

Tobacco, Work and the Process of Ecological Change in Sirisia, Bungoma County, 1975-2005

Dr. Ndalilah, Joseph W.

Lecturer

Department of History, Political Science & Public Administration

University of Kabianga

P.O.Box 2030-20200, Kericho

Kenya

Abstract

This study examined the history, place and impact of commercial tobacco cultivation on ecology and environment. It also discussed perceptions of the consequent environment in Sirisia, Bungoma County using the Rational Choice Theory. The study applied this Theory to explain how the tobacco scheme initiated work on tobacco farms which in turn induced and sustained environmental change in Sirisia between 1975 and 2005. The paper holds that commercial tobacco cultivation in Sirisia, interfered with the pre-capitalist (Bukusu) harmony with the environment (nature). Against this background, the paper argues, ecological change became a permanent feature of Sirisia historiography in the period 1975-2005. The paper was based on archival research, oral interviews as well as analyzing existing literature on the impact of cash crops such as tobacco on environment.

Key Words: Commercial, Tobacco Cultivation, Environment, Environmental Perception, Ecology, Ecological Change, Nature.

Introduction

Commercialization of agriculture such as through tobacco production in the Third World has invited a lot debate on their impact on ecology and environment (Boesen & Mohele, 1979). The works of Babalola (1993), Baud, (1995), Maxon, 1994,1995., Muhereza (1995), Aliro (1993)., Scott (1982) and Otieno (1998), for example, are classic attempts by social scientists to come to grips with the issue through analyses of the impact of tobacco production on environment. These scholars hold the view that, commercialization of agriculture such as through tobacco production had a negative impact. Otieno and Aliro for instance, examining two separate environments, arrive at the conclusion that, peasant shift to commercial tobacco cultivation led to environmental change. These views are shared by Stubbs (1985), Rubert (1997), Wilbert (1991), Goodman (1993), de Jesus (1985), Goodspeed (1954) and Ndalilah (2015) who albeit in different study areas also examine the tobacco plant, its history and impact on environment. The main focus of these works has been its origin, spread from the Western Hemisphere and its impact. These works often note persistent beliefs that the plant was a panacea.

Therefore, the tobacco plant, its use and impact on ecology and environment has attracted a lot of scholarly attention (Scott, 1982., De Jesus, 1985., Boesen & Mohele, 1979, Chacha 1999, Otieno 1998). Spencer writing under its inspiration called it "divine tobacco" (Spencer, 1984), while Wilbert terms it "our holly herb *nicotiana*,... the smoke of the Gods" and that "it soothes the mind and sobers thought" (Wilbert, 1987). To some scholars it is a historical icon. More elaborately, Werner, in a preface to his masterpiece, *Tobaccoland*, echoes its social fabric calling it not only as a sort of fellowship, but as a vast domain of democracy wherein we find gathered people of every class and creed, a bond of sympathetic understanding, contact and good fellowship (Werner, 1939).

Despite the wealth of literature on tobacco, scholars have not adequately explored the process of ecological change occasioned by tobacco cultivation as well as overall impact on environment (Gately, 2001). In addition these accounts describe tobacco not only as an impetus but as a very popular crop in many parts of the world, Kenya included. The critical question is: how did this crop acquire modern negative peculiarities? Drawing upon reported evidence from the history of the crop, Lohnert & Geist (1999) hold that the impact of the crop is overly negative.

As to how tobacco reached Kenya in particular, there have been suggestions that it reached the interior of Kenya through Arab influence while other sources point to Portuguese presence on the Kenyan coast. This exotic tobacco venture was quite limited until the British American Tobacco (BAT) and the Kenya government embarked on the plan to make the country self-sufficient in tobacco production. But tobacco, it must be emphasised, was native to Sirisia and grew wildly like weeds (*enyonyi*) but later domesticated. This indigenous tobacco (*eraba*) was also grown on small scale by peasants long before the establishment of exotic tobacco. The Babukusu in Sirisia, for example, have had a long association with the crop. Some other sources suggest that the tobacco crop originated from Nilotic communities and Bugishu, Uganda.

Production and use of tobacco as noted, have been issues of great controversy. The concern has been expressed not only in respect to the health hazards associated with the consumption of tobacco but also emphasis with the impact on ecology (Khaoya, 1992., Boserup, 1965). This study examines how commercial tobacco cultivation initiated the process of ecological change in Sirisia, Bungoma County, in the period 1975-2005. As a prelude, it examines pre-tobacco Bukusu environmental conservation efforts. It holds that, precolonial Bukusu lived in harmony (balance) with nature emphasizing that environmental degradation was not rampant. Further it is observed that forest cover in Sirisia was subjected to extensive agricultural exploitation through commercial tobacco cultivation between 1975 and 2005. The landuse pattern therefore changed from one of mixed farming to dominance of a single cash crop- tobacco (tobacco monoculture), further depleting soil nutrients. Most importantly, the imposition of tobacco in Sirisia placed severe long-term strains on local ecological systems.

The Need to Understand the Impact of Cash Crops on Ecology and Environment

A lot of literature has emerged and the issue of the impact of cash crops on environment is presently a central theme in the historiography of Kenya. But an analysis of the impact of tobacco cultivation on ecology and environment particularly in Sirisia has not been researched on and, therefore, remains to be told in full. Earlier works dealt with tobacco production and its impact on labour, food security and environmental change elsewhere, ignoring areas such as Sirisia. This opens the research on tobacco to the dangers of generalized works and hence scholars need to study at micro level and present a systematic analysis. Not only is it important to focus attention on the impact of Multinationals through tobacco cultivation on ecology and environment, but the period that the research is based represents an important epoch specifically in Sirisia historiography and more importantly on environmental history. This study examines the impact of commercial tobacco cultivation on ecology and environment in Sirisia, Bungoma County in the period 1975-2005 particularly on a community that previously had a predominantly mixed economy.

Limitation of the Study

The paper is limited to the study of tobacco, work and the process of ecological change in sirisia between 1975 and 2005. Although the study focused on the process of ecological change in Sirisia during this period as well as its effects on the environment, the findings may be generalized to other tobacco growing regions in Kenya and elsewhere in Africa and the general Third World that share the same historical and socio-economic characteristics.

Materials and Methods

Sirisia is part of the Bungoma-Busia tobacco growing region and is located between longitudes 340E and 350E and the latitudes 00 and 10N 9 (Republic of Kenya, 1997-2001). Sirisia is located in Bungoma County, one of the administrative regions in Kenya. Specifically, the area is part of the wider Amagoro, Amukura, Kanduyi, Nambale and Sirisia (with the main tobacco hub at Malakisi) tobacco growing areas. The area has a high human population. This is attributed to conventionally rain fed agriculture practiced in this region. The soils are rich and suitable for mixed farming except in some parts like Chebukutumi, Bisunu, Butonge, Namutokholo, Yabeko, Kabuchai and Chongoi whose soils are underlain by hardpans (Republic of Kenya, 1999).

This paper was based on primary sources sought through oral interviews in form of field interviews and eye witness accounts. By use of question guidelines the informants were allowed to talk freely on the topic of study. Archival sources were then used to supplement oral interviews. More data was obtained from BAT Annual Reports, Bungoma District Development Plans, Reports from the Ministry of agriculture, Ministry of Environment and Natural resources as well as Statistical Abstracts capturing the impact of commercial tobacco cultivation on labour, food security and environment in Sirisia in the period 1975 to 2005 and elsewhere. Other sources included books, Journals, Newspapers, Magazines, Articles and Theses.

