Rainforest Alliance Certification of Kenyan Tea Farms: A Contribution to Sustainability or Tokenism?

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An Environmental Management System (EMS) is an approach organisations can use to structure their management to prevent or minimise adverse environmental and social impacts. Rainforest Alliance Certification (RFC), one example of an EMS, was adopted by a number of Kenyan tea farms in 2007 to promote sustainable tea production. It addresses the three pillars of sustainable development (environmental, economic and social) and as such is suited to tea farming which is characterised by job insecurity, strenuous work conditions, child labour and environmental resource degradation.

As numbers of EMSs and pressures on organisations to adopt them increase, it is imperative to evaluate their contribution to achieving sustainability. In this study, a mix of methods - qualitative interviews with farm managers and government officials, quantitative interviews with farm workers, biophysical observation and secondary data - were used to compare agri-environmental and socio-economic indicators between certified and non-certified tea farms.

Analysis of the results indicates that the RFC brings some important social and environmental benefits, for example, improved work conditions and to a limited extent, natural resource conservation. Certified tea farms maintain riparian strips to protect natural resources and also monitor their water quality more frequently than non-certified tea farms. However, there were no significant differences in some aspects including employees' housing conditions and source of cooking energy.

Although there are important benefits from adopting the RFC, there are obvious gaps between certification and sustainability which need to be addressed if full benefits are to be achieved.

Keywords: developing countries, Rainforest Alliance Certification, tea farming, comparative evaluation, Kenya

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ACRONYMS

CARE	Cooperative for Assistance and Relief Everywhere
CSD	Commission on Sustainable Development
CSR	Corporate Social Responsibility
DFID	Department For International Development
DPSIR	Driving forces-Pressures-State-Impacts-Responses
DSR	Driving force-State-Response
ECBA	Environmental or Extended Cost Benefit Analysis
EMAS	Eco-Management and Audit Scheme
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Policy
EMS	Environmental Management System
EPZA	Export Processing Zones Authority
ES	Ecosystem Services
FLO	Fair Trade Labelling Organisation
FSC	Forest Stewardship Council
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
ISO	International Organisation for Standardisation
KHRC	Kenya Human Rights Commission
Ksh.	Kenya shillings
KTDA	Kenya Tea Development Agency
KWS	Kenya Wildlife Service
MAF	Ministry of Agriculture and Forestry

MCDM	Multi-Critria Decision Mechanisms
MDG	Millenium Development Goal
MNCs	Multi-national Corporations
NEMA	National Environmental Management Authority
NGO	Non-Governmental Organisation
NZ $	New Zealand dollar
NZAID	New Zealand Agency for International Development
OECD	Organisation for Economic Co-operation and Development
PPE	Personal Protective Equipment
PSIR	Pressure-State-Impacts-Response
PSR	Pressure-State-Response
PSR/E	Pressure-State-Response-Effects
RFC	Rainforest Alliance Certification
SAN	Sustainable Agriculture Network
SLF	Sustainable Livelihoods Framework
SMEs	Small and Medium Sized Enterprises
SPSS	Statistical Package for Social Scientists
SWNZ	Sustainable Wine New Zealand
TBL	Triple Bottom Line
TGM	Total Gross Margin
TNS	The Natural Step
TRFK	Tea Research Foundation of Kenya
UK	United Kingdom
UN	United Nations
UNCED	United Nations Conference on Environment and Development

UNCTAD	United Nations Conference on Trade and Development
US	United States
WCED	World Commission on Environment and Development
WRMA	Water Resource Management Authority

Chapter 1
Introduction

A European settler, GWL Caine, introduced tea to Kenya from India in 1903 (Gesimba, Langat & Wolukau, n.d.). The production of tea was initially developed as a colonial export crop by the British company Brooke Bond, which was later acquired by Unilever in 1983 (Amde, Chan, Mihretu, & Tamiru, n.d.). Since then, planting and production of tea have increased significantly and it has become the country's leading export crop earner of about NZ $ 0.8 billion in 2006 (Mwaura & Muku, 2007). Tea production has risen from 18,000 tonnes in 1963 to 345,817 tonnes in 2008 (Kenya Human Rights Commission, 2008). In 2006, Kenya attained fourth position in tea production after China, India and Sri Lanka, with 10 per cent of the global tea production (Amde et al., n.d.). The main buyers of Kenyan tea, accounting for more than 70% of the tea export volume, are Pakistan, the United Kingdom and Yemen.

There are two main groups of tea growers in Kenya – the smallholders and the large scale growers, who are also referred to as the estate sub-sector. The estate sub-sector is owned by 16 companies which operate 38 tea processing factories (Mwaura & Muku, 2007). Small scale farmers have played an important role in the cultivation of tea in Kenya. It is estimated that on average they hold and manage fewer than eight hectares of tea plantations (Nyangito, 1999). The smallholders contribute up to 60 percent of the total crop in the country while large scale tea estates contribute 40 percent (Mwaura, Nyabundi, & Muku, 2005). The smallholders are managed by the Kenya Tea Development Agency (KTDA) and are served by 54 tea processing factories. The Kenyan tea sector directly and indirectly employs three million people, about 10 percent of the population (Mwaura & Muku, 2007).

Despite its major contribution to the Kenyan economy, tea production has been associated with environmental and social problems. For example, studies have established poor working conditions, inadequate basic facilities such as housing and low income security as some of the social issues common in tea farms (Sanne van der Wal, 2008; KHRC, 2008). In addition, there are concerns related to conventional agriculture, including declining soil productivity and deteriorating environmental quality (Reganold, Papendick & Parr, 1990). These concerns have turned people's focus in many parts of the world to sustainable agriculture. For a farm to be sustainable, Reganold et al., (1990, p. 112) observe that:

> "… it must produce adequate amounts of high-quality food, protect its resources and be both environmentally safe and profitable… sustainable agriculture addresses many serious problems …: high energy costs, groundwater contamination, soil erosion, loss of productivity, depletion of fossil resources, low farm incomes and risks to human health and wildlife habitats."

With the growing concerns over sustainability issues in agriculture, a number of sustainability tools have been developed and adopted for various agricultural systems, for example, Fair Trade in cocoa farms and Sustainable Wine New Zealand (SWNZ) in viticulture operations. Studies have indicated that these sustainability tools perform differently given their specific focus and context (Bacon, 2005; Muradian & Pelupessy, 2005). Furthermore, studies have been more concentrated in developed than developing countries. Therefore, this research, by evaluating whether the Rainforest Alliance Certification (RFC) of Kenyan tea farms has resulted in any benefits, especially its contribution to achieving sustainable agriculture, fills a gap in the literature for both tea farms and certification in a developing country context.

The following sections highlight the tea production process in Kenya and introduce the meanings of sustainable agriculture and environmental management systems as perceived in this research.

1.1 The tea production process

Tea is vegetatively propagated in a tree nursery from stem cuttings. Through grafting, a number of clones have been produced especially by the Tea Research Foundation of Kenya (TRFK). High yielding tea varieties with drought, pest and disease resistance traits have been produced through plant breeding and subsequent cloning (Wamanga & Koech, 2010). The stem cuttings are nurtured in polythene bags filled with soil in either straight plants or grafted forms. It takes approximately two and a half years for the stem cuttings to be ready for planting in the field. After field preparation, new plants are established in the field following recommended spacing and holing, so as to maintain the desired crop cover and optimise on land use (Wamanga & Koech, 2010). This is then followed by regular weeding, watering, formative pruning and plucking. Infilling is also carried out to replace any tea plants that could have been lost as a result of drought, disease and pest attacks. In the process, fertilisers and pesticides are applied according to the needs of a plantation. During a period of two years, tea plantations mature until the initial harvesting, commonly referred to as tea plucking. Wamanga and Koech (2010) define plucking of tea as the manual or mechanical harvesting of shoots from tea bushes consisting of two (or three) leaves and a bud for onward delivery to

the factory for the processing of made tea. Tea pluckers take precautions because the quality of the plucked tea leaves has a significant impact on the quality of the resulting made tea.

After tea leaves are plucked, the leaves' quality is inspected and those that meet the specified standards are weighed and consequently transported to the factory. At the factory, the fresh green leaves are withered using troughs, tranks, continuous withering units or trancos. In the trough method, leaves are held in well-ventilated troughs to undergo both physical and chemical withering. Steam is applied if necessary to speed up moisture removal. In the trank or tranco method, leaves are put into tranks/trancos while fanning them to achieve chemical withering (Wamanga & Koech, 2010). The leaves are then passed through the Rotorvane for cutting, tearing and curling (CTC). After the CTC, tea is fermented using the Continuous Fermentation Unit (CFU) system and dried in the Fluidised Bed Dryers (FBD) before sorting and packaging (Universal Work Health and Safety Consultancy Limited, 2009).

From the initial step of propagating tea in a nursery to the industrial processing stage, a number of environmental sustainability issues are encountered, including the use of artificial fertilisers, pesticides, effluent discharge to natural water bodies and destruction of habitats for wild animals. These concerns are common to most types of agriculture, and have seen farmers in many parts of the world shifting their focus to more sustainable agriculture practices. The following section introduces the concept of sustainable agriculture.

1.2 Sustainable agriculture

For decades, agriculture has been one of the foundations of human society and a major activity at the human-environment interface (Lélé, 1991). As a primary source of production, it has ensured man's livelihood. Over a period of time, man has sought possible means of increasing food production and hence greatly modified practices in agriculture. This has resulted in a modern industrialised or conventional agriculture which is highly specialised and capital intensive. Conventional agriculture is heavily dependent on synthetic chemicals and other off-farm inputs (Schaller, 1993). Attempts to increase production in a complex ecosystem have therefore led to various sustainability concerns as conventional agriculture is known to have adverse impacts on various segments of life.

Some of the problems associated with conventional agriculture were identified by Schaller (1993, p. 90) and Aldy, Hrubovcak, & Vasavada (1998, p. 85) as: contamination of ground and surface water from agricultural chemicals and sediments; hazards to human and animal health from pesticides and feed additives; adverse effects of agricultural chemicals on food safety and quality; loss of the genetic diversity in plants and animals; destruction of wildlife

including bees and beneficial insects by pesticides; growing pest resistance to pesticides; reduced soil productivity due to soil erosion; over-reliance on non-renewable resources, and health and safety risks incurred by farm workers who apply potentially harmful chemicals.

There is overwhelming evidence in the literature regarding the undesired impacts of conventional agriculture. Early authors who expressed such concerns include Rachel Carson (1962), who wrote in *Silent Spring* about the ill-effects of pesticides. As a response to the deteriorating situation, more efforts are now directed towards achieving sustainable agriculture, which the US Congress in the 1990 Farm Bill defined as an:

> "… integrated system of plant and animal production practices having a site specific application that will, over the long term: (a) satisfy human food and fiber needs; (b) enhance environmental quality; (c) make efficient use of non-renewable resources and on-farm resources and integrate appropriate natural biological cycles and controls; (d) sustain the economic viability of farm operations; (e) enhance the quality of life for farmers and society as a whole" (Public Law 101-624, Title XVI, subtitle A, Section 1603 as cited in Aldy et al., 1998, p. 3).

The above definition provides an important but still somewhat limited understanding of sustainable agriculture as considered later in this research.

Pressure has been mounting on farmers to take actions in reversing the undesired trends in the agricultural sector. Some authors who specialise in this topic include Kilian, Jones, Pratt & Villalobos (2005), Monteiro & Rodrigues (2006), Raynold et al. (2006) and Rivera-Ferre (2008), who reported the need to select, adapt, transfer, and assess sustainable environmental management and best production practices. In the last three decades, farmers who have sought to conduct their businesses in a more responsible manner have increasingly been adopting EMSs in order to help them identify and mitigate adverse impacts from their activities. The following section introduces EMSs and briefly explains some of the factors that have led to their adoption.

1.3 Environmental management systems

> "The growing economic value and consumer popularity of sustainability standards inevitably raise questions about the extent to which their structure and dynamics actually address many environmental, economic and public welfare issues" (Giovannucci et al., 2008, p. ix).

Traditional instruments of environmental protection such as command and control regulation, and taxes on pollution have been relied on to manage natural resources (Arora & Cason, 1996; Brown & Getz, 2007). These are now being complemented with voluntary environmental standard initiatives (Darnall et al., 2008). The need to attain sustainability in turn has led to a proliferation of sustainability initiatives in many industries in recent years (Allen, Van Dusen, Lundy & Gliessman, 2009). Voluntary environmental initiatives can be defined as non-statutory environmental initiative efforts made by private or public enterprises/organisations to improve environmental performance beyond the existing legal requirements (Labatt & Maclaren, 1998; Paton, 2000). Some of these standards/environmental initiatives have been developed and incorporated as part of the overall management system of an organisation which includes the organisational structure, responsibilities, practices, procedures, processes and resources for determining and implementing the firm's overall aims and principles of action with respect to the environment, and hence are often referred to as Environmental Management Systems (EMSs) (Kolk, 2000).

The adoption of EMSs has spread extensively worldwide mainly in the industrial sector and more recently in the horticultural sector of the agriculture industry (Tee, Boland, & Medhurst, 2007). The EMS concept refers to actions incorporated voluntarily by organisations into their management in order to prevent or minimise adverse environmental and social impacts. They have been designed to provide a methodical approach to managing the impacts of organisations and businesses on the environment. A number of studies designed to investigate the effectiveness of EMSs have been conducted, mostly in developed countries because the adoption of EMSs has also been more concentrated in those countries. This view is also shared by Harrison and Hoberg (1994), and Brickman et al. (1985) as cited in Harrison (1999, p. 2).

> "… there is also renewed interest in cooperative policy instruments in countries such as the Netherlands, Canada, Australia, the United Kingdom, and Japan, where environmental regulation has traditionally been relatively cooperative."

Also, some researchers have opted to compare EMSs (e.g., Raynolds et al., 2007), while others have focused on one or two of the pillars of sustainability (e.g., Kilian et al., 2005; Raynolds, Murray & Taylor, 2004; Tovar, Martin, Cruz & Mutersbaugh, 2005). This presents a dearth in the literature regarding evaluating the performance of EMSs within a bigger context, i.e., agricultural sustainability and sustainability in general. EMSs such as ISO 14001, Fair trade and the Rainforest Alliance Certification programme have been introduced into developing countries to help in pursuing sustainability in agricultural activities. However,

few studies have been carried out to assess their significance in the context of a developing world.

A plethora of voluntary sustainability standards have emerged in the agri-food sector. Some of these can be limited to pre-farmgate and business-to-business schemes, for example, Good Agricultural Practices (GAP). They may also display a label for final consumers as a competitive point of difference, for example, Fair Trade certification (Battisti, MacGregor, & Graffham, 2009). Battisti et al. (2009) further observe that sustainability standards are applied to a wide range of agricultural produce and are affecting all participants in the supply chain, from sub-Saharan producers to industrialised country customers. The main factors that have motivated adoption of the sustainability standards are presented in Table 1.1.

Table 1.1 Drivers for voluntary standards compliance for producers in developing countries

Drivers	Brief explanation
Financial	As with any new market opportunity, investment is necessary to comply. Higher income/larger margins (or opportunities for these) are significant drivers.
Technical efficiencies	Improved organisational performance and better chances of organisational survival. Benefits from implementing and running compliant systems result in less fraud, higher yields, and more efficient farms.
Upgraded benefits of trade	Benefits such as training help to support and upgrade organisational performance.
Signalling	Compliance signals to all buyers of quality produce the production skills of the farm. Crucially these signals are important in accessing finance, training, information etc.
Reduced risk	More durable trading relationships than are available on alternative markets e.g., local markets.
Alternatives	For farmers with few alternatives to cash crops, this might be their only option to sell these products.

Source: (Battisti et al., 2009, p. 13)

As organisations and businesses are increasingly adopting the voluntary sustainability standards, studies are being conducted to evaluate their performance. Van Wijk, Danse & Van Tulder (2008) examined claims that voluntarily adopted, private quality standards by supermarkets improve the quality of products in respect to food safety, and environmental and social sustainability. They realised that the majority of the 36 standards studied were perceived to facilitate trading opportunities for developing country producers, but only for the suppliers who could meet the criteria of quality standards. While a number of studies agree that there are positive gains from the adopted voluntary sustainability initiatives relative to the conventional system in agriculture, they also point out some flaws that are worth addressing.

As an example, Muradian & Pelupessy (2005) claim that the ability to participate in a voluntary regulatory system may work as a "reputation" tool for farmers, facilitating coordination between traders and growers, but they do not ensure a better economic performance. Studies of Fair Trade certification have found it beneficial for producers in terms of income generation, organisational skills, capacity building, and resilience to external shocks (Bacon, 2005; Muradian & Pelupessy, 2005).

The mixed results on performance of the voluntary sustainability standards make it important to evaluate them. Consequently, as the Kenyan tea farms are adopting Rainforest Alliance Certification, the question is whether this brings about improvement in environmental, social and economic aspects of the farms' operations and whether any such gains are significantly different from those of farms which do not adopt such systems. Apart from the individual tea farms' internal evaluations, there has been no research work of this nature, especially in the Kenyan tea farms.

1.4 Problem statement

With the increasing awareness of the impacts of man's activities on natural resources, there is mounting pressure from various groups on businesses to exercise sustainable practices. This has seen increased adoption of EMSs as tools for improving sound environmental management and to ultimately achieve sustainability. However, studies have indicated that EMSs alone, depending on the factors that motivated their adoption, may not foster sound environmental management (Darnall, Henriques, & Sadorsky, 2008). For example, Nebel, Quevedo, Bredahl Jacobsen, & Helles (2005, p. 1) reporting on the performance of the Forest Stewardship Council (FSC) in Bolivia found:

> "Only little improvement was obtained through certification in itself. Furthermore, deforestation persists unabated. Therefore, it appears that major roles of the FSC certification have been (i) regulation – oriented verification of compliance with already established norms and (ii) creation of a forum for consensus formation between dominating policy formulating actors."

The RFC has been used in Latin America, Asia, North America, Oceania and Europe and is now certifying cocoa, coffee and tea farms and raising awareness of sustainable forestry and Forest Stewardship Council (FSC) certification in Africa. The Rainforest Alliance team aims to promote both sustainable forestry and agriculture by training forest and farm managers, and certifying forestlands and farmlands as it replicates what it terms a model of success (Rainforest Alliance, n.d). Unlike some EMSs e.g., ISO 14001, the RFC system targets all

three pillars of sustainability - economic, environmental and social aspects. Unpublished reports and news bulletins have been circulated through the internet reporting on the success of the RFC as an EMS (e.g., http://ecoki.com/tea-growers-rainforest-alliance-certification/, accessed on 26th October 2010).

However, despite internet reporting, very little formal research has been carried out in assessing the performance of this particular EMS. A comparative study which is related to this research was conducted by the International Institute for Sustainable Development (IISD) in 2008. It covered five countries, Kenya, Peru, Costa Rica, Honduras and Nicaragua. However, its aim was to compare benefits and costs (environmental, social and economic) between those farms implementing sustainability initiatives, including Fair Trade, Organic, Utz Certified, CAFE practices, 4C and Rainforest Alliance, and those that do not, rather than the performance of one specific type of management system, which is the subject of interest of this thesis. The principal research question therefore is: does the RFC result in improved environmental and social performance of certified farms in the Kenyan tea industry?

1.5 Study aim and objectives

The main aim of this study is to determine whether the RFC of Kenya tea farms has produced the environmental, social and economic benefits envisioned by the farmers and their stakeholders when certification was first undertaken.

Objectives

The three principal objectives are to:

1. Review the EMS literature and develop an evaluative framework for assessing performance of the RFC.

2. Determine if the RFC leads to improved environmental, social and/or economic outcomes.

3. Make recommendations regarding EMSs and sustainable tea production in Kenya, and potentially elsewhere.

1.6 Thesis outline

This thesis has seven chapters: introduction, study area, literature review, methodology and study methods, results, discussion and, conclusions and recommendations.

Chapter two provides brief information about the study area and the tea farms. It also summarises the laws governing tea production in Kenya.

In chapter three, a review of literature is undertaken to improve the readers' understanding of the subject matter. Brief information about tea farming in Kenya is given in this chapter. In addition, the chapter discusses practice of the RFC program. Sustainability in the agricultural context and the possible agri-environmental indicators are reviewed including sustainable livelihoods. This is because the livelihoods of the tea farm employees are a key concern in this study. From the reviewed literature, an evaluative framework is developed.

Chapter four outlines the research methodology and identifies specific methods for data collection. Alternative methods for conducting similar research are explored and the reasons for adopting the methods used in this research are discussed.

Chapter five presents results obtained from both the quantitative and qualitative approaches. The quantitative results are presented as a comparison of variables between the certified and non-certified tea farms. Narrative descriptions of the findings from the qualitative interviews conducted with the government officials, semi-structured interviews with the farm managers, secondary data and biophysical observations are also presented in this chapter.

In chapter six, the study results reported in chapter five are discussed based on the three sustainability components, i.e., environment and ecological system, social conditions and economic performance. The chapter also discusses whether the RFC has made it possible to achieve sustainable livelihoods among the certified tea farm employees and sustainable agriculture at the farm level. Lastly, the chapter explores whether the RFC standards advocate for strong or weak sustainability.

Finally, chapter seven offers conclusions on the performance of the RFC as an EMS. The chapter also recommends possible actions that can improve performance of the RFC program in the Kenyan tea production process and elsewhere in the context of the developing world.

Chapter 2
The study area context

2.1 Introduction

In this chapter, the physical location and characteristics of the study area (Kericho district) are presented. In addition, some of the demographic and social characteristics of the study area such as population size, economic activities and services are identified. The chapter also provides insight into the laws governing tea production processes in Kenya.

2.2 Kericho district

This research was conducted in Kericho district of the Rift Valley province (see Figure 2.1), which is one of the eight provinces in Kenya. The study area within Kericho district is in the Western part of Kenya. Kericho district was chosen because it accommodates most of the large tea companies' estates, which are the focus of this research. The area is renowned for its vast expanses of tea plantations and can thus be considered as the tea capital of Kenya, and one of the leading exporters of high quality tea in Africa (Universal Work Health and Safety Consultancy Limited, 2009).

The district is situated between latitude 0°7' 0N and longitude 35°10' 60E, and has an average altitude of 1,987 metres above sea level. It covers a total area of 2,110.6 km^2 of which 67.9 km^2 is under gazetted forest, 6.0 km^2 is water and 10.6 km^2 is covered with urban settlements. Arable land area is 1,698.8 km^2 while the non-arable land area, excluding water mass, gazetted forests and urban areas, is 327.3 km^2 (Ministry of Planning and National Development, 2002).

2.2.1 Physical and natural characteristics

Kericho district has an undulating topography with the Tinderet and Mau escarpments in the northern and north western parts. The land generally slopes to the west and hence influences the drainage to the same direction. Kericho plateau, which forms the central part of the district slopes gently from about 2,500 metres to 1,800 metres above mean sea level.

The district's land was originally an equatorial rainforest. Therefore, it is well endowed with rivers including Kipchorian, which originates from the Western Mau Forest, Kipturet, Timbilil, Kiptaret, Timbilit, Maramara, Chemosit and Malaget. Some of these rivers pass

through the tea estates and have rapid falls that can be harnessed for hydro-electric power generation.

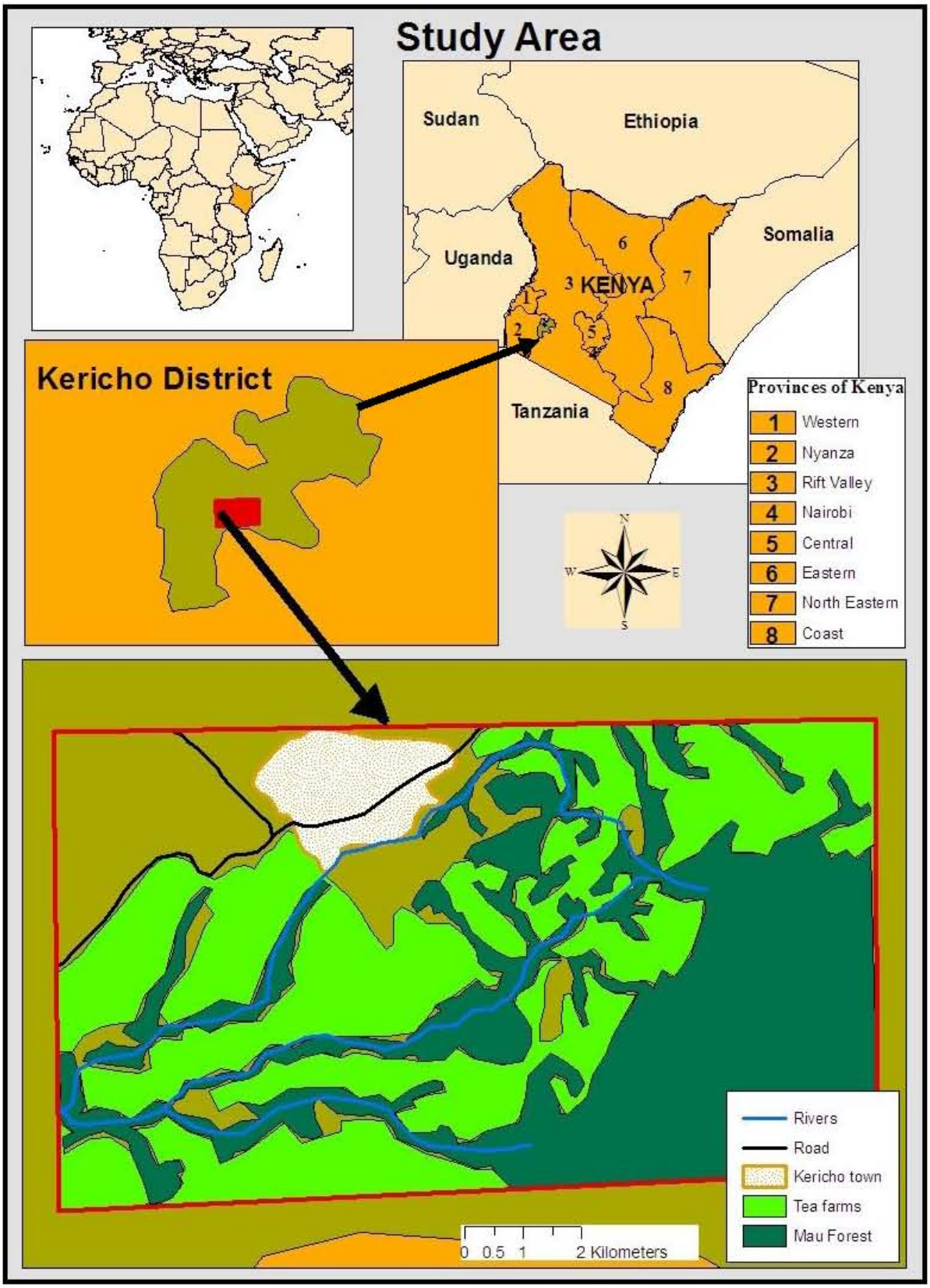


Figure 2.1 Map of Kenya showing the study area

The soils within the district owe their origin to volcanic, igneous and metamorphic processes (Ministry of Planning and National Development, 2002). The district can be subdivided into four agro-ecological zones: the upper highland zone which is most suitable for wheat and pyrethrum production, the lower highland zone which is suitable for wheat, maize and pyrethrum, the upper midland which is suitable for coffee and tea, and the lower midland zone which is suitable for growing cotton (Ministry of Planning and National Development, 2002). The rich volcanic soils are deep and well drained with a pH that tends towards acidic (between 4.0-5.0) (Mwaura & Muku, 2007).

The district experiences an average temperature range of 15-24 °C and receives a well distributed mean annual rainfall of 1400 mm (Ministry of Planning and National Development, 2002). A small dry season is experienced in January and February, and otherwise there is no real break between the first and second rainy seasons (Mwaura & Muku, 2008; Wamanga & Koech, 2010).

2.2.2 Socio-economic factors

The 2009 population census established the human population size of Kericho district as 758,339 (Kenya National Bureau of Statistics, 2009). Males (381,980) slightly outnumber females (376,359).

A detailed report of the 2009 census has not been released but the 1999 census estimated the total number of households in Kericho at 98,867, with an average of five people per household (Ministry of Planning and National Development, 2002). Agriculture is the main source of income for 80% of households. The practice of agriculture in the district can be categorised into two levels: small and large scale. The average land size for small-scale agriculture is five acres and that of large scale is 100 acres (Ministry of Planning and National Development, 2002). The main food crops produced in the district include maize, beans, Irish potatoes, finger millet and wheat (Dorthe von & SÃ¸rensen, 1993). The main cash crops are tea, coffee, sugarcane, pyrethrum and pineapples. The study area's population is also involved in livestock rearing and the keeping of cattle, goats and sheep.

The average distance to the nearest potable water point is 5 km, but only 47,988 households have access to potable water (Ministry of Planning and National Development, 2002). The literacy level for males is 81% and for females is 64% (Ministry of Planning and National Development, 2002).

2.2.3 Laws governing the tea production process in Kenya

For a long period of time, Kenya's natural resources have been managed under various Acts of Parliament, resulting in a sectoral approach to natural resource management. Some of the Acts with direct bearing on tea production include: the Environmental Management and Coordination Act (EMCA) 1999; the Tea Act (Cap. 343); the Forest Act, 2005; the Agriculture Act (Cap. 318); Water Act, 2002; Labour Institutions Act, 2007, and the Wildlife (Conservation and Management) Act (Cap. 376). This sectoral approach has been blamed for conflicts and inaction among the various sectors (R. K'Apiyo, personal communication, September 15th, 2005). For example, while a water source may be found in a forest land, the two resources are managed using two different statutory Acts (Water Act Cap. 372, Water Act 2002 and Forests Act Cap. 385) of Parliament, which may have conflicting stands on the management of either of the two resources. In 2000, a new Act, the EMCA, 1999 was assented to. This Act (EMCA, 1999) was drafted in order to harmonise the 66 pieces of Acts that governed the natural resources in Kenya. It led to the establishment of the National Environmental Management Authority (NEMA), which is the Authority responsible for the management of the environment in Kenya. The Act was not meant to repeal the existing Acts but where there is a conflict, the EMCA, 1999 prevails (see Appendix B).

Chapter 3
Literature review

3.1 Introduction

In this chapter, a literature review is undertaken to clarify the rationale of the study and to identify an evaluative framework. The chapter starts by discussing tea production and the associated sustainability issues. This provides an insight into the importance of rethinking the way the tea production process is undertaken. Next, EMS as one of the options for improving tea production conditions is reviewed. This leads to consideration of factors that motivate the adoption of EMSs, and whether they help in achieving sustainability in the operations of organisations and farms. After a general discussion of the EMSs, the Rainforest Alliance Certification (RFC) programme as an EMS is introduced. Its background and practice are analysed to understand the opportunities it presents in contributing to sustainability outcomes.

Subsequently, a review of the approaches used to study EMSs by other researchers is carried out with the aim of adopting the most appropriate one for this study. A comparison approach based on the triple bottom line (TBL) indicators was adopted. This is then followed by the development of a conceptual framework, which borrows from the driving force-state-response (DSR) indicators framework and sustainable livelihoods framework (SLF). As the study is mainly based on the comparison of sustainability indicators, the indicators are then selected and discussed. The chapter ends with a tabulated summary of the indicators used in this research.

3.2 Tea production and sustainability

The negative effects of agriculture on the environment have become increasingly visible (UNCTAD, 1993 as cited in Vatn et al., 2006). Tea farms replaced the initial forest lands and therefore have a myriad of sustainability issues challenging their existence. Conversion of forests into farmlands has resulted in conflicts between man and wildlife, water pollution, increased run-off, soil erosion and degradation of soil fertility. Land use change presents persistent problems because such changes have the potential to disrupt the hydrological cycle of a drainage basin which can alter both the balance between rainfall and evaporation, and the run-off response of the area (Sahin & Hall, 1996). Some of the raw materials and inputs in the tea farms include agrochemicals such as fertilizers, pesticides in the tree nursery and herbicides for suppressing weeds (Wamanga & Koech, 2010). The use of inorganic fertilizers,

for example, nitrogen fertilizers including urea, phosphates, potash, sulphate of ammonia and magnesium sulphate, presents possibilities of water and air pollution. Universal Work Health and Safety Consultancy Limited (2009) reports the adverse impacts from the tea production process as water pollution by the agrochemicals and their packaging waste, environmental degradation due to poor quality of the effluent from processing tea, pressure on water resources, health hazards as a result of worker exposure to tea dust, and other health and occupational risks.

Social issues, especially those related to work conditions, were reported by the comparative study conducted in 2006 by the Kenya Human Rights Commission (KHRC, 2008). One of the study's aims was to assess the working conditions and terms of service for workers in the low cadre of employment on the tea estates. The identified problems experienced by tea farm workers include job insecurity as a result of casualisation of labour, strenuous work conditions perpetuated by high production targets, child labour, "deplorable" housing conditions, and discrimination along the lines of sex and tribe (KHRC, 2008). The undesirable work conditions in the tea sector have been blamed on low prices for tea (Sanne van der Wal, 2008, p. i):

> "Low prices are affecting the sustainability of the tea sector, with working conditions and the livelihoods of plantation workers and small-scale farmers in tea producing countries under pressure. Meanwhile, tea trade and distribution are dominated by a few international companies that benefit from stable retail prices."

Sanne van der Wal (2008) compared work conditions in six leading tea producing countries (India, Sri Lanka, Vietnam, Indonesia, Kenya and Malawi) and reported similar findings to those of the KHRC (2008). The following is a summary of Sanne van der Wal's (2008) findings:

> "… working conditions for pickers are often poor, with low wages, low job and income security, discrimination along ethnic and gender lines, lack of protective gear and inadequate basic facilities such as housing and sometimes even drinking water and food. At the same time, there is no possibility for tea plantation workers to improve working conditions because trade unions are ineffective or absent and/or are not representing them because most of them are temporary workers… The sector's environmental footprint is considerable, with reduced biodiversity as the result of habitat conversion, high energy consumption (mainly using logged timber) and a high application of pesticides in some countries." (p. 1)

The discussed challenges require redress if the tea companies are to conduct business in a more responsible manner. In order to address some or all of these challenges and instil sustainability into their operations, some tea companies have adopted Rainforest Alliance Certification which, according to the Sustainable Agriculture Network (SAN) standards, has the capability to address almost all of the identified concerns.

3.3 Voluntary Environmental Management Systems

The global need to respond to ever rising environmental concerns has seen a proliferation of different types of EMSs. This is because EMSs have been considered to enable organisations adopting them to identify the manner in which their activities interact with the environment. Furthermore, through the adoption of EMSs, environmental managers discover how the undesired impacts can be prevented or minimized (Rondinelli & Berry, 2000). It is believed that environmental concerns facing us today are indicators of both environmental and economic inefficiency. These concerns arise because many cost-effective environmental measures are inadequately exploited by managers (Könnölä & Unruh, 2006; Müller et al., 1997; Porter & Van der Linde, 1995). In response, EMSs of different types have been developed.

Depending on the orientation of EMSs, they can be categorised as 'process oriented' or 'goal oriented'. Hughey, Tait, & O'Connell (2004, p. 8) observe that:

> "The orientation, goal or process, is a very important element of an 'ems'. It determines the outcomes of a system and ultimately determines the sustainability of a system."

Consistent with this view, Raynolds, Murray, & Heller (2006) argue that certification and labelling represent an important institutional avenue for promoting social and environmental sustainability, however, the key variations in the ideas and practices employed in these efforts influence their potential. Process-oriented EMSs have a systematic procedure for implementation, for example ISO 14001. On the other hand, goal-oriented EMSs focus on the end-products and are flexible and hence more adaptable in different circumstances, for example The Natural Step (TNS). Hughey et al. (2004) found that greater emphasis has been placed on the process-oriented EMSs, for example ISO 14001, perhaps because of their ease of implementation. EMSs can also be categorised based on the bodies that developed, and the industry types that have adopted them.

Non Governmental Organisations (NGOs) have also started advocating for sustainability in the operations of businesses. They have created new private governance structures which are based on the specification of particular standards, establishment of verification procedures, and granting of certifications and labels (Raynolds et al., 2006). These are referred to as third-party certifications because they have non-corporate coordinating bodies, with the NGOs setting standards and monitoring compliance (Raynolds et al., 2006). Rainforest Alliance Certification is an example of such standards developed by NGOs. Standards can also be developed internally for corporate self-regulating. This is referred to as first-party certification. Given their self-interested nature, first-party certifications have limited credibility (Raynolds et al., 2006). Moreover, industry associations can also establish standards to regulate their operations. This category of standards is known as second-party certifications. Among the three groups of standards, third-party certification has been found to be characterised by participatory structures, clear standards, and credible verification systems (Raynolds et al., 2006). Also, there are standards coordinated by government or multilateral agency bodies but which are still voluntary. These are referred to as fourth-party certifications (Raynolds et al., 2006).

3.3.1 Factors motivating adoption of the EMSs

Reasons for adopting EMSs vary from one organisation to another. Objectives pursued by various organisations when adopting EMS have been identified by Tee, Boland, & Medhurst (2007) as natural resource management, maintenance of market access and meeting investor expectations. There has also been pressure on businesses from various interest groups including the media, as they expose poor working conditions, especially in developing countries, and campaigns for fairer trade launched by non-governmental organisations (NGOs) (Hughes, 2001). According to Rondinelli & Berry (2000), public demands for enforcement of regulations and for increased disclosure by investors, regulators, and public interest groups is one of the factors that have increased corporations' sensitivity to their social responsibility. The factors influencing adoption of the EMSs may determine the level of returns gained from their application. Darnall et al. (2008) emphasize the need to consider the motivations for adopting these management systems in order to understand the link between EMS and business performance.

3.3.2 Do EMSs offer a solution to sustainability issues?

Since 1996, over 88,800 facilities worldwide have adopted EMS certified to ISO 14001 and thousands more have adopted other EMSs (Peglau, 2005 as cited in Darnall et al., 2008).

Inferring from the EMSs' adoption rate, there seems to be a general consensus that EMSs have a role to play in the sustainable operations of businesses. Raynolds et al. (2006) argue that certification and labelling represents an important institutional avenue for promoting social and environmental sustainability, but that key variations in the ideas and practices employed in the certification efforts influence their potential for achieving positive outcomes. In the same vein, Nel, Binns, & Bek (2007) observe that certification offers an opportunity to catalyse local economic development as a result of access to global markets. Various EMSs have various strengths, for example, Hughey et al. (2004) found that ISO 14001 accredited grape growing companies had decreased usage of sprays, increased knowledge of the staff on the environment, contented neighbours, decreased waste through recycling, decreased use of natural resources and led to continual improvement of business systems among others. Besides, Sustainable Winegrowing New Zealand (SWNZ) accredited companies claimed that their scheme had led to an overall healthier environment, improved canopy management, decreased use of water, improved organic matter in the soil, facilitation of monitoring and more notably, they eliminated spray usage (Hughey et al., 2004). However, some studies have questioned the capability of EMSs to improve operations of businesses. Raynolds et al. (2006) noted differences among Fair Trade, Organic, Utz Kapeh, RFC and Shade/Bird Friendly initiatives. For example, while the RFC standards were realised as the broadest, (i.e., covering ecosystem and wildlife conservation, integrated crop management and agrochemical restrictions, soil and water conservation, and waste management), their agrochemical criteria were noted to be weak (Raynolds et al., 2006).

There are claims that certification has absorbed substantial time and energy from all sectors but given back very few concrete results (Ozingais, 2004). This view is also shared by Konnola & Unruh (2006) who argue that as much as EMSs may initially produce improvements in environmental performance, they also limit organisations from exploring superior innovations that are discontinuous. According to Studer, Tsang, Welford, & Hills (2008), most existing efforts, such as environmental support programs and award schemes, do not have a great impact on the environmental and social performance of Hong Kong's Small and Medium-sized Enterprises (SMEs). Another view is that sustainability standards supported by different organisations vary considerably, with some failing to deliver their intention (Nel et al., 2007). Therefore, as these EMSs are developed and adopted in the organisations and various businesses, it is imperative to establish the potential of each of them in achieving sustainability.

3.3.3 What is sustainable agriculture?

Sustainability, as derived from the Brundtland Commission Report (1987) is three pronged (environmental, social and economic) and has temporal and spatial dimensions. Sustainability emphasises a quality of life that can be achieved intra-generationally and inter-generationally. The adverse impacts associated with conventional agriculture are usually highlighted when discussing sustainable agriculture. Although sustainable agriculture cannot be precisely defined, it is popularly understood as an environmentally sound, productive, economically viable, and socially desirable agriculture (Schaller, 1993; Yunlong & Smit, 1994). This position is further elucidated by Yunlong & Smit (1994, p. 303):

> "Agricultural production systems which contribute to environmental deterioration are not considered to be sustainable as they pass on to future generations increases in production costs or cleanup costs, together with reductions in income or food security."

In this regard, sustainable agriculture requires resource conservation, protection of the environment, and farming in partnership with nature. Praneetvatakul et al. (2001, p. 103) observe that sustainable agriculture in the development context:

> "… has to meet production efficiency, resilience of ecosystems, appropriate technology, maintenance of the environment, cultural diversity, and satisfaction of the basic needs."

This postulates that the main purpose of sustainable agriculture is to provide for the food production needs of human society while ensuring social welfare and economic needs are met, while also maintaining the natural environment. The literature on sustainable agriculture is not limited, and some authors have further outlined the conditions defining it. An example is Webster (1997, p. 96) who defined sustainability in agriculture with the following five goals:

1. A more thorough incorporation of natural processes into the agricultural production processes;
2. A reduction in the use of off-farm inputs;
3. A greater use of the biological and genetic potential of plant and animal species;
4. An improvement in the match between cropping patterns and physical limitations to ensure long-term sustainability of current production levels;

5. Profitable, whole-farm management to conserve soil, waste, energy and biological resources.

Although there is no consensus on a single definition of sustainable agriculture, there exist commonalities in the descriptions by various authors (Yunlong & Smit, 1994). In this research, I embrace the view that sustainable agriculture should allow for economic benefits in terms of productivity and financial income, enhance the livelihood of workers/producers, conserve natural resources, and improve the social well-being of a community.

From findings of various studies, it is clear that voluntary standards can have a positive contribution in pursuing sustainability, but the significance of such contributions is pegged to their goals, objectives and structures. EMSs vary in several ways including but not limited to: sectoral bases, areas of primary concern, breadth of concerns, strategies, and type of sponsoring body (Raynolds, 2000). Raynolds et al. (2006, p. 13) conclude:

> "… that private regulatory initiatives may help promote social and environmental sustainability. Nevertheless, there are important differences between certifications that delimit their potential position impacts, and there are important limits to the degree to which these initiatives can replace public regulations."

Performance of sustainability standards can also vary depending on the farm type, as observed by Gómez Tovar et al. (2005) in a study comparing market connections and certification practices in large and small-scale producers. Furthermore, farmers also have a diverse range of objectives they are seeking to address through the adoption of EMSs. Tee et al. (2007) identify these objectives in the Australian wine and grape industry as ranging from natural resource management outcomes through to maintenance of market access and meeting investor expectations. In the main, studies evaluating broader links between an organisation's environmental strategies and its business performance report mixed results (Darnall et al., 2008), with some claiming improved business performance and others illustrating insignificant results. Given the differences in certification outcomes in different contexts, which are influenced by different factors, it is imperative to study the performance of these systems in their unique context. That is, the results realised from the studies conducted in the developed world context cannot necessarily be generalised for the developing world.

3.3.4 The importance of understanding contributions by the EMSs

Understanding contributions by EMSs in general will enable producers faced with numerous options to choose from, and make informed decisions (Giovannucci et al., 2008). With the

realization that the benefits from implementing EMSs vary depending on the factors that motivated their adoption, it becomes increasingly important to assess their practical outcome. Instances may occur where companies struggle to adopt legitimate, but difficult-to-implement practices. This is possible when they lack the complementary resources and capabilities to do so (Darnall & Edwards, 2006 as cited in Darnall et al., 2008). Besides, organisations may become more interested in marketing their products rather than focussing on the socio-economic status of the employees. Ozingