

## **Integrating Sustainability Ethics in Commercial Sugarcane Farming in the Lake Victoria Basin, Kenya**

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### **Abstract**

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Since its introduction, large-scale commercial sugarcane farming has not significantly improved the living standards of particularly small-scale farmers in the western Kenya sugar belts. Being a monoculture production system, environmental loss associated with it, particularly loss of biodiversity cannot be overemphasised. Lately, sugarcane farming is increasingly encouraging on land traditionally known as Kenya's food crop baskets. This discussion paper interrogates this trend in commercial sugarcane farming and warns on deepening food security threats if this industry is not controlled. Further ethical considerations that need to accompany commercial sugarcane farming are discussed based on research finding from Koyonzo, Lurambi, Nzoia and Chemelil in the greater western Kenya sugar belt. This paper thus argues in favour of dynamic policy and legislation to control expansion of sugarcane farming into areas known for their contribution to household and national food security. In addition sugar processing companies need to contribute to sustainability concerns by integrating establishment of indigenous forest cover and food crop production in their nucleus estates. Over all, it is hoped that this paper will stimulate debate on plantation crops that take much arable land away from food production, despite Kenya's and Africa's food insecurity situations; and thus relevant policies in favour of sustainable production systems.

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**Keywords:** Contract Sugarcane Farming, Environmental Ethics, Western Kenya

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## 1. Introduction

The development of the sugar industry in Kenya started with private investments at Miwani in 1922, followed by Ramisi Sugar Company in 1927. After independence, six additional companies were established namely: Muhoroni (1966), Chemelil (1968), Mumias (1973), Nzoia (1978), South Nyanza (1979) and West Kenya-Sugar (1981) (Maina *et al.*, 2011). Other up-coming sugar factories include Busia Sugar Company, Soin Sugar Company, Transmara Sugar Project, Ramisi Sugar Project, Siaya Sugar Project and Kamulamba Sugar Project. Since sugar consumption continues to outstrip supply in Kenya, it is possible that this increase in millers is meant to profitably bridge this gap. Between 1981 and 2004, total sugar production grew from 368,970 tonnes to 517,000 tonnes. On the other hand, domestic sugar consumption increased even faster, rising from 324,054 tonnes to 669,914 tonnes over the same period (Maina *et al.*, 2011). As such Kenya has remained a net importer of sugar, with mean annual imports of 200,000 tonnes (Kenya Sugar Board, 2004a and b).

Commercial sugarcane farming has transformed more arable land in Kenya, particularly Western and Nyanza provinces into expansive monoculture landscapes than any other single plantation crop (Republic of Kenya, 2006). Western Kenya is thus the largest sugar belt in the country. In terms of cane suppliers, small-scale farmers are the majority, followed by large-scale farmers and lastly the company nucleus estates (Republic of Kenya, 2002). Sugarcane currently accounts for about three times more land cover than other key cash crops like tea or coffee and its land area seems to be increasing (Figure 1). Recent developments that have seen an incursion of private millers in the once predominantly maize belt of western Kenya will only exacerbate the threats of household food insecurity as more land gets lost to sugarcane farming. Western Kenya has nine sugar processing companies, all competing for scarce arable land (Kenya Sugar Board, 2011). This region is generally classified as medium potential and can also support other crops critical in achieving community food security (Jaetzold and Schmidt, 1983; Jaetzold *et al.*, 2005). Often expansion of plantation farming does not factor strategies in favour of biodiversity conservation and management of household food security in their planning. The households, which supply sugarcane to these firms end up suffering double tragedy: increased income insecurity and environmental degradation.

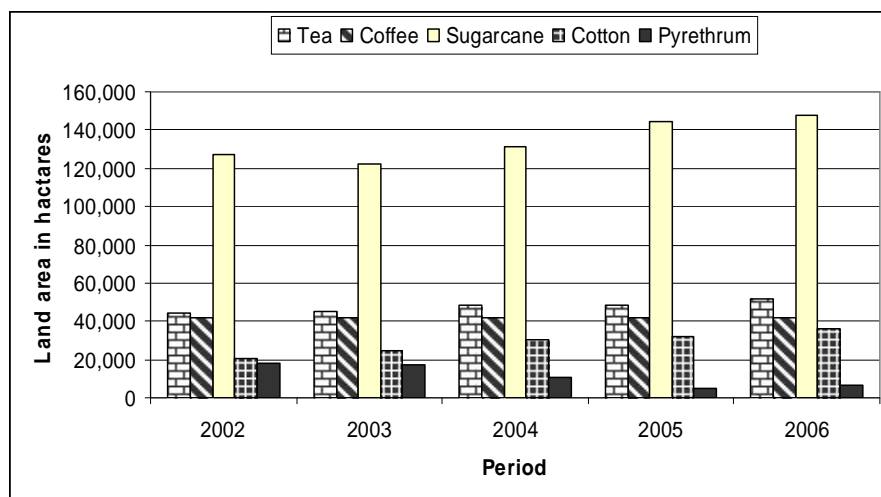


Figure 1: Trends in key cash crop by land area in hectares (Source: Republic of Kenya, 2006)

Estimates indicate that sugarcane production directly supports over 250,000 small-scale farmers who supply over 80% of the cane milled by the sugar companies. Yet the major sugar belt is also associated with high poverty levels (Republic of Kenya, 1999). Although income from commercial sugarcane farming has enabled large-scale farmers in western Kenya to improve their living standards, small-scale farmers remain trapped in poverty (Waswa *et al.*, 2012), but are also reluctant to diversify their livelihoods away from sugarcane due to the societal high status associated with contract sugarcane farming (Waswa *et al.*, 2009a). Household well-being is certain to be undermined as more arable land previously used for subsistence farming gets converted into sugarcane. In addition, due to Kenya's liberalised economy, price and market forces operating within trading arrangements such as the World Trade Organisation, the East African Community, Common Markets for East and Southern Africa, and African Caribbean and Pacific-European Union, have precipitated stiff competition to the domestic sugar industry, making production costs perhaps among the highest in Africa. This cost is directly borne by the farmers, which effectively reduces their returns from sugarcane farming, and thus raising the question on the effectiveness of such long-duration monoculture cropping system in rural poverty alleviation.

Furthermore, corporate social responsibility policies of most sugar companies remain weak particularly when it comes to sharing income between farmers and the companies; and when it comes to reporting on environmental performance (Waswa *et al.*, 2009b).

Similar observations linking contract sugarcane farming to poverty have been reported elsewhere. For instance, in Brazil, the world's number one producer of sugarcane over the years, the sugarcane industry employs over two million labourers who mainly engage in unskilled wage labour. Their wages are however below their living standards and are unreliable as they are contracted for only six months per year and as such, they are unable to maintain their families (Schneider, 2010). Labourers in the rural Kigali experience similar conditions of hard work and low wages compared with other forms of employment, which makes working for out growers better in payment though effective wages are still considered insufficient to support a household. Similarly, employment on sugar farms is associated with severe income poverty in South Africa (Lorentzen, 2009). Whether such labourers have alternative ways of income generation remains an open question given the land tenure challenges in South Africa.

Ecologically speaking, trends in the loss of agri-biodiversity in western Kenya remain high; while firms engaged in sugarcane farming and sugar processing do not seem to have any practical and predictable steps to simultaneously conserve the regions biodiversity (Netondo *et al.*, 2010). Devoting more land to commercial sugarcane farming and other cash crops like coffee, tea, sisal, eucalyptus among others will equally undermine the country's forest cover, which stands at about 2.2% against the expected coverage of 10% (UNEP/GoK, 2009; Kenya Forest Service, 2011). Since the amount and quality of biodiversity in a given place is a key indicator of ecosystem health (Bertollo, 1998; Hilty and Merenlender, 2000), deliberate polycentric efforts are needed to integrate and increase agri-biodiversity and forest cover within monoculture production systems. Overall, agricultural investment that is likely to impact the environment negatively besides causing conflicts and other forms of human ill-being may not be regarded as ethical. Though IFPRI (2002) affirmed that with few exceptions, agricultural growth is the most effective path to reducing poverty and hunger in the least developed countries, its focus on food security at the global level may turn out to be counter-productive because it is easy to ignore critical factors at the local and farm level.

This explains the focus of this paper on contract sugarcane farming at the local level, based on the premise that household food security leads to national food security and not the other way round.

## 2. Methodology

Field surveys were done in the three sites namely Lurambi and Koyonzo in Mumias; and Chemelil in Nyanza (Figure 2) between 2008 and 2009 using social approaches as described by among others Neeman (1994) and Fink (2003).

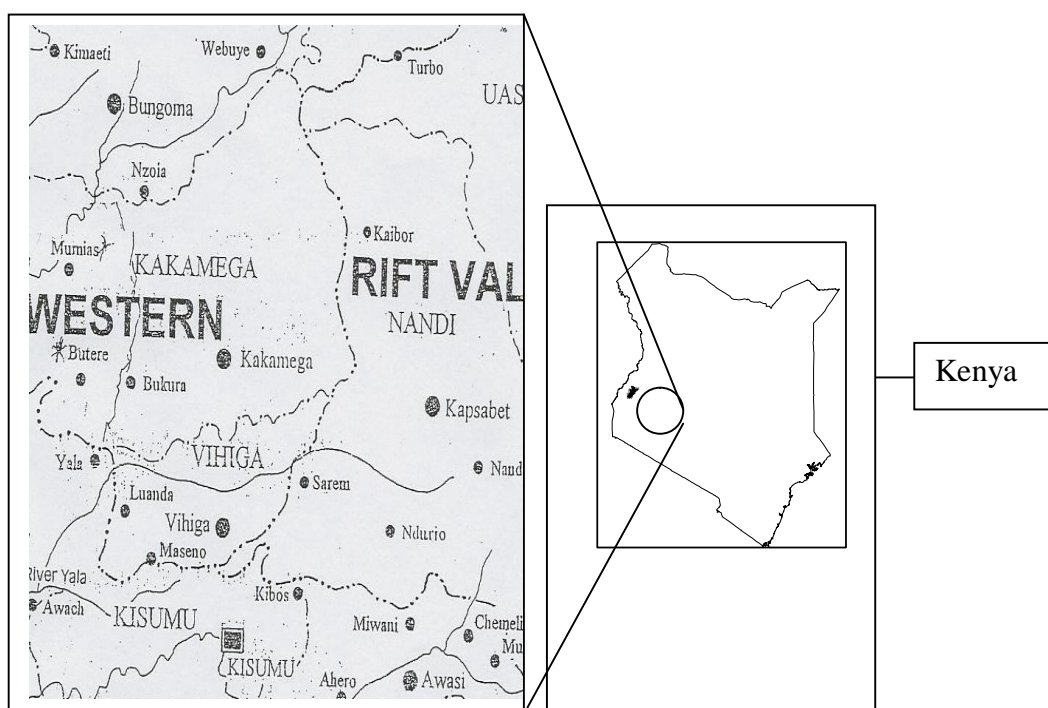


Figure 2: Location of Mumias and Chemelil, in Western Kenya Sugarcane Belt (not to scale)

The three sites lie in the medium to high potential agricultural zones and are suitable for crops like sugarcane, staple cereals and legumes (Jaetzold *et al.*, 2005 and UNEP/GoK 2009). Researcher-administered questionnaires were used to collect data from 39, 40 and 37 officially contracted farmers in Chemelil, Koyonzo and Lurambi respectively. These farmers are the ones who were willing to share information from their payment statements.

They were selected randomly from lists of farmers engaged in sugarcane farming. Focal group discussions in workshop-based set-ups were used to cross-check the validity of responses and to brain storm on emerging issues, while at the same time disseminating some preliminary research findings to the farmers.

As far as ecosystem services are concerned, a cross-sectional research design as described by (Glock, 1967) was used to gather data. Data was collected from 150 farmers chosen through simple random sampling from Mumias and Nzoia sugar belts in western Kenya, between July and November 2010. A questionnaire instrument comprising of a 5-point likert scale as recommended by Jaccard and Wan (1996) was used to estimate the ecosystem services that the farmers were aware of. The level of loss of ecosystem services measured ranged from 1=Not at all to 5= completely, but also included 0 for being unaware.

Data on ecosystem services was subjected to correlation and regression analysis to investigate the relationship between sugarcane farming and loss of ecosystem services as the dependent variable. Secondary data were obtained from relevant official literature. Descriptive statistics using SPSS was used to compare the key variables in terms of means, ranges, modes, and frequency distribution.

### **3. Results and Discussion**

#### Socio-economic Information

Being patriarchal societies, household heads in all study sites were men and owned an average of 2.5 ha, 0.7 ha and 1.9 ha in Chemelil, Koyonzo and Lurambi respectively (Table 1). Education levels ranged from 8-16 years of formal schooling in Chemelil, 8-12 in Koyonzo and 8-16 in Lurambi. As such the mean level of schooling across the three sites was 9 years, representing early secondary school. This level of schooling does not represent sufficient capacity building in agriculture as an enterprise. Farmers thus rely on indigenous knowledge handed down through generations and to some extent basics in agriculture acquired through primary and secondary education.

Table 1: Selected Socio-economic Statistics in the three study sites

Variable	Lurambi	Koyonzo	Chemelil	Mean Statistic
No. of Respondents	37	40	39	39
Education level (years)	8-16	8-12	8-16	9
Mean land area (hectares)	1.91 (4.8)	0.69 (1.7)	2.52 (6.3)	1.71 (4.3)
Mean Yield (tons)/ha	50.58	86.68	87.52	74.93
Mean Gross income/ha (KES)	80,179.50	127,555.10	218,788.20	218,788.20
Mean Net income/ha (KES)	26,922.60	39,688.60	90,086.80	90,086.80
Mean Net income as % of Gross	33.6	33.1	41.2	35.96

( ): land area in acres. KES: Kenya Shillings. Source of data: Official farmers' payment statements (Source: Waswa *et al.*, 2012).

The mean land area of 1.7 hectares represents small-scaling farming, which requires appropriate land and crop husbandry practices if farmers are to realise profits. The environmental implications such as loss of biodiversity are better understood when many such small plots are viewed as one whole. Of the gross income, milling companies retained at least 60% with farmers earning a net pay of below 40% (Waswa *et al.*, 2012). Such disparity in income distribution is unethical since farmers are likely to be trapped in poverty for a long time.

#### Trend in Sugarcane farming in Mumias Sugarbelt

Inception of contract sugarcane farming in western Kenya has been associated with a steady increase in the number of farmers in the period 1970s to 2000. From this period, there seems to be a gradual decline in the number of farmers growing sugarcane on a commercial basis (Figure 3). This has been attributed to the low economic returns associated with smallholder sugarcane farming. When majority of sugarcane suppliers and providers of labour are financially marginalised when it comes to income sharing with milling companies, ethical considerations are needed to try and balance the playing field.

Although Mumias Sugar Company is the biggest and presumably the most successful milling company in the country, it is the second poorest when it comes to payments to farmers (Table 2). This only serves to entrench financial poverty of the farmers. The negative impact of such income disparities is appreciated when considered alongside the total family size (6-8 people) and the statutory waiting time to harvest sugarcane (24-36 months). The little income received after 24 months goes into repayment of debts accrued in the same period, which leaves most smallholder farmers trapped in a vicious cycle of sugarcane-driven poverty for not willing to diversify their farming to other economically viable crops as demonstrated by Waswa et al., (2009a).

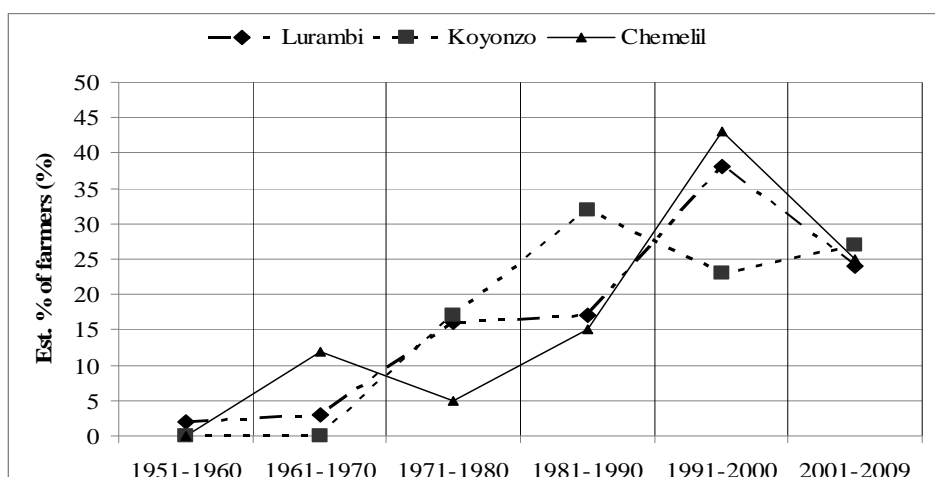


Figure 3: Trends in the number of sugarcane farmers in Mumias sugar belt

Opinion on willingness to diversify crops away from sugarcane varied across the sites. Although about 85% and 57% of farmers in Chemelili and Lurambi respectively, indicated that they would be willing to diversify their livelihoods from sugarcane farming (Figure 4), implementing this decision was very difficult for most farmers due to the social stigma of being associated with “un progressive farmers still held captive to subsistence farming”. With aggressive awareness campaigns on sustainable livelihoods, indigenous cereals (maize, sorghum and millet) would be the most preferred being staple food crops. Where diversification would remain a challenge, encouraging farmers to intercrop sugarcane with other early maturing crop varieties would be viable options during sugarcane’s earlier phenological stages.



An ethics conscious and farmer-friendly company would invest in such extension services

Table 2: Comparison of Sugarcane prices per ton among as at July 2011

	Private millers				
	Mumias	Kibos	Butali	Soin	West Kenya
Total crop area (hectares)	52,530	4,377	17,379	1,351	23,254
Price/ton (November 2011) (KES)	4,185.85	4,300	4,000	4,350	4,300
	Parastatal Millers				
	Nzoia	Sony sugar	Muhoroni	Chemelil	
Total crop area (hectares)	26,234	16,976	14,190	16,962	
Price per ton Nov. 2011 (KES)	3,800	3,500	4,000	4,300	

KES: Kenya Shillings. Source: Kenya Sugar Board, 2011

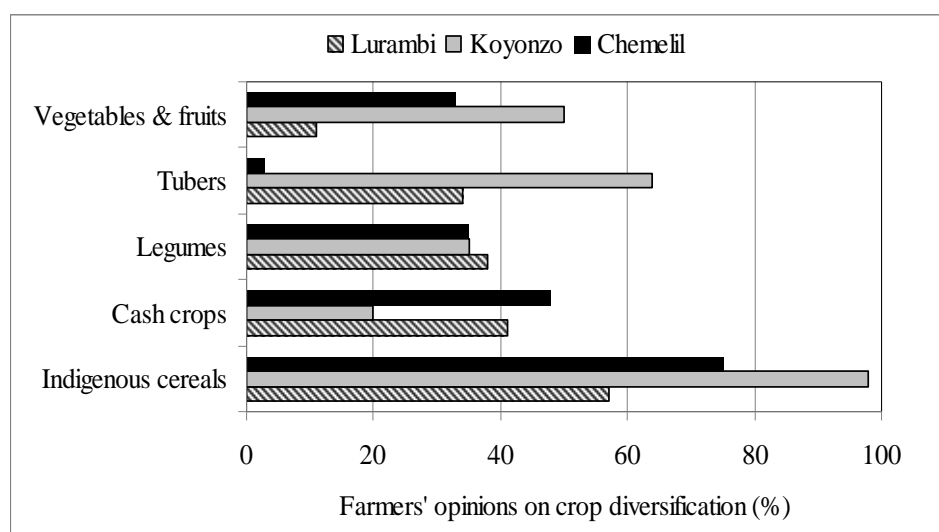


Figure 4: Farmers' opinion on potential crop diversification

The prominence given to tubers, and in particular cassava and sweet potatoes in Koyonzo is because of their traditional importance in hunger management and their requiring only limited space, where most family would have been put under sugarcane farming. When the sugar company allows farmers to put all their land under sugarcane, the implications is that they do not mind households starving for 24-36 months as they wait for the harvest.

Similarly, although Eucalyptus and *Aloe vera* are emerging as promising cash crops in several parts of the country, their net effect on food security and environmental health will need to be continuously investigated. Crop diversification thus represents a much needed departure from monoculture systems. A prioritized menu of high value non-stable crops that Kenya and other neighbouring countries can take advantage of are provided by among others the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA, 2009). With seasonal and annual crops like beans, maize, vegetables, tubers and selected fruits, farmers have a chance to harvest more than once per year and thus steady their financial inflow.

### Sugarcane Farming and Ecosystem Services

In terms of ecosystem services, livelihoods of households in sugarcane belts risk to be undermined through decline in wood fuel, thatching grass, natural water supply, pastureland and medicinal plants among others, as much land is converted into sugarcane plantations (Figure 5). About 60% of the respondents in Nzoia sugarbelt in western Kenya thought that expansion of sugarcane farming resulted into decline in the availability of building material, wood fuel and extinction of indigenous plants that were important to the community because of their medicinal value. About 66% of the respondents indicated no longer enjoying this service. The few who still enjoyed this service had made deliberate efforts to conserve such plants within small woodlots on their farms.

To cope with declines in tree-related benefits like wood fuel and building material, farmers are now opting for exotic tree species like eucalyptus, a tree that is facing strong resistance from environmentalists due to its perceived un-friendliness to water resources. Robinson *et al.* (2006) observed that establishing *Mallee eucalypt* stands and belts resulted in the de-watering of soil profiles, both vertically, to depths of 10 m, and lateral distances of 6–20 m from belts.

It is now government policy in Kenya to rid all river banks of eucalyptus trees. But introducing it on arable land for income generation seems ironical and unethical given its known negative effects on land quality and hence future food security.

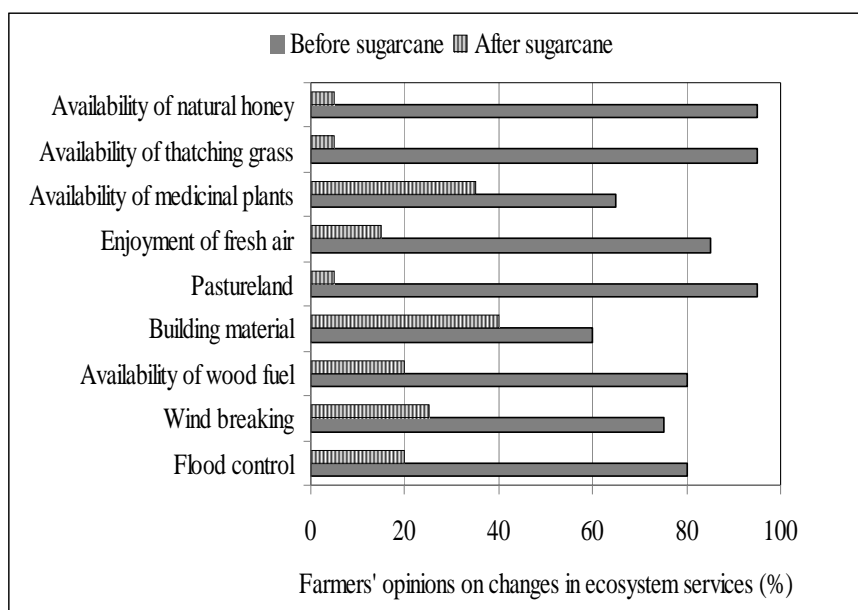


Figure 5: Farmers' opinions on changes in ecosystem services in Nzoia

On the environmental problems associated with sugarcane farming, farmers indicated loss of wetlands and their functions as critical effects. With regard to pollution, release of particulate matter into the atmosphere from the factory and increased vehicular density and its affects were identified as the main concerns (Figure 6). In addition respondents were concerned about emerging social ills as a result of mushrooming of towns around sugar factories, which are associated with population concentration and hence rising cases of diseases particularly HIV and Aids.

Increase in poverty is to be understood from the low financial returns and the social dynamic off-shoots associated with the crop. Cases of sugarcane leasing at throw-away prices, families using their crop as collateral to borrow finances from rural elites, and the opportunity costs associated with delayed harvesting are examples of social dynamics that end up impoverishing most vulnerable farmers.

Decline in soil fertility was observed in subsequent ratoon crops and also when farmers replaced sugarcane at the end of the cropping cycle (after 3-4 ratoon crops). On the other hand loss of biodiversity is inevitable given the monoculture nature of sugarcane farming.

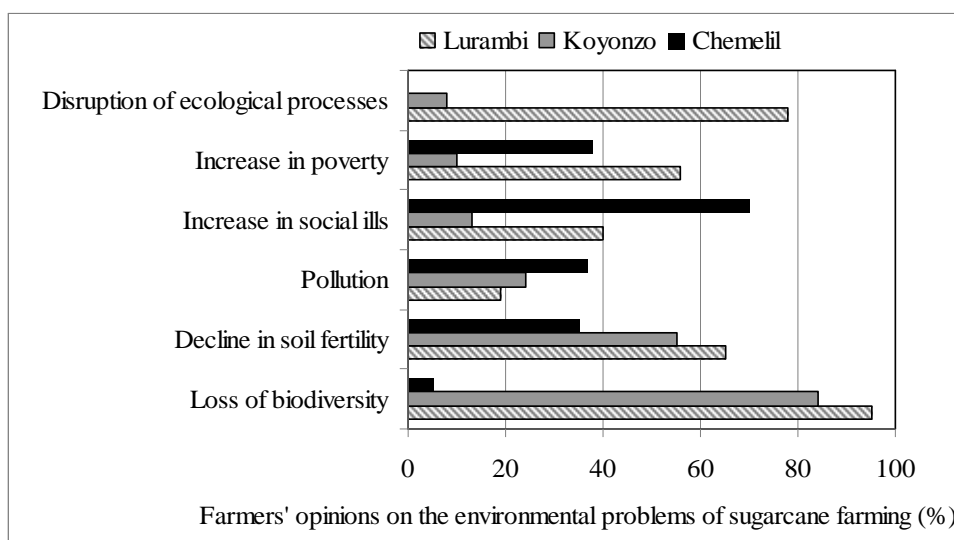


Figure 6: Farmers' opinions on sustainability problems of sugarcane

Consequent human responses in such circumstances often affect the whole ecosystem negatively in a vicious cycle of poverty and environmental degradation. It is also on this basis that this paper interrogates the ethics of expanding commercial sugarcane farming in western Kenya, when rights to food and, a clean and healthy environment have now been defined and entrenched in the national constitution (Republic of Kenya, 2000; Republic of Kenya, 2010). To produce this food while increasing forest cover and agri-biodiversity requires investment in sustainable intensive systems with specific ethical considerations, whose full implementation is hinged upon a legal framework.

In terms of ecosystem services, results showed that there was a strong linear negative relationship between sugarcane farming and loss of ecosystem services. This agrees with the conventional understanding of the negative effects on plantation monocultures. This linear relationship therefore indicates that as sugarcane farming increases, uses of ecosystem services are likely to decrease.

Sugarcane farming negatively correlated with provisioning services ( $r = -0.22$ ,  $p < 0.03$ ), regulatory services ( $r = -0.20$ ,  $p < 0.04$ ), cultural services, ( $r = -0.23$ ,  $p < 0.03$ ) and supporting services ( $r = -0.38$ ,  $p < 0.01$ ) (Table 3).

Table 3: Correlations between sugarcane farming and ecosystems services (N = 290)

	SCF	ES-P	ES-R	ES-C	ES-S
SCF	1.00				
ES-P	-0.22*	1.00			
ES-R	-0.20*	0.30**	1.00		
ES-C	-0.23*	0.37**	0.10	1.00	
ES-S	-0.38**	0.29*	0.78**	0.10	1.00

\*\* Correlation is significant at the 0.01 level (2-tailed); \* Correlation is significant at the 0.05 level (2-tailed); where: SCF=Sugarcane farming; ES-P=Ecosystem Provisioning services; ES-R=Ecosystem regulatory services; ES-C=Ecosystem Cultural services; ES-S=Ecosystem supporting services

A linear regression performed on the data showed that Sugarcane farming is significantly related to loss of ecosystem services after controlling for other factors. The standardized beta value of -0.65 for sugarcane farming confirms the negative relationship between sugarcane farming and loss of ecosystem services. The t-statistic for sugarcane farming ( $t = -4.043$ ) indicates that the relationship is significant at the  $p < 0.001$  level. The adjusted  $R^2$  (e.g., adjusted for the number of predictor variables) is 0.40, indicating that the sugarcane farming explain almost 40 percent of the variation in loss of ecosystem services. It is also noted that the F-statistic is significant ( $F = 16.347$ ,  $p < 0.001$ ), indicating that the amount of variation explained by the predictor variable was not 'by chance' (Table 4). There is an inverse relationship between expanding sugarcane farming and loss of ecosystem services. Similar results were obtained by Netondo (2011), who noted that erosion of biodiversity in the sugar belts of western Kenya directly translates into a decline in ecosystem services in the study areas.

Since anybody or firm may invest in commercial sugarcane farming, as envisaged in the liberalized economy, invoking provisions in the Bill of Rights in Kenya's National Constitution, 2010 could provide the needed entry point for policy to regulate monoculture production systems like sugarcane farming.

For instance the Country's vision in terms of forest cover is 10%. In this regard, all wetlands and flood plains should be reclaimed, rehabilitated and protected from new encroachment by invoking the restoration orders of the Environmental Management and Coordination Act, 1999. Where farming has encroached on such ecosystems, the same should be reclaimed for reforestation, exclusive of the 10% forest cover requirement. Based on the western Kenya sugar belt, such a legal requirement could help reclaim and re-forest about 16,000 hectares of land (Table 5).

In addition, compelling firms engaged in large-scale sugarcane production to set aside another 20% of their land as national food crop reserves, would put about 32,000 hectares under food production, besides contributing to national development through job and wealth creation. Reduction in expected sugarcane yields due to reduced land area could be compensated for through efficient production and processing practices along the value chain.

Table 4. Ecosystem services regression model

Regression variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std Error	Beta	-	-
Constant	3.80	0.34		11.034	.000
Sugarcane farming	-0.56	0.14	-0.65	-4.03	.001
Dependent variable: Loss of ecosystem services; n=290; R=0.65, R <sup>2</sup> =0. 47; adjusted R <sup>2</sup> =0.40 F-statistic = F=16.347, p<.001.					

Table 5: Possible land savings for reforestation and food production in the Western Kenya Sugar belt (ha)

Name of Sugar Company	Land area under sugarcane as at 31 <sup>st</sup> December 2010	Land that could be reforested <sup>1</sup>	Land that could be reserved for food crops <sup>2</sup>
Chemelil	15,556.00	1,555.00	3110.00
Muhoroni	13,551.00	1,355.00	2710.00
Mumias	56,927.00	5,692.00	11,384.00
Nzoia	25,574.00	2,557.00	5114.00
South Nyanza	16,765.00	1,676.00	3352.00
Miwani	4,198.00	419.00	838.00
West Kenya	19,720.00	1,972.00	3944.00
Soin	1,300.00	130.00	260.00
Kibos	3,992.00	399.00	798.00
Total	157,583.00	15,758.00	31,510.00

<sup>1</sup> Computation is based on the 10% national vision of forest cover; <sup>2</sup> Saving 20% of company land

## 5. Conclusions and Recommendations

In its present form, commercial sugarcane farming though profitable to the firms and large scale farmers, fails the ethics test through its exacerbation of poverty within its main clientele – the majority small-scale farmers. Equally significant is the negative effect of large scale sugarcane farming on nature and biodiversity conservation, and ecosystem services critical to rural livelihoods. Legally-backed policies are required to encourage firms engaged in sugar processing to integrate food production, biodiversity conservation and more forest cover in their nucleus estates and out-grower schemes. Possible areas of intervention include:

- i. The need to compel firms engaged in large-scale sugarcane farming to set aside 10% of their nucleus land area for reforestation with indigenous trees. This would be in-line with national target of 10% forest cover (Kenya Forestry Services, 2005). Such firms should establish forest nurseries to supply tree seedlings to themselves and surrounding communities as part of their corporate social responsibilities. In the spirit of partnership as envisaged in the Millennium Development Goals, government should recognise and provide tax subsidies to companies and households that exceed the statutory 10% forest coverage.
- ii. To reduce pressure on forests due to the high demand for wood fuel among the rural poor, there is need for urgent investment in alternative energy sources. Through their co-generation options sugar processing companies could contribute to the rural electrification program, targeting surrounding households as priority. Availability of electricity has the potential of expanding options for off-farm economic practices, thus reducing dependence on sugarcane among the rural clientele.
- iii. With less than 30% of Kenya's total land area being arable and food security remaining a pressing challenge, as much prime land as possible should be put under food production. As such the rationale of allowing expansion of sugarcane farming in traditional national food baskets like Western Kenya and parts of Rift Valley should be interrogated and regulated by legal framework. Sugar processing firms should be compelled to set aside another 20% of their nucleus land as national food crop reserves.
- iv. A formula that guarantees equitable sharing of profits between the company and the farmers is needed in order to avoid exploitation of farmers, who remain generally powerless and marginalised with regard to financial decision-making.
- v. A firm that is guided by farmer-friendly ethics cannot allow dependent and generally ignorant farmers to put all their land in sugarcane farming knowing very well that the waiting period of 24-36 months would have severe effects on their food supply and nutritional status. As such necessary vetting of eligible farmers is paramount. To be eligible for contract farming, a farmer should have at least an acre of land, excluding that set apart for sugarcane farming, for subsistence farming.



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