Results and Discussion

Pre-capitalist Ecology and Environment in Sirisia

There has been a long tradition in western intellectual thought that pre-colonial people particularly in Africa lived in some kind of harmony or balance with nature. Environmentalist literature today pictures pre-colonial communities as "children of nature." (Chacha, 1999., Beinart and Coates, 2000). As rightly observed by Beinart and Coates (2000), they lived lightly upon the land, never achieving the technology or demographic weight to disrupt their environment. That was true of the Bukusu society which like any other African community loved nature. There was always a link between the domesticated homestead and the natural vegetation (Packard, 1981. 3). Natural forces were respected and venerated. As Beattie points out, most of the elements of the physical and cultural environment had both auspicious and inauspicious aspects (Beattie, 1968. 438). Wild places were associated with fertility, healing, were a source of game, wild food and medicine (Beattie, 1968., Ndalilah, 2012). For instance, Bukusu rituals particularly constrained them from damaging nature (OI, Phylis Ndalila, July 28, 2010). Thus, the natural world was a source of power and wealth and, therefore, was carefully managed.

There is, nonetheless, some evidence of a spiritual conservatism among the Babukusu. Certain animals and trees were considered sacred, with each clan, *ekholo* having its own sacred tree, animal or bird. The *Bamulika* clan, for example, venerated the *kumusola* (OI, Andrea Ndalila, July 28, 2010). This respect for the natural world as was the case among the Babukusu in Sirisia also stemmed from appreciation of the beauty of nature and the communion of man with his world (OI, Phylis Ndalila, July 28, 2010).

Therefore, this study is premised on the fact that ecological change in Sirisia, Bungoma County between 1975 and 2005 was due to tobacco commercialisation. In fact, an examination of the indigenous Bukusu grazing strategies and environmental management reveals that they were good environmental managers (Ndalilah, 2012). The community played a role in generating knowledge based on a sophisticated understanding of their environment; a socio-cultural and ideological framework that never stressed the domination and "domestication" of the African "wilderness" (Anderson, & Grove, 1987).

The Babukusu believed that trees possessed spirits that would intervene in human affairs (Ndalilah 2012). For example each of the Bukusu clans exercised special controlling rights over large trees on their holding (OI, Phylis Ndalila, July 28, 2010., Warren, 1992). When clearing land, they would leave huge and conspicuous trees, at intervals to absorb the "spirits" from the ones harvested and were not cut or allowed to fall without a ceremony to transfer the "spirits" to other sites and trees (Ndalilah 2012., OI, Andrea Ndalila, July 28, 2010). It was held that young people who used such trees for fuel would become sick or die, but very old men and women could do so without danger (OI, Phylis Ndalila, July 28, 2010). Restraint on cutting trees was part of customary tenure rights and land use practices (OI, Andrea Ndalila, July 28, 2010). These were reinforced by cultural beliefs about trees. For example, *Khurenya chikhu* or fetching of firewood was carefully regulated. Only dead, dry and fallen pieces of wood would be gathered for firewood and in general live wood was never cut for fuel (OI, Phylis Ndalila, 2010). For instance, the area around *Yabeko* in Sirisia is believed to have had sacred trees. A number of respondents interviewed held that, dense forests had been destroyed due to among other reasons, clearing land for commercialisation of agriculture through tobacco cultivation, charcoal, construction and often through sheer ignorance (OI, Simon Wakachunga, July 20, 2010). It was also generally held by most respondents in Bukokholo that trees and forests played a pivotal role in Bukusu traditional religion and culture (OI, Sammy Siingia, September 28, 2010).

Generally, it has been demonstrated clearly that, the Babukusu used a wide range of techniques in managing their natural resources and that these systems were neither random nor irrational, but quite deliberate and adaptive to the vagaries of their environment.

The "level of technology" in indigenous resource management evolved into complex organizations and techniques. It should be noted that, in this regard, the basic principles behind a number of traditional resource management techniques were still viable and valid and can be used as a starting-point for the development of appropriate strategies for incorporation into development projects.

Tobacco, Ecology and History in Sirisia, 1975-2005

The issue of the impact of commercial tobacco cultivation on ecology was a matter of debate in Sirisia between 1975 and 2005. With tobacco cultivation, environmental degradation became much more pronounced in Sirisia during this period. For example, continued overuse of the same farms altered the soil PH and inhibiting germination of food crops. In cases where crops germinated, they did poorly because the nutrient level was low. These sources gave different perceptions on the causes of both food security and environmental change in Sirisia. For instance, Andrea Ndalila observed that;

It is sad these days, tobacco can no longer do well. The land is bare, it is hot. We have no food. Trees have been cleared over the years to meet the high demand for wood fuel required in tobacco curing. The best world in which we lived has been taken from us, rivers are drying up, forests are gone. We are now poor; we cannot educate our children... Sirisia was never like this! (OI, Andrea Ndalila, July 28, 2010).

Indeed, on this point, another respondent from Mwalie Location was in agreement:

In the past whenever it rained, our granaries would be full. This changed with the start of commercial tobacco cultivation in Sirisia. Land available no longer supports food crops due to soil exhaustion. Once cleared for tobacco, it is exhausted and can't support tobacco for long. Every season tobacco is moved to new fertile lands. But most people are addicted to growing it (OI, Margaret Namachanja, July 30, 2010).

Oral accounts also point out that the frequency in famine and/or subsistence crises attributed to natural disasters, particularly drought due to destruction of vegetation cover engineered by commercial tobacco cultivation and pestilence (OI, Andrea Ndalila, July 28, 2010). To stress the social basis of famine in Sirisia is not in essence to diminish the role of environmental factors in determining food security. At times, there were uncertain and relatively short rainy seasons which were a critical variable in food production. This, as observed, was due to wanton destruction of vegetation cover and in the process altering the hydrological cycle. The southern part of Sirisia in particular suffered regularly from low rainfall and the fact that it had fragile and infertile soils fully accounted for low food production. The seasonal hot spells imposed further constraints on agricultural production in Sirisia.

Furthermore, tobacco cultivation, exhausted soils because of constant and heavy application of fertilizers and chemicals (Khaoya, 1992). Farms previously planted with tobacco, discouraged the cultivation of food crops like maize, sorghum and millet, a negative impact on food security in Sirisia in the period 1975 to 2005. This forced peasants to grow their food crops on tobacco-eroded soils. In the words of one Maurice Wamukota, "the richest lands were dedicated to tobacco cultivation" (OI, Maurice Wamukota, July 29, 2010).

Generally, ecological change in Sirisia in the period 1975 to 2005 was closely linked to the impact of commercial tobacco cultivation. That explains is how forest cover was subjected to extensive exploitation. The land use pattern was changed from that of mixed farming to a dominance of a single cash crop- tobacco. The resulting changes in land cover put natural resources under pressure, created a need for greater investments in the maintenance of land quality and strategic decisions to secure future continuity of production (Ndalilah, 2015). In this case, tobacco production in Sirisia led to over-exploitation of land, water plus a general depletion of ecology and landscape capital (Khaoya, 1992). It did also pose a major challenge to health and environmental sustainability (Fraser, 1986., 1988).

In the 1980s, Fraser in reference to the developing world noted that, forest cover was at the level at which it was capable of meeting the current and future wood fuel demand on a sustainable basis (Fraser, 1988). This was not the case in Sirisia in the years 1975 to 2005 because among the underlying causes of tobacco related deforestation, were the use of wood in the farm-based process of curing tobacco (leaves) and making poles and sticks for barn construction (Geist,1997.,1999). The World Bank (1984) also came to a similar conclusion. Thus, it is important to note that, commercial tobacco cultivation had thorough going ecological impact in many parts of Sirisia, 1975 to 2005.

Apart from placing severe long-term strains on local systems of food production, tobacco cultivation led to unscalable soil erosion -exacerbating loss of rich top soil and depleting soil nutrients. The same impact was witnessed on the road network where there was massive erosion as was observed on the road network in Sirisia (Ndalilah, 2015). Some roads were abandoned due to massive erosion rendering them impassable. The net impact was poor transport of agricultural produce such as tobacco, coffee, cotton and maize.

Land degradation was not a natural by-product of tobacco agriculture but a consequence of tobacco grown within a particular political economy (Khaoya, 1992). For example, BAT's insistence on incorporating more peasant farmers into the tobacco scheme in Sirisia was the primary reason for rampant deforestation and soil erosion (Chacha, 1999.,2000). One opponent of the BAT land management system in Sirisia in 2000 observed that:

The main activity of peasants is the destruction of forests to create fields to grow tobacco, a task that requires a great deal of labour and results in the thoughtless burning and devastation of rich vegetation. Peasants are not permitted to use the same land for a second tobacco season, once they harvest tobacco, they are forced to open up new areas creating new destruction, also causing soil erosion and infertility. Thus, thousands of hectares of forest are destroyed annually to promote tobacco (OI, Joseph Kunikina, July 29, 2009).

Oral accounts in reference to forest conditions in Sirisia later in 2005 further stressed the destructive effects of commercial tobacco cultivation on the region's once rich vegetation. These accounts observed that:

Forest vegetation is cut and then burned; tobacco is grown on that piece for only a year; the next year they grow maize, potatoes, millet, sorghum and cassava. Each year, they clear new grounds for tobacco. In the process apart from destroying the natural trees, they also lower soil fertility and general food potential through soil erosion. Forests are destroyed leaving out only weeds (OI, Tobias Wafula, April 10, 2010).

Consequently, any casual visitor to Sirisia by 2005 could recognize profound changes in landscape (cover) that obviously emanated from commercial tobacco cultivation. Some of these changes included destruction of natural tree vegetation cover, change of vegetation from natural to artificial vegetation punctuated by blue gum and graevilla, change in grass vegetation through clearing and burning, low water levels, unscalable soil erosion, loss of rich top soil depleting nutrients destruction of natural habitats for wild animals and killing of aquatic life in rivers due to pesticides and artificial fertilizer use among other changes. It is also important to note that tobacco production generally fast tracked the cycle of environmental change. Despite these changes, some regions in Sirisia retained environmental resilience as inhabitants had a good relationship with it. Ndalilah (2012) for example, compliments this standpoint suggesting that Sirisia maintained resilient and sound ecological footing until the period of commercialisation of tobacco. Although isolated in many respects, Sirisia households were aware of these changes in landuse. Oral accounts did capture that the area was originally covered with dense forest, had high fauna and flora diversity before commercialisation of tobacco (OI, Fatima Nasambu, June 23, 2010., Andrea Ndalila, September 28, 2009). The same oral accounts also did observe that there were many wild animals; then, which unfortunately had diminished between the years 1975 and 2005.

Another profile in the category of environmental change in this case was population. Fulfilling the resource needs of a growing population ultimately required some form of landuse change to provide for the expansion of food production through forest clearing, to increase production on already cultivated land or to develop the infrastructure necessary to support demographic transition. These types of landuse changes had several ecological impacts such as soil erosion, altering of soil PH, frequent drought, famine and destruction of natural habitats as well as general flora and fauna (KNA/MW/3/4). Thus, the case of population increase and shortage of labour, continued high prices on food crops, lack of items to be bought with money available were some of the emerging problems (Republic of Kenya, 1997-2001). The population, in other words, had almost doubled. It is indisputable that tobacco consumed large tracts of land meant for settlement and animal husbandry; a feat that accelerated environmental change in terms of deforestation, decline in soil fertility, through erosion and general destruction of vegetation cover.

In 1989, population density in then Bungoma District varied but on average it was at 294. In Sirisia division, the average was nearly 286 (Republic of Kenya, 1997-2001). According to **Table 1.1** below, population increase in Sirisia was surprisingly low from 1989 to 2001.

Table 1.1: Populations and Density by Division in Bungoma District, 1989-2001

Division	Sq.km	1989	1997	1999	2001
Kanduyi	318	329	415	439	465
Bumula	353	244	307	326	345
Kimilili	178	356	449	476	505
Tongaren	375	189	239	253	26
Webuye	397	296	395	418	420
Sirisia	209	286	359	380	403
Central	233	298	375	398	422

Source: Kenya Population Census 2009 Vol, 1 (Nairobi, 2009), Cited in Republic of Kenya, Bungoma District Development Plan, 1997-2001.

Table 1.1 (above) shows population and density per division in Bungoma district from 1989 to 2001. In Sirisia, there was population rise from 286 in 1989 to 403 in 2001, a difference of 216 growth rate ($403-286=216$) which translates to 75.52%. From this projection, it is discernable that population density in Sirisia could have risen to over 100% in the year 2005. This trend in population growth as was observed, led to accelerated changes in land use and environmental change through deforestation. Deforestation, however, was not the only threat to human subsistence in Sirisia. BAT, in envisioning the amount of fuel to be used in future by its contracted farmers, begun afforestation programmes to cushion future fuel wood deficits further aggravating environmental change.

BAT's policy of engagement in agroforestry extension and support for smallholder tobacco farmers in Sirisia went hand in hand with commercialisation of tobacco (Khaoya 1992., Ndalilah, 2015). At the beginning, it was mandatory for any peasant tobacco grower to plant 100 trees each year as the main requirement for entry into the BAT contract system. This number was deemed necessary to insure enough wood fuel for the curing process each year. In Sirisia, wood resources required in flue-cured tobacco had far reaching consequences on the existing forest resources. To achieve its set goals, BAT further gave free inputs for both tobacco and trees on loan, repayable in the form of tobacco to peasant tobacco farmers (OI, Rebecca Mutenyo, March 23, 2010). It also reconstituted a body consisting of Assistant Leaf Technicians (ALT) to advise tobacco farmers in Sirisia on the ration of the size of land, number of tree seedlings to be planted and the appropriate timings for planting (Khaoya, 1992). Specifically, it dealt with tree planting as an advisory body. Equally, the ALT advised tobacco farmers to plan ahead for wood fuel from the woodlot to the tobacco barn (usually located near the homestead) for curing (Aliro, 1993, Agriconsult, 1991). The ALT also provided educational outreach to farmers in the tobacco zone regarding the planting of trees for conservation. This included advice on which species (both exotic and native) were to be planted for water and soil conservation.

The BAT Company consistently argued that, due to the large crop acreages per family, labour constraints inhibited adequate attention to the crops during periods of peak demand. Thus, soil erosion and a decline in soil fertility became a reality with population pressure on the available land resources. It was, therefore, crucial for BAT to plan ahead. Thus, experts noted that:

The farm type studied had not yet reached a critical stage in terms of providing a livelihood to the farm family. Resources were still adequate and reasonably managed while climatic conditions, especially rainfall, were favourable. However, the present trend of an increasing population was likely to continue and the existing farming systems as well as the woodlot approach for solving wood fuel problems would therefore not suffice for the future. Several agro-forestry land use systems/technologies were proposed to solve some of the present and future problems (Hoekstra and Kunguru, 1982).

Trees were planted in a row at spacing of 0.5 to two metres for fuel wood and/or light poles on the coppicing cycling whereby the coppicing cycle mainly depended on spacing and/or use. This boundary planting served to demarcate the cropland.

As early as the mid-1980s, it had been agreed that, trees for wood fuel, pole production or timber were to be grown in combination with grass strips established to control soil erosion. Tree species selected for this system were fast growing, with a high litter production and nutrient recycling capabilities such as; *Grevillea Robusta*, *Cassia siamea*, *Markhamia spp*, *Leucaena leucocephala*, *Mimosa scabrella* among others.

In 1983 BAT took serious steps to afforestation commitment based on eucalyptus species. By 1995, a tree audit report released by Moi University revealed that the Company's afforestation programme had over 40 million surviving trees planted by its contracted peasant tobacco farmers and public institutions near tobacco leaf growing areas such as Sirisia (Khaoya, 1992., Ndalilah,2015). Indeed, a visitor to Sirisia between 1975 and 2005 could easily recognize the preponderance of blue gum tree species in the region. An incongruous symmetry had evolved as farms were demarcated with hedges (Ndalilah, 2015). It is, therefore, important to note that BAT, provided a wonderful example of a wholistic, well-researched approach towards a sustainable source of on-farm fuelwood for tobacco production. By carefully testing out the use of different tree species, methods of planting them and the land area and quantity of trees required for the process, tobacco extension agents were able to advice to tobacco farmers to plant trees (Khaoya, 1992).

It is important to note that, the aroma of the final cured tobacco, especially of the flue-cured tobacco, depended on the type of tree used in curing. For this reason, BAT staff encouraged tobacco farmers to use indigenous tree types in the provision of fuelwood apart from eucalyptus. This led to the depletion of indigenous trees and a subsequent transformation of tree vegetation from an indigenous one into an exotic Eucalyptus one. Very rare species such as *markahamia*, *plaiylx grevillea robusta* and fig trees were often preferred for curing purposes.

However, while BAT contract specified the grower's responsibilities as regards issues such as when, where and how to plant tobacco, it remained silent on the use of wood fuel. For example, as late as 2005 (and even to date), it did not require tobacco farmers to plant trees before they were registered to grow tobacco. As a result, the rate of deforestation always exceeded the rate of regeneration of forest cover. But the argument was always cast in a different way (Fraser,1986 Geist,1999). The total acreage of land under tobacco compared to the total land area under arable and perennial crops was insignificant to create any competition between the two. The issue, however, was that tobacco competed for land with forests because a plot of land on which tobacco was grown was only available again for tobacco after a number of years (Muhereza, 1995.16).

In Sirisia in the years 1975 to 2005, forests were cleared not only to provide land for growing tobacco, but construction of curing facilities. Despite the alleged low wood fuel consumption for tobacco curing, relative to other uses, the wood fuel supply situation relative to the rate of deforestation in some places caused a lot of concern. Wherever BAT established tobacco, it advised and encouraged farmers to undertake tree planting programmes through grower's woodlots. Consequently, BAT extension staff were appraised on the basis of their tree nursery seed-bed work. BAT also put in place major afforestation sites such as one of them at Malakisi. However, even with such efforts, farmers lamented that:

The Company is shouting about massive tree planting but this, I'm afraid is nothing less than an outrageous attempt to veil the whole problem. There can be no argument that trees in the tobacco producing areas are being felled willy-nilly and that in the not too distant future, there won't be any left at all. The trouble is that BAT, as well as the tobacco grower, can get away with it (OI, Andrea Ndalila, July 28, 2010).

From the complaints on deforestation in Siisia, it can be deduced that BAT policies on deforestation were not anchored on local realities. First, the programs were not anchored in the overall development program of the communities where tobacco was grown such as the Babukusu in Sirisia particularly in the years 1975 to 2005, except to the extent that it directly benefit BAT. Secondly, afforestation programs between 1975 and 2005 were particularly fruitless because of poor weather conditions, high termite damage leading to low survival rate of seedlings. An attempt to centralize seedbeds at Malakisi did not work out because of problems of labour supply. The tobacco farmers walked long distances from their homes to venues of the centralized seed beds which sometimes were not well taken care of as workers were few and as a result they did not put in enough incentives for efforts to plant trees. Thirdly, some of the staff were either less interested in afforestation or were not competent enough to handle it while others abandoned work on afforestation (Otieno, 1998). Sometimes tobacco farmers obtained seedlings which they never planted.

Eucalyptus does not produce thick dark smoke needed to give the tobacco leaf its dark mahogany colour. The curing process demanded a lot of wood fuel (KNA/MW/3/4). Consequently, a lot of indigenous trees were evidently felled to meet this target and given that they had constant and steady fire output they happen to have been well suited for tobacco curing. Notable endangered indigenous trees in Sirisia were *kimikimila*, *kimilaa*, *kumuenjaenja kimitoto*, *kimikhuyu*, *kimilemba*, *kimitua*, *kimikhoge* and *kimipeli*, which were almost extinct by 2005 (OI, Rebecca Mutenyo, March 23, 2010). These trees, which otherwise provided good hardwood, were felled by tobacco farmers for curing tobacco leaves. "My son cut all the Euphorbia; *kimitua* trees I used in fencing my compound, the result is exposure of my houses and granaries to recurrent strong winds," lamented Mzee Joseph Mukholi, whose son was a tobacco farmer (OI, Joseph Mukholi, March 23, 2010).

By the 1990s, BAT admitted that its tree programme had not necessarily taken place in the same areas where tobacco farmers were cutting down trees (cited in Ndalilah, 2015). It claimed, however, that as a condition to contract, those tobacco farmers who used wood become "self-sufficient" by planting trees to supply their own fuel needs. However, BAT neither mentioned the tree types planted nor the percentage of trees that grew to maturity (Baraclough & Ghimire, 1995., Descola & Palsson, 1996).

It should be observed that fire-cured tobacco normally grew on a variety of soils, but the optimum ranged from heavy fertile sandy loams to sandy clay loams. Once forest soils were cleared of the tree cover, they quickly got exhausted. The very light soils required a lot of fertilizers to achieve the same results and tobacco grown on such soils was not well managed. Hence there was need to open up new lands. The agronomy of tobacco production required the use of a piece of land once every four years. Rotation reduced build-up of eel worms, *kamakhani* and nematodes. This goal could only be realized through opening up new areas.

However, deep ploughing was required to construct ridges on which tobacco was planted. This brought soil nutrients to the top, which were quickly lost through surface run-off and filtration leaving the soils poor. Further, the use of chemicals in soils where deep ploughing was carried out meant that such chemicals were leached to underground water reservoirs (Guyer & Richards, 1996). Water flows into natural springs also contaminated them, meaning the effects on people's health were immense in addition to the destruction of aquatic life in rivers. From such background and development, therefore, people living in villages situated in the vicinity of Sirisia-Butonge-Bukokholo regions forged interesting notions about environmental change and reasons they gave for encroaching the forest to grow tobacco. They also gave reasons as to why there was low food supply given that for years, people in this area grew millet, sorghum and to a lesser extent cassava as the main food crops.

Tobacco, Memory and Environmental Perception in Sirisia, 1975-2005

Environment was perceived differently among the Babukusu, who formed the bulk of the peasant tobacco farmers in Sirisia. For example, when a Bukusu man in Sirisia said: "I am going to search for *limenya*" he either meant he was to clear a piece of land, or work it for food (OI, Joseph Mukholi, March 23, 2010). It also meant adventure or a search for a better life elsewhere, a move from one village to another to improve his livelihood. Finally, if man is very poor, he could as well say he was searching for *limenya* elsewhere (OI, Antonina Nasimiyu Ndalila, July 23, 2009). These notions, therefore, were the real justification to clear forests in Sirisia as from 1975 for commercial tobacco cultivation which in turn brought forth life and a place to live, *limenya* so to speak. There were salient implications in all these expressions. "I am going to search for a living, i.e *limenya*" implied moving to the unknown, a departure from the known field, villages and perhaps people (OI, Phylis Ndalila, July 28, 2010). The man was to enter the unknown to work to get his *limenya*. In practice, however, the expressions were also a polite way to leave for another place in pursuit of a good livelihood. If a man wanted to move and farm elsewhere, he could not say that, land in the village was infertile. But to say that he wanted to search for *limenya* was a euphemism implying he was leaving (OI, Andrea Ndalila, July 28, 2010). Hence the man was not complaining but people would see the prevalence of opportunities and more specifically food elsewhere.

It is important to note that to search for *limenya* was equally a right as no man would hinder another to sustain himself and his family. Accordingly, no one could stop someone to search for *limenya*, that is, to clear a piece of land to feed himself. A number of informants in Sirisia in the period 1975 to 2005 recognized that "the search for *limenya*" captured the central perception of the basic human condition among the Babukusu who formed a big percentage of commercial tobacco cultivators (OI, Joseph Mukholi, March 23, 2010). But *limenya* was simultaneously a specific term and in times of famine, it represented survival. Accordingly, the search for *limenya* was embedded in peasant tobacco farmers' perceptions of the forest in Sirisia.

To search for *limenya* was to follow the direction of the ancestors (OI, Andrea Ndalila, July 28, 2010). But the search for *limenya* for long coexisted with activities whose goals were quite different, notably to consider the state and legacy of the forest and to search for money through intensive agricultural demands (*Bulimi*) of tobacco.

From the above discussion, it can be deduced that the quest for better livelihood informed the way the people of Sirisia-Butonge-Bukokholo-Malakisi (the main tobacco hub) in Sirisia perceived their ecological change between 1975 and 2005. The expansion of tobacco agriculture here and population increase influenced the local people and features strongly in their comments regarding environmental change in the period 1975- 2005. At the same time, landscape in Sirisia witnessed drastic change with the introduction of exotic tobacco in the mid-1970s. Therefore, the destruction of habitat for flora and fauna in Sirisia between 1975 and 2005 was a direct consequence of this development.

Of the respondents interviewed, a larger percentage glorified the era before commercialisation of tobacco but vilified the emerging landscapes. For instance, majority testified that before the introduction of commercial tobacco cultivation, there existed an indigenous tree cover on hilly areas interspersed with bushes. Benjamin Sulungai agreed that, when he was young (he was born in 1920), a large area of Sirisia division was heavily forested (OI, Benjamin Sulungai, July 29, 2009). The forests had a parliament of monkeys; *Chikhima* and a lot of grass (*ebonga*) for thatching huts (OI, Phylis Ndalila, July 28, 2010). He added that they built their houses on hilly areas using a layer of stones; *kamaramu* to make forts; *lukoba*.

Most informants agreed that, Sirisia as a region was very fertile during the pre-tobacco period, which they attributed to virginity, natural regrowth and low population then. The soil was very fertile compared to the period 1975 -2005, because initially an individual did rotational bush fallow to regain fertility (OI, Rebecca Mutenyo, March 23, 2010). They attributed the decline of tobacco cultivation to soil infertility. They also held that food production had declined because of the same and alteration of soil PH making germination of some food crops impossible. If and when some food crops germinated, they had a stunted growth which eventually led to minimal harvests if any. In other words, environmental change in Sirisia was intricately tied to food production. Planting was done once a year and there were two rainy seasons; the long rainy season; *kumunane* from February to July and a short one between August and December. By 2005, one respondent argued that Sirisia division generally had very unreliable rainfall. Further:

The hills were once dotted with beautiful trees which provided land cover and helped retain rainwater. Today, the land, is bare. The trees were cleared over the years to open fresh fields for commercial tobacco cultivation and also to meet the high demand for wood fuel required in tobacco curing. Even the forests that we relied on in the past for firewood are depleted. And a local stream-Toloso; a major source of water, has dried due to deforestation (OI, Phylis Ndalila, July 28, 2010).

From these accounts, it is important to note that, there were significant changes in people's memory and perception on changing patterns of aspects of environmental change particularly on soil type, forest, rainfall, temperature and trees. Speculations by local people on the causes of climatic change raised wider concerns. These speculations on climatic change nevertheless failed to provide information to enhance climate records in Sirisia between 1975 and 2005. What they did to contribute was an understanding of how climate change was perceived and its impact on the environment. According to Joseph Mukholi, between the 1950s and 1960s:

The soil was very fertile, we planted once a year but nowadays we have to plant twice a year to meet food subsistence. Today, population increase has led to drastic decrease in the size of land per family. We also have to use manure and fertilizers to get any harvest, unlike in the past (OI, Joseph Mukholi, March 23, 2010, February 3, 2010).

All the respondents held that common food crops were millet and sorghum which were initially in plenty in Sirisia but had declined significantly between the years 1975 to 2005. This, as observed was due to peasant farmers' entry in to the tobacco cultivation which demanded a lot of labour. The same crop as observed did destroy the nutrient cycle in the soil. One respondent emphasized that initially vegetables such as *chisaka*, *enderema*, *makoe*, *lifwafwa*, *sarati*, *sinakanda* and *esufwa* were also in plenty (OI, Phylis Ndalila, July 28, 2010).

Oral interviews also revealed a rich traditional ecological knowledge and experience of resource management. These sources also did capture plant species that had declined by the year 2005 as well as their uses. The same was true of the utilization of tree species by local people, their perceptions of changes in tree cover and suggested solutions for associated problems.

Oral interviews further held that agribusiness through commercialisation of tobacco was the main cause of depletion of forest cover in Sirisia in the period 1975 to 2005. In sum, the destruction, decrease and depletion of certain plant species reduced vegetation cover. It also enhanced exposure of surface soil to both wind and water erosion leading to increased land degradation. Encroachment on land under forest reserves for tobacco growing led to a multiplier effect. This also led to constant use of land and general decline in soil fertility. When asked to identify the plant species and relate their numerical development to pre-defined observation criteria in relation to the past and present, the plant species in decline were reported more often than species that had increased or those introduced. But oral information from tobacco farmers in Sirisia in the period 1975 to 2005 further emphasized the loss of a number of valuable tree species key in construction and making hand tools, herbal medicine, fodder and tobacco curing (OI, Andrea Ndalila July 28, 2010). The declining species apart from socio-economic importance to individual households, they were also important to general ecology.

In regard to the decline in grass quality, oral information available noted that Sirisia had rich pastures (*kamayilwe*) with a lot of grass; *Bunyasi*. Some of these grasses such as *ebonga*, *kamakololwe*, *kimilele* and *kamasindakusi* were used for thatching houses. These grasses according to oral information grew luxuriantly and were never depletable in spite of regular use. They were therefore, not depletable in the period prior to the establishment of commercial tobacco in Sirisia. Some respondents had knowledge on water conservation and explained its relationship with trees. It was agreed by respondents that the thick vegetation and huge trees that existed before commercialisation of tobacco in Sirisia were cleared to pave way for its cultivation as well as for curing the crop. They were replaced with exotic types which were of less value, consume a lot of water, poor in aiding hydrological cycle hence a decline in rainfall (OI, Antonina Nasimiyu Ndalila, July 23, 2009).

In addition to that, respondents did agree that the expansion of commercial tobacco cultivation in Sirisia, resulted in habitat destruction which in turn became a threat to the remaining biodiversity (OI, Andrea Ndalila, July 28, 2010). Commercial tobacco cultivation in Sirisia, therefore led to the degradation of agricultural and semi-natural habitats causing decline in biodiversity between 1975 and 2005. Equally important was the decline in the distribution and abundance of wildlife. Evidence suggests that commercial tobacco cultivation was responsible for these losses in Sirisia. For instance, respondents agreed that initially the forested areas of Sirisia had a lot of fauna, both small and big (OI, Rebecca Mutenyo, March 23, 2010). Wild animals such as *enjofu*, *chimbuyusi*, *chikhima*, *Namunyu*, *chingera*, *etalangi*, *engwe*, *emboko*, *punda mulia* among others, inhabited this area (OI, Andrea Ndalila, July 28, 2010). The respondent observed that these animals were no longer found in Sirisia between 1975 and 2005 because their habitats had been destroyed.

A third discussion on the factor that led to decline in environmental conditions in Sirisia between 1975 and 2005 as had been before, was the quest to produce tobacco and get quick money. This had a correlation with the poor mentality the inhabitants had on the ecology. According to oral accounts, this ecology was special because of some extraordinary attributes that stimulated feelings of power, mystery, awe, transcendence, peace and healing (OI, Andrea Ndalila, July 28, 2010). The Babukusu in Sirisia made sacrifices; *kumulukha* such as slaughtering a goat (*Kumulukha*) to appease the gods before breaking the ground during the planting season to induce good harvests. These areas provided nourishment to society because of their sacred nature. Benjamin Sichangi observed that there was a place identified by clan elders to discuss communal cultural matters (OI, Benjamin Sichangi, February 3, 2009).

Hunting was also carried out in which small wild game, such as *chimuna*, *chinduyu*, *chikhisi*, *chiswara*, among others were targeted. These animals, it was observed, vacated Sirisia when it was cleared to pave way for the establishment of tobacco in the mid 1970s and by the year 2005 there was no forest habitat for them (OI, Phylis Ndalila, July 28, 2010). According to Phylis Ndalila, Sirisia and other forested areas were environmental fantasies. The respondent further argued that, commercial tobacco cultivation undermined such indigenous institutions through modern technologies harmful to the environment.

In addition to that, respondents observed that commercial tobacco cultivation in Sirisia in the years 1975 to 2005 forced inhabitants to clear all forests and bushes (OI, Zablon Natembeya, July 20, 2010). Respondents had varying views about the state of environment in Sirisia between 1975 and 2005 with most of them observing that, it had changed significantly. They noted that soil fertility had declined significantly because the land was under continuous tobacco agricultural activities and could not regain fertility (OI, Phylis Ndalila, July 28, 2010). It was also observed that there was a lot of rain in the past unlike in the period 1975 to 2005.

Most respondents attributed it to cutting of trees. They were of the view that trees aided rain formation through evapotranspiration (completing the hydrological cycle) (OI, Fatima Nasambu, June 23, 2010). Christopher Musabi also observed that there was tobacco cultivation on steep areas and even on hilltops (OI, Christopher Musabi, June 26, 2010). In his own words "Rain was heavy in the past but by 2000, it had reduced and instances of dry spells were rampant due to wanton destruction of forests." He held that when he was a child it would rain for 3-4 months but between 1975 and 2005 it went even for four months without raining.

A common expression by almost all the respondents was the fact that rain had declined in Sirisia between 1975 and 2005. Nevertheless, some respondents did not clearly state why or link it directly to the decline in forest cover, Benjamin Sichangi for instance, observed that:

The environment in our area is not good because rain has declined. It rains for two to three days and stops, trees have been cut, rain formation is limited, soil fertility has reduced. We have been continuously cultivating this area until the yields have reduced. There are food shortages. Whenever it rains, there is a lot of soil erosion because trees that used to guard against have been cut. There was extensive farming hence soil is very loose such that rain water washes our farms bare. It is very hot and within five days after the rains it becomes dry destroying pasture. Since the beginning of tobacco cultivation, indigenous trees have been cut and now replaced with exotic ones like blue gum which have negative affect on our farms, they use alot of water (OI, Benjamin Sichangi, February 3, 2009).

Other informants did capture the direct impact of the decline of rain on water levels in rivers. Most of them were of the view that if forests were removed, precipitation would run off to the sea via river flow. Benjamin Sichangi example, held that the wells that they used for drinking water had all dried because of clearing of forests around water points to create room for tobacco cultivation (OI, Benjamin Sichangi, February 3, 2009). He further observed that soil fertility had reduced and they had to plant twice a year to ensure a steady food supply. In his own words: "You cannot plant trees to the disadvantage of food". Equally, as observed, the grass that grew naturally in Sirisia and used for thatching huts had diminished. Thus, the peasants had to source for money (albeit under very difficult conditions) to buy iron sheets. He also observed that between 1975 and 2005, Sirisia environment had greatly changed. He held that in the past they used to get a lot of agricultural produce from the farms but due to population increase and continuous use of land (and perhaps overuse) had lost its previous fertility (OI, Benjamin Sichangi, February 3, 2009).

All respondents did recall that there were huge rivers before the introduction of commercial tobacco cultivation in Sirisia. The respondents further alluded that whenever it rained, they could swell for over a week (OI, Andrea Ndalila, July 28, 2010). If and when one was found on the opposite side of the river bank, he could not cross until the volume of the river subsided. Cultivation was also not done on the river banks because wild animals like monkeys; *chikhima*, *chimbuyusi*, *chikhisi* and elephants; *enjofo* which inhabited these riverine areas could destroy crops. These animals were no longer available by 2005 because their habitats had been destroyed through felling of trees. One respondent in reference to river Malakisi observed:

You would not see this river (Malakisi) because of the thicket but now it is seen from far. The water levels have gone down. This river used to swell especially upto the 1970s. We used to drink water from the river and also watered our livestock there. But nowadays the water is dirty, reduced in volume and we have to sink boreholes even for domestic use (OI, Benjamin Sulungai, July 29, 2009).

It was also observed by the same respondent that by the year 2005, the river was very narrow due to siltation arising from cultivation on the river banks. Accordingly, the water volume as noted, was initially high. *Lusiiba* was described by respondents as a place along the river course where water was still and very deep (OI, Zablon Natembeya, July 20, 2010). Accordingly, all the respondents held that these changes in the river regime had devastating effects on general ecology and lives. It was also observed that, whenever it went without raining for about 1 to 2 months, there was significant reduction of the water level in the river. This was because the trees and bushes that served as shades had been cut and land around the source of the rivers extensively cultivated hence hindering the flow of water. Cultivation along the river banks led to recurrent soil erosion which filled the base of this once huge river. It was observed by Rebecca Mutenyo, for example that:

River Malakisi was amazingly big in the past. It used to overflow far through into neighbouring lands. Whenever it rained, the river could swell for over a week forcing people to remain on either side of the river they were until the water subsided. The bushes along the river were also habitats to many kinds of birds (OI, Rebecca Mutenyo, March 23, 2010).

All the respondents argued that in the past, this river had a rich aquatic life and specifically different kinds of fish (*Ching'eni*) which they used to fish (OI, Andrea Ndalila, July 28, 2010). But by the year 2005, there was no fish in the river because the water had reduced and therefore destroyed their habitat. Fishing was done by both men and women. On River Malakisi, Pharis Mulongo, observed that "young men caught these fish, *khuloba* using *lulobo* or bait but were no longer fishing" (OI, Pharis Mulongo, July 30, 2010). It was also held that this river was inhabited by different kinds of snakes (*Chindemu*) such as *Chikhilakhima* (black mamba), *Namaswakhe* (cobra), *Nafwo* (puff adder) and *Mukoyabaka* (python). *Chingosia* (vultures) were also found around the river and mostly fed on these snakes. Birds such as *chinyange* inhabited the river but between the years 1975 to 2005, most had migrated (OI, Andrea Ndalila, July 28, 2010). For instance the respondent observed that the birds and wild animals that lived in Sirisia prior to tobacco commercialisation had migrated because their habitats had been destroyed. Andrea Ndalila observed that, "in Sirisia there is scarcity of rainfall because of depletion of trees around the river as livestock scramble for available little water although very dirty" (OI, Andrea Ndalila, July 28, 2010). He held that soil erosion was rampant between the years 1975 and 2005 because people who cultivated along the river banks and on hills, not observing proper agricultural practices.

A discussion with most of the tobacco farmers in Sirisia suggested a number of reasons for environmental change. Above all, the tobacco farmers interviewed stressed that the decline in precipitation was the main cause of environmental changes in Sirisia between 1975 and 2005. Some tobacco farmers stressed that drought; *kumumu* or *siimiyu* in the late 1980s particularly, had long lasting effects. According to Zablun Natembeya:

The drought destroyed everything. All these trees have grown after it. The animals also died, because of the drought while many people left the village to look for food and water. They also moved with their livestock. The community had certainly moved from mixed farmers to semi-pastoralists (OI, Zablun Natembeya, July 20, 2010).

In addition to low precipitation recorded, a substantial number of the tobacco farmers stated that the local people had equally caused environmental damage. Others specified, however, that trees were cut to sell firewood and charcoal. At the same time, most of the trees were cut to get cash, because of poor harvests (OI, Phylis Ndalila, July 28, 2010). Oral information emphasised that in the pretobacco period, firewood collection did not contribute to environmental changes, because only dry parts or dead trees were cut. Some respondents also suggested that tobacco farmers did contribute to environmental changes through the use of environmentally harmful farming methods. Others described the uncontrolled use of fire as a major cause of environmental destruction in the period 1975 to 2005. While restating this view, Simon Wakachunga noted that:

Because of fire, some people lost a lot of trees. The trees dried and did not grow again. People burned their fields before cultivation. This sometimes spread and burned grasses and trees. It used to be better, now the land does not give the same crop. People usually cultivated the same area year in and year out and this has reduced its productivity. Rain has also diminished (OI, Simon Wakachunga, July 20, 2010).

Poorer female-headed households also did severely affect the environment. They did intensive cultivation to survive in the short term. They were also obliged to cut trees to sell wood fuel. Therefore, a focus on women's direct interaction with the environment concludes that they had a greater role in land degradation. Generally, women chanced on cutting trees as gender, poverty and the need to maintain a livelihood forced them to do that to survive. However, they could neither change nor reverse this trend. The peasant farmers captured the observed change in environment in the period 1975 to 2005, associating it with agricultural commercialisation via tobacco cultivation.

Historians have highlighted the role of memory as a social process which helps people to make sense of the past and articulate meanings in their lives (Samuel, & Thompson, 1990). The features we find in the landscape, the changes we observe and our attribution of the causes of change, all elucidate our life experiences. Environmental problems are compounded by social problems. The tobacco growing areas of Sirisia are undeveloped and historically marginalized. The peasant tobacco farmers had poor living conditions punctuated by poor housing and limited utilities. Their quality of life between 1975 and 2005 was incredibly poor.

Many of the farmers, as they worked to transform the tobacco seedlings into cured leaf for BAT faced myriad health problems. “I believe the smoke we inhale from tobacco and different shrubs have harmful effects,” claimed Martin Namasake (OI, Martin Namasake, July 29, 2010). Villages were always enveloped in smog; *lilisi* during the two to three months, May, June and July, when curing of tobacco, the drying process in crude oven-like structures was at the peak. Fire was normally kept at a given intensity to ensure a perfect crop. Thus, women, particularly, were held in near bondage rekindling the flame that baked the “golden leaf.”

Women worked with children strung on their backs, coughing as they worked for BAT Company. Complaints of “congested” chests particularly during the curing process abounded. The barns were poorly ventilated and farmers had no safety gears provided to the tobacco farmers, the result was passive smoking and high risk of chemical poisoning. Local medical practitioners Sirisia Health Centre then reported an increased number of cases of respiratory diseases during the curing season, particularly from tobacco farmers. “Unfortunately, most farmers cannot correlate their health problems with tobacco smoke,” says the local Medical Officer at Sirisia Health Centre, Maurice Wamukota (OI, Maurice Wamukota, July 29, 2010). The problem, he explained, was tied to biomass-based kitchens. “If they were not using wood fuel for cooking, they would probably understand tobacco is the cause of their respiratory health problems” he said.

Furthermore, farmers were unaware of safe handling of chemicals provided by BAT. Some even used the chemicals in spraying vegetable crops. Furadin, for instance, has active ingredients banned in the West. Also tobacco growing regulations required farmers to be provided with safety gears, namely safety chemical goggles, chemical respirator masks, hand gloves, sprayer coat with food and gumboots. “I started growing tobacco in 1976 but over the years I have never been given any safety gears save for 1994/95 when I was given a pair of low quality boots and a hopeless dust coat,” said Mr. Michael Manyonge, one of the pioneer farmers (OI, Michael Manyonge, October 10, 2009).

Conclusion and Way Forward

This paper has examined the links between commercial tobacco production and environment in Sirisia in the period 1975 to 2005. As a prelude, it discusses the background information on the environment prior to commercial tobacco cultivation. It has been observed that the local community, the Bukusu society positively interacted with the environment; they were children of nature. However, the study holds that environmental degradation was induced and sustained by commercial tobacco cultivation causing ecological collapse. Cutting of indigenous trees for tobacco curing indeed altered the environment leading to insufficient water and occasional dry spells. Therefore, with the tobacco regime, the issue of environmental and ecological change became an integral aspect of Sirisia historiography. The paper affirms that soil erosion occasioned by clearing land for tobacco cultivation and deforestation in pursuit of wood fuel for curing tobacco led to food shortage and environmental degradation. Finally, the paper discussed patterns of environmental change in Sirisia and noted that, the imposition of exotic tobacco had thorough going ecological and health implications in Sirisia in the years 1975 and 2005. Apart from placing severe long-term strains on local systems of food production, tobacco cultivation led to unscalable soil erosion and exhaustion. In addition, the quest for better livelihood informed the way the people of Sirisia perceived their environment.

References

- Agriconsult, (1991). *The Economic Impact of the Tobacco Industry in Kenya*. Nairobi: BAT.
- Aliro, K.O. (1993). Environmental and Socio-economic Impact of Tobacco Production in Arua District. Kampala: Panos Institute.
- Anderson, D. & Grove, R. H. (1987). *Conservation in Africa: People, policies and practice*. Cambridge: Cambridge University Press.
- Babalola, A. (1993). *Capitalist Development in Agriculture: The Case of Commercial Tobacco Farming in the Oyo-North Division, Oyo State, Nigeria*. Lagos: Longman.
- Baraclough, S. L. & Ghimire, K. (1995). *Forests and Livelihoods: The Social Dynamics of Deforestation in Developing Countries*. (London and New York: Macmillan and St Martin's Press, 1995).
- Baud, M. (1995). *Peasant Society Under Siege: Tobacco Cultivation in Cibao Dominican Republic 1870-1930*. (Mimeo, Cambridge, 1995).
- Beattie, J. (1968). Aspects of Nyoro Symbolism. *Africa*, 38(4 Oct, 1968).
- Beinart and Coates (2000). *Environmental History*. London: Heinemann.
- Boesen, Janik and Mohele, A.T. (1979). *The Success Story of Peasant Production; The Political Economy of a Commodity Producing Peasantry*. Upsalla: OUP.
- Boserup, E. (1965). *The Conditions for Agricultural Growth: The Economics of Agrarian Change in Population Pressure*. Chicago, Aldine Publishing Co.
- Chacha, B. K. (1999). Agricultural History of the Abakuria of Kenya From the End of the Nineteenth Century to the Mid 1970s. M.A Thesis, Egerton University, Njoro.
-(2000). *From Pastoralists to Tobacco Peasants: Tobacco and Transformation of an African Society, 1969-1999*, A Seminar Paper Presented at St. Antony's College, University of Oxford, African Environment Seminar, 23 November 2000.
- De Jesus, E. C. (1998). *The Tobacco Monopoly in the Philippines: Bureaucratic Enterprise and Social Change, 1756-1880*. Manila: Ateneo de Manila University Pr.
- Descola, P. & Palsson, G. (eds) (1996). *Nature and Society: Anthropological Approaches*. London and New York: Routledge.
- Fraser, A.I. (1988). "Wood, Tobacco and the Environment", *Tobacco Forum*, Vol. 2 No. 1.
- (1986). *The Use of Wood by the Tobacco Industry and the Ecological Implications*. Edinburgh: International Forest Science Consultancy.
- Gately, Iain. (2001). Tobacco: The Story of How Tobacco Seduced the World. In N. Lezard, 'Light Up Your Life', *The Guardian*, December 1.
- Geist, H & Lohnert, B. (1999). "Endangered Ecosystems and Coping Strategies: Towards a Conceptualization of Environmental change in the Developing World" in Lohnert, B. & Geist, H. (Hrsg.) *Coping with Changing Environments: Social Dimensions of Endangered Ecosystems in the Developing World*. Singapore: Aldershot Brookfield.
- Geist, H. (1997). *Tobacco Growers of Songea District and their Miombo Environment (Ruvuma Region/Southern Tanzania)*. Preliminary Results-Duesseldorf.
-(1999). *Tobacco: A Driving Force of Environmental Change in the Miombo Woodland Zone in Southern Africa*. Paper Presented at St. Antony's Conference of African Environment, Past and Present 1999.
- Goodman, J. (1993) *Tobacco in History; The Cultures of Dependency*. London and New York: Routedledge.
- Goodspeed, T. (1954). *The Genus Nicotiana, Chronica Botanica Company*. New York: Waltham Mass, Journal of Pharmaceutical Sciences.
- Guyer, J. & Richards, P. (1996). *Social Perspectives in the Management of Biodiversity Variety in Africa: Africa 66 (1)*. London and New York: James Currey.
- Hoekstra, D. A. & Kunguru, F.M. (1982). "Agroforestry Systems For Small-Scale Farmers", Procedure of An ICRAF/BAT Workshop Held In Nairobi, September 1982.
- Khaoya, S. A. (1992). Socio-Economic Assessment of Constraints in Renewable Energy Options for Tobacco Curing in Bungoma-Busia Region, Kenya. M.Phil Thesis, Moi University, Eldoret.
- KNA/MW/3/4

- Maxon, R.M. (1994). *Up in Smoke, Capital and the Colonial State in the Tobacco Industry in Western Kenya*. (African Economic History 22, 1994).
-(1995). *Up in Smoke: Peasants, Capital and the Colonial State in the Tobacco Industry in Western Kenya, 1930-1939.* Review 18, No.1.
- Muhereza, F. E. (1995). *Agricultural Commercialisation, Contract Farming and Tobacco: A Study of Socio-Economic Effects of Tobacco Growing in Masindi District, Uganda.* Kampala: Heinemann.
- Ndalilah, J. W. (2005). *Capitalism and the Making of Wage Labour in Kimilili, 1895-1963*. M.phil Thesis, Moi University, Eldoret.
-(2012). *Labour Dynamics in Kenya's Pre-Capitalist Bukusu Economy and Society*. JETERAPS 3 (5).
-(2015). *Agricultural Commercialisation, Contract Farming and Tobacco: A Study of the Impact of Tobacco on Employment Trends in Rural Sirisia, Bungoma County, Kenya, 1975-2005* in *International Journal of Agricultural Extension and Rural Development Studies* Vol. 1No. 2. 26-37
- OI, Andrea Ndalila, July 28, 2010.
- OI, Antonina Nasimiyu Ndalila, July 23, 2009
- OI, Benjamin Sichangi, February 3, 2009
- OI, Benjamin Sulungai, July 29, 2009
- OI, Christopher Musabi, June 26, 2010
- OI, Fatima Nasambu, June 23, 2010
- OI, Joseph Kunikina, July 29, 2009
- OI, Joseph Mukholi, March 23, 2010
- OI, Margaret Namachanja, July 30, 2010
- OI, Martin Namasake, July 29, 2010
- OI, Maurice Wamukota, July 29, 2010
- OI, Michael Manyonge, October 10, 2009
- OI, Pharis Mulongo, July 30, 2010
- OI, Phylis Ndalila, July 28, 2010
- OI, Rebecca Mutenyo, March 23, 2010
- OI, Sammy Siingia, September 28, 2010.
- OI, Simon Wakachunga, July 20, 2010
- OI, Tobias Wafula, April 10, 2010
- OI, Zablon Natembeya, July 20, 2010
- Otieno, J. (1998). *Tobacco Under Contract: Agricultural Development and Environmental Change in Kuria District, Western Kenya*. Ph.D Dissertation, University of Illinois at Urbana Champaign.
- Republic of Kenya. (1999). *Bungoma District Development Plan, 1997-2001*. Nairobi: Government Printer.
- Richards, P. (1983). *Ecological Change and the Politics of African Land-use*. African Studies Review, 26.
- Rubert, S. (1997). *A Most Promising Weed: A History of Tobacco Farming and Labour in Colonial Zimbabwe, 1890-1945*. Athens: Ohio University Center for International Studies.
- Scott, C. (1982). *The Evils of the Tobacco Habit*. Dwligh Barlin: Forgotten Books.
- Spencer, P. (1984). *Pastoralists and the Ghost of Capitalism*. Production Pastorale et Societe 15.
- Stubbs, J. (1985). *Tobacco on the Periphery: A Case Study in Cuban Labour History, 1860-1958*. Cambridge: Cambridge University Press.
- Vail, L. (1977). *Ecology and History: the Example of Eastern Zambia*. *Journal of Southern African Studies*.
- Warren, M. (1982). *Indigenous Knowledge, Biodiversity Conservation and Development*. Centre for Indigenous Knowledge for Agriculture and Rural Development, Iowa State University, Ames, Iowa 50011 USA, International Conference on Conservation of Biodiversity in Africa: Local Initiatives and Institutional Roles, National Museums of Kenya, Nairobi, Kenya, August 30-September 3.
- Werner, C. A. (1939). *Tobaccoland*. New York: Ullan Press.
- Wilbert, J. (1987). *Tobacco and Shamanism in South America*. New York: Yale University Press.
-(1991). *The Smoke of the Gods; A Social History of Tobacco*. New York: Eric Barns, Temple University Press.
- World Bank (1984)