markets (Republic of Kenya, 2007; 2008; SID, 2010). In addition, these differences are largely a consequence of law, whether customary or common especially with regard to the ownership of land and other productive assets (SID, 2010; Karimbux, 200; Mneney, 2000; International Law

Coalition, 2009). For example, women own approximately 1-5% of all titled land in Kenya although they constitute the majority of those actively engaged in farming in rural and urban areas (SID, 2010). This is despite the constitutional requirement at Articles 27(3) and 60 (1a&f) (Republic of Kenya, 2010), which states that,

> *"…women and men have the right to equal treatment, including the right to equal opportunities in political, economic, cultural and social spheres (Article 27: 3) and land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable, and in accordance with the following principles (a). equitable access to land; (f). Elimination of gender discrimination in law, customs and practices related to land and property in land (Article 60, 1a & f)."*

Despite the foregoing provisions including the dictates of the 2009 Kenya Land Policy (Republic of Kenya, 2009c; Mwenzwa & Bunei, 2012), gender disparities in land and property ownership and control are glaring, to the disadvantage of women not only in Mbeere but also in the rest of the country. This has direct implications on land conservation, utilization and by extension food production, which in turn affects household as well as community food security and national development. Indeed as data attests, women are relatively disadvantaged as compared to men in food production in the study area and elsewhere as we later discuss in this work.

2. Materials and Methods

The data that form part of this work was collected during the months of February, March and April 2015 in Kiritiri Division of Mbeere South Sub-County, Embu County, Kenya. The aim of the study was to understand how gender and land ownership interact in dryland farming and the implications of this interaction on household food security. It was carried out using various data collected methods namely; survey, focus group discussions, direct observation, key informant interviews and desk research. In particular, there were four group discussions, seven key informant interviews while 75 households were surveyed using the household questionnaire, from which, 44 women and 31 men were interviewed, with their ages ranging between 26-57 years.

In addition, key informant interviews were carried out with a local chief, a women farmers' group leader, a youth group leader, a prominent farmer and three agricultural extension officers. Moreover, the focus group discussions were carried out with a youth farmers' group, agricultural extension officers and a women farmers' group, all from the study area. In addition to the foregoing methods, there was also an observation checklist and the use of secondary data to corroborate the firsthand information. For example, through the use of an observation checklist it was possible to identify the various crops grown, people involvement in farming activities and the soil conservation measures undertaken by local farmers among other issues.

3. Findings

The findings for this study are categorized into various sub-themes including ecological and anthropogenic threats to dryland farming; gender, farm work and related activities; and finally gender, land ownership and food production systems in the study area.

3.1 Ecological and Anthropogenic Challenges to Dryland Farming

A variety of challenges to dryland farming both natural and anthropogenic were noted and these has had adverse effects on food production and security not only in households, but also the community at large. To begin with, dryland farming is threatened by persistent drought that has the impact of reducing crop yield and escalating food insecurity in the study area. The foregoing drought is responsible for inadequate rainfall and hence soil moisture deficiency. In addition, some soils are infertile as some of the areas are rocky ruling out farming of any kind including dryland farming.

Furthermore, due to the observable general vagrancy of the physical environment, livelihood diversification is minimal and when this happens, it comes with heavy material and human resource investment. For example, irrigation farming which may be an alternative to dryland farming is not only costly in terms of finances, but also the physical distances that water has to be pumped to reach farms. Indeed, it is only a handful of farmers with farms adjacent to the dams that benefit from River Tana. The farmers with farms along the river are largely commercial growing horticultural and other crops for the market.

Besides ecological challenges, there were anthropogenic activities that adversely affected dryland farming and hence food production. These include the introduction of *muguka* (Khat) farming, idleness among local youth and poor soil conservation techniques. Others include shifting cultivation, poor farming technology, illiteracy, policy shifts and inadequate resources for extension on the part of extension officers. As mentioned earlier, the introduction of *muguka* as a cash crop had it positive and negative side. While extension officers as well as farmers reported that it may have increased food security for some households due to increase financial returns throughout the year, in other households, it was seen as a double curse.

In the latter case, while *muguka* worked to decrease acreage under food crops as reported by locals, the returns were largely appropriated for purposes that were counterproductive to household food security including drinking liquor and immorality. Indeed, many local farmers and administrators who were interviewed concurred that after the introduction of the crop, some men metamorphosed into perennial drunkards to the detriment of household food security and welfare.

In addition, the introduction of the crop also so many youth get into drinking liquor given that many had their own portions of land under *muguka*. They therefore had money with little effort given that *muguka* requires little labor compared to other crops against returns throughout the year. Indeed, as one youth *muguka* farmer

explained during a focus group discussion, *"…the only major difficult with muguka growing is during the dry season when I have to buy water to water the crop. This is also the time when returns are at the apex given the scarcity occasioned by drought. For a few of us who can afford to water the crop during the dry spell, we make a kill. I don't really need to grow maize which is seasonal against unreliable rainfall and all I want is money."*

The returns some of these youth get from the *muguka* growing a good enough to dissuade them from growing food crops. Unfortunately, most of the money is appropriated through drinking and other leisure activities at the expense of buying food for their families. Indeed, an inspection of five liquor bars in Kiritiri Market one evening revealed that they were largely patronized by youth and *muguka* middlemen leisurely taking liquor.

Furthermore, illiteracy and the use of traditional methods of cultivation were noted as impediments to dryland farming, food production and therefore partly responsible for food insecurity in the study area. Indeed, of the 75 people interviewed, their levels of education were as presented in table 1.

Table 1: Respondents' Level of Education

Level of education	Number	Percentage	Cumulative percentage
None	10	13.33	13.33
Primary	31	41.33	54.66
Secondary	21	28.00	82.66
Tertiary	10	13.33	95.99
University	3	4.00	99.99
Total	**75**	**100.00**	**100.00**

Source: Field data, March/April 2015.

As shown in table 1, about 83% of those interviewed had only up to secondary level of education, with the implication that most of the information they used in farming was either traditional knowledge or the skills they got from agricultural extension officers. While secondary level of education may not necessarily be adequate for effective dryland farming, the minimal contact between the farmers and extension officers was not enough either. Nonetheless, it was determined that the long experience of some of the farmers worked well and extension officers had informally converted such farms into demonstration farms. During a focus group discussion with agricultural extension officers one of them explained,

> *"There are interesting success stories particularly those who have been working well with us. Although they are not so many, we can proudly say that we have had an impact particularly working with the relatively old farmers who have attended our trainings religiously as history and our records can attest. Such farmers are always asking us about weather forecasts, new pesticides, availability of fertilizers and are also the ones on record as having taken soil conservation and agro-forestry seriously. In addition, they have many varieties of crops to spread the risk of crop failure. During the dry season, they are the ones who flood the local markets with citrus fruits-there is always something*

to eat for their families. We have informally been using three of these farmers as local extension officers and their farms for demonstration when we carry out extension education."

The foregoing is a testament that while agricultural extension officers have been working despite the logistical challenges that they face, many farmers are yet to play their rightful role and are hence partly responsible for food insecurity. This is for the reason that farmers fail to implement what is extended to them by the extension officers. During a focus group discussion with a women farmers' group and while acknowledging the foregoing one farmer opined,

"We cannot ignore the role of extension officers in giving us information and we cannot say in confidence that we do not have the right information. However, to put in practice what we know is the major problem. Take for instance when am required to grow sorghum and millet as drought tolerant crops yet I am alone-my husband is working in Meru, my children go to school and I do not have a farm hand against many household chores. I have to tend the farm, look after livestock and yet fetch water and firewood and prepare a meal for the children before they arrive from school. Sorghum and millet growing requires that you are in the farm the whole day scaring birds at least for two months before you harvest. When you harvest there is the thrashing before you can get money to buy other foods. These crops also fetch very little returns against the intensity of labor that has to be spent. I would rather grow maize and beans than the so called drought tolerant but labor intensive crops that will not provide food immediately."

From the same data, it was deduced that all the 10 respondents who had not attended formal schooling were women. In addition, at each subsequent level of education, the percentage of men was more than that of women except at the university level where out of the 3 university graduates, 2 were women. Given the foregoing scenario, it is important to interrogate at the theoretical level, the interface between level of education and acquisition of appropriate information.

Studies have shown that those with relatively high level of education are also in a position to get information and easily understand and internalize it (Wanjala, 2000; Kinuthia, 2009; Ontita, 2012). As a result, it is expected that those with high level of education are also able not only to get information easily, but also understand it. This is the scenario in the Mbeere drylands where levels of education are low as shown in table 1. The implication of the foregoing is that many farmers use traditional methods of farming and technology in the midst of aridity, soil moisture deficiency and low intake of input such as fertilizers, pesticides and other agro-chemicals. Indeed, mechanized farming is almost alien, leaving farmers using the hand hoe and ox-drawn plough in farming.

Moreover, the foregoing is accompanied by poor choice of crops and a physical environment that largely forbids livelihood diversification. Indeed, of the 75 farmers

interviewed, only 35% were using fertilizers, with about 67% reporting to have used pesticides. Overall, women farmers were the majority in the use of fertilizers and pesticides perhaps because they were also more organized in groups that worked well with extension officers as opposed to their male counterparts. While many of the farmers avoided drought tolerant but labor intensive crops such as millet and sorghum, others hardly used any fertilizers including farm yard manure that was available. Indeed, an observation in one household revealed that farm yard manure (cow dung) was making cattle restless in a shed especially after it was soaked with rain water given that the shed had no roof.

Due to population pressure and the traditional practice that sons inherit land from their fathers, land has been divided and subdivided among siblings making them small and hence uneconomical. Even where crop land acreage is large, soil fertility, aridity and associated factors stand in the way of farmers benefiting from economies of scale. This is compounded by the invasion of farmland by *muguka*, effectively compromising the land acreage under food crops. Furthermore, the crosspollination of low farm input intake and accompanying low levels of farm technology work to make the already ugly situation more so to the disadvantage of food production and hence food insecurity. Indeed, unreliable weather patterns in the area only to make the scenario dire.

3.2 Gender, Farm Work and Related Activities

Literature abounds to the effect that women take the bulk of farm work and generally domestic chores (Mwenzwa 2011; FAO, IFAD & WFP, 2014). Indeed, women constitute 75% of Kenya's agricultural labor force although as shown elsewhere in this work, gender inequalities undermine their productivity, including limited access to essential resources and institutionalized barriers to credit and land ownership (Institute for Development Studies, 2006). The foregoing is not any different from the study area where there was a clear division of labor regarding farm work and conservation activities particularly on gender lines. With regard to farm work, it was clear that women took the bulk, with men taking largely supervisory roles. Table 2 below is a depiction of the way farm duties are shared by gender.

Table 2: Gender division of farm labor

Role	Male	Female	Both
Land ownership	√		
Farm work supervision	√		
Sowing seeds		√	
Weeding			√
Mulching		√	
Daily tending of crops		√	
Digging terraces	√		
Harvesting		√	
Thrash grains		√	
Decision on what to plant	√		

Fertilizer application	√		
Pesticide application	√		
Marketing produce			√
Growing *muguka*	√		
Marketing *muguka*	√		

Source: Field data, March/April 2015

From table 2, there is an apparent clear gender division of labor regarding farm work making it appear that men are the most burdened by farm work given that they have more farm duties. These include decision making on what to be planted, digging terraces, farm work supervision and both fertilizer and pesticide application among others. Women on the other hand are more involved in daily tending of crops, marketing farm produce except *muguka*, weeding, harvesting, thrashing grains and sowing seeds. A closer scrutiny of these farm roles shows that the duties performed by women are not only repetitive, but also requires their physical presence in the farms such as daily tending of crops including guarding against wild animals. On the other hand, the roles of men are more or less occasional and some do not necessarily require the man's physical presence. For example, during a key informant interview a local administrator explained that,

> *"I do not have to be at home to give instructions to my family as to which crop to be planted on which part of the farm, neither I have to physically show them the livestock that they should take to the market. When I was working as a teacher in Narok in the eighties, I could simply write a letter to my wife in which I gave instructions as to what ought to be done and I did not expect any exceptions. Men by their nature work like that everywhere."*

It is important to note that even though there is clear division of labor by gender, it does not necessarily mean that men could not undertake some of the roles that are expected to be done by women and vice versa. For example, there are men who did weeding and thrashing of grains, while some women as well took part in the harvesting and marketing of *muguka*. As a result, it is important to mention that the allocation of duties was not rigid given that exceptions were clearly observed. Nevertheless, from the data it is clear that women did the bulk of farm work especially the tedious, manual repetitive and generally work that requires their physical presence. The implication is that women actually did most of the physical production of food in addition to other family welfare related chores.

3.3 Gender, Land Ownership and Food Production

As pointed out in the methodology, 31 men and 44 women respectively were interviewed during this study. It was determined that while only one (1) woman owned land in the study area, all men interviewed owned land. Land ownership here is defined to mean not just physical access but also the ability to appropriate and dispose of the same at will. Further, ownership also includes the authority to determine what is

to be grown on the land including whether anything was to be grown at all. It was determined that, the sole woman land owner owned the family land by virtue of having been widowed and the fact that her eldest son was too young to legally own land. She explained that:

> *"Baada ya kifo cha mme wangu, nililazimika kushtaki kifo ndio hadi miliki ya ardhi ibadilishwe kutoka kwa jina lake hadi langu. Niliofia mashemeji wangeweza kuingilia kati na kuitwaa ile ardhi ambayo ni urithi wa watoto wangu. Umiliki wa ardhi hapa kwa wanawake ni nadra sana kama wewe si mjane. Hata hivyo wajane umiliki ardhi kama watoto wao ni wa umri mdogo kama hawa wangu. Nagonja tu wakue kiasi cha kupata kitambulisho cha taifa ndio niwagawie kila mmoja sehemu yake (After the death of my husband I had to quickly process and change the land title deed from his name to mine. I feared that in-laws could dispossess me of the land that is the inheritance of my children. Land ownership by women here is rare unless you are widow. Even the widows own land when their children are young like mine. I am just waiting for them to get national identity cards so that I can subdivide the land to each one of them).*

What comes out of the foregoing quotation? It is clear from literature that ownership of assets including land gives an individual the confidence and authority to take care of the asset in a way that is productive and sustainable. From a number of interviews among women regarding whether they ought to on land, opinion was divided. While 23% of those interviewed were of the opinion that they ought to own family land, 57% believed that their husband's ownership of land was enough-that they were comfortable *landless*. Surprisingly, the rest of the respondents (20%) were non-committal and therefore did not give a response to this question. One of the latter aged 51 years and who was also an extension officer explained during a key informant interview,

> *"My husband has demonstrated responsibility for the last 27 years that we have been married. His property is mine and therefore there should be no problem if the family land title deed is under his name. I know he would be surprised if I asked to possess part of the land now and I have not asked for it during the last 27 years. I would rather other issues break my marriage than my push to possess land which I own anyway. My work is basically to ensure family harmony but not to be the Biblical woman who breaks her family using her tongue."*

Whereas it is not in doubt that there are responsible men who would appropriate land for the benefit of the family, there are also exceptional cases who may do so for selfish interests. In this regard, during a focus group discussion with a local women farmers' group, it was revealed that men were the sole determinants of how the land would be utilized and as such determined the acreage to be set aside for various uses. There was consensus that although women did not feel highly disadvantaged, the fact

that men had the sole authority regarding land utilization hampered dryland farming. The foregoing was in the sense that women could not plant the crops that out of experience were better placed to ensure household food security.

Moreover, women were also disadvantaged and could not successfully challenge men decisions as to the acreage to be put under food crops. With regard to the foregoing, one of the focus group participants explained,

> "*My family has 12 acres out of which 7 are set aside for grazing and the rest is farmland. In March 2013, my husband unilaterally decided to put 3 acres of the farmland into muguka*[ii] *growing leaving the family to grow food crops on a 2 acre piece of land which can hardly feed the family. It was a surprise but since he is the head of the household, I had to execute his decision."*

The foregoing as was revealed in other interviews discussions was not unique to this particular household, but a reality that many other local household have had to learn to live with. The implication is that with the introduction of *muguka*, food crop land has decreased with obvious decrease in the amount of food produced. This is against unreliable and unpredictable weather patterns in the midst of poor farming technology and other anthropogenic activities that further degrade land. The result can partly explain the perennial food insecurity in the Mbeere drylands as the intersection of gender, land ownership and decision making power compound food production.

However, it was pointed in key informant interviews and focus group discussions that the introduction of *muguka* may have improved food security for some households. That notwithstanding, the new cash crop was more of a curse than a blessing to other households given that its ownership was vested in men, some of who appropriated returns in ways that were counterproductive to household food security. Indeed, as the new crop took away part of the food crop farmland, climate change and its vagaries heightened challenges of food production even as income from the crop was utilized casually including in the taking of liquor. An extension officer who has worked in the area for close to 7 years opined that "*increasing muguka acreage apparently came with increased drunkenness among many farmers to the detriment of family welfare*." Such is an affront to food production, security, family welfare and development at large.

4. Conclusions and Recommendations

From the data, it was clear that the potential of the Mbeere drylands is higher than normally thought and that it is yet to be fully tapped. Indeed, if the potential of dryland farming and the attendant benefits are fully tapped, this can make the area food self-sufficient, its *own bread basket*. In addition, that there is more that local farmers need to do to augment food production, increase incomes and alleviate food insecurity cannot

[ii] A variant of Khat (miraa), a local cash crop that has lately colonized farmlands in Mbeere drylands

be gainsaid. However, for the foregoing to be realized, it is important that the following strategies among others be adopted.

First, with the introduction of the World Bank and International Monetary Fund (IMF) engineered Structural Adjustment Programmes (SAPs) in the 1980s, there has been a dramatic change in the way agricultural extension services are provided to the demand-driven style with does not seem to have gone down well with local farmers. The single most important challenge in the field is the inadequacy of specialized extension staff and the ever inadequate resources to facilitate them to serve farmers on time and appropriately. More important, it would seem that agriculture was devolved to the counties when they were not resource-ready. Given the foregoing, many farmers see the demand-driven fashion of providing extension services as part of the problem rather than the solution and are therefore reluctant to seek assistance from the officers. Even when this happens, implementation of the extension officers' advice is to some extent unrealistic as captured verbatim elsewhere in this work.

As a result, it is important that the county government allocates more resources to ensure intensification of agricultural extension services. This is expected to partly bridge the human and material resources gaps and hence reach as many farmers with extension services as possible. On its part, the central government hat is particularly charged with policy formulation should overturn the demand-driven style of agricultural extension so that the officers can be facilitated to go around farms to monitor and determine farmers' needs. This is expected to ease the burden on the part of the farmer and help increase farm production many-folds.

Second, it was observed that there are food-cum-cash crops that can do well but that have either been neglected by farmers or are grown in very small scale despite the availability of adequate farmland. For example, green grammes that can be grown as food as well as cash crop are grown by a few farmers and on small-scale. As such it is observed that increasing farmland under green grammes and other crops accompanied by intensified extension services stands a chance of increasing the food available to households as well as their incomes. In addition, streamlining its bazaar perhaps through initiating local farmer marketing cooperative societies is seen as an avenue to increase farmer income as this would do away with exploitative middlemen.

Third, farmers and extension officers alike were unanimous that before the World Bank SAPs, there was a concerted effort at agro-forestry by the government with particular emphasis on trees that were suitable to local climate conditions including the provision of acacia seedlings. These were important in increasing forest cover and reducing soil erosion as well as conserving rain water. With change of policy in line with World Bank conditionalities regarding reduction of expenditure on such services, there is an apparent movement towards desertification as charcoal dealers and commercial firewood harvesters are targeting indigenous trees without an accompanying re-afforestation. The precedent that has been set is one of survival for the fittest, with the result being manifestation of the Tragedy of Commons hypothesis-land is becoming more bare and barren due to casual deforestation.

Flowing from the foregoing, there is the need for the revival and revitalization of the deforestation programmes that has since died in order to increase the acreage under trees in line with the ideals in the social pillar of the Kenya Vision 2030 (Republic of Kenya, 2007; 2008). In the absence of the foregoing, it is expected that more and more forest cover will be depleted with the result that the land become bare, inviting both wind and water to erode the already fragile soil. The foregoing stands in the way of not only soil moisture and soil conservation, but also minimizes crop yield as nutrients are washed away by surface run-off and into water bodies. The overall result would be eutrophication in water bodies, negatively affecting aquatic ecosystems as well as minimizing crop yields.

Fourth, there is apparent little emphasis by farmers on drought tolerant crops that may be labor intensive in favor of less labor intensive ones at the expense of local food security. For example, while millet and sorghum could do well even under little rainfall, these crops have largely been neglected and instead farmers are concentrating on other crops like maize and beans that require relatively large amounts of rainfall. Part of the problem as was reported by many research participants was the amount of labor investment against potential benefits especially the income to accrue to farmers from such crops. Another reason would be the lessened interaction between farmers and the extension officers that may be explained by the physical numbers of the latter as well as the resources set aside for extension activities.

As a result, it is suggested that more effort and resources need to be committed and invested in extension work to augment information flow to the farmers regarding cropping and choice of crops that are suited to the local weather conditions. An important intervention strategy may require extension education for farmers to change attitude towards drought tolerant but labor intensive crops as opposed to less labor intensive crops whose suitability to local conditions is questionable. In the absence of the foregoing, crop failure will remain to haunt farmers and food insecurity will most likely increase in the face of local environmental degradation and global climate change.

Fifth, it is noted that farmers at a minimum take little regard to minimizing soil moisture loss through evaporation, leading to soil moisture deficiency, decreased crop yields and subsequent food insecurity at the household and community levels. As a result, there is very little available moisture in the soil given that its moisture retention capacity is reduced due to inappropriate cropping patterns. While there are many crops that can be grown to partly reduce soil moisture loss, this is not given due regard perhaps as a result of reduced intensity of interaction between farmers and agricultural extension officers.

To partly overcome the foregoing scenario and increase crop yields, there was consensus among all extension officers interviewed to the effect that growing of crops that are not only adopted to the local weather conditions but also that will bring two other benefits. These benefits came in the form of acting as mulch against soil erosion and soil moisture loss and producing food for the household and the market. One such crop as pointed out by all the field extension staff interviewed was *Dolicos lablab*, locally

known as *Njahi*. *Njahi* has the ability to cover the soil as it grows horizontally to the ground and has many leaves as well as being harvested twice a year. Indeed, this crop among others does not affect the growth and development of other crops that it is intercropped with, but act as live mulch again soil moisture loss. This is expected to substantially reduce soil moisture loss and hence increase other crop yields like maize and sorghum.

Six, it was observed that many farmers have neglected their farmers and left them unprotected from soil erosion either by surface run-off or wind. Indeed, the extent of farm neglect is so glaring that it can rightly be averred that most of the rain water is largely drained into streams. This has the triple disadvantage of increasing soil erosion, reducing soil moisture content and decease in soil nutrients. The foregoing is partly due to the fact that local farmers rarely dig terraces and cut-off drains in their farms. In addition, most farms are tree-bare and as such making water retention out of the question. Hence, instead of rain water percolating in the soil, most of it flows into streams and eventually into larger water bodies like rivers, dams and finally into the ocean to the disadvantage of farmland.

Given the foregoing state of affairs, it is suggested that extension officers need to go an extra mile and intensify efforts towards soil conservation extension education. Such would be undertaken through imparting knowledge on the importance of soil conservation through digging of terraces and cut-off drains on both farms and forests to arrest soil erosion as well as minimizing the speed of surface run-off. This if effected would have the triple advantage of retaining water, preventing soil erosion and minimizing soil nutrient loss. A combination of the foregoing advantages would definitely see increased crop yield and alleviating food insecurity a great deal.

Seven, literature on extension education has faithfully pointed to the fact that farmers and adults in general are more at ease when theory is married with practice particularly in an area that is of great interest to them. To ensure the internalization and institutionalization of extension education information, it is suggested that the Ministry of Agriculture in collaboration with the County Government of Embu provide resources to establish a few demonstration farms in the study area. Such demonstration farms are expected to go a long way in making farmers appreciate the importance of several activities including soil conservation, intercropping and other dryland farming practices. Once these are institutionalized and cascaded to their farms under the guidance of extension field staff, it is expected that crop yields would be increased many-folds and partly food insecurity.

Eight, there seems to be an observable disconnect between climate change and the ability of local farmers to adapt to the resultant climatic shift. Hence, despite the observable adverse effects of climate change, there is little the farmers seem to have changed to accommodate them. For example, with decreasing rainfall amounts over the years and continued growing of crops in the same pieces of land, conservation activities seem to be largely the same. Moreover, shifting cultivation is still practiced with little value-addition input into the land for example through digging of terraces and

application of other inputs to increase food yields. As a result, it is recommended that extension education in such areas should be intensified giving more emphasis to women who are largely more involved in farming activities in the study area.

Eight, it was found out that of the 44 women who were interviewed in this study, only one (2%) owned land, when ownership was defined to mean and include the ability to appropriate and dispose of it at will. The respondent was however a widow aged 39 years, who owned the land by virtue of the husband having been deceased and whose oldest male child was 15 years old at the time of the study. Hence, an important dimension to dryland farming as well as water and soil conservation in the study area was gender in nature. As such 85% of the women interviewed and who did not own land did not feel that they had the direct obligation to conserve land, which they regarded as the sole responsibility of men. On their part, 57% of the interviewed men believed that women should have no direct role in land conservation unless allowed by their spouses or male figures.

Flowing from the foregoing, it is suggested that women participation is soil conservation is partly hampered by the wobbly land ownership status. Indeed, there was a general feeling and atmosphere of helplessness among women in terms of how land would be utilized including which crops to plant. 95% (42 out of 44) of the women interviewed believed that the decision as to what crops to grown in the family land was the prerogative of men irrespective of whether they were physically present or engaged in white collar engagements elsewhere.

Consequently, it is suggested that to augment women participation in conservation activities, strategies need to be put in place to make women feel more that they own land. How this can be achieved may perhaps have everything to do with law, social work research activities and extensive and intensive community advocacy and mobilization. Indeed, Mwenzwa (2011) has recommended a number of areas that are of particular research priority in dryland farming in the country. Otherwise to change an aspect that has been institutionalized through the cultural umbrella of reality may not be as easy as said.

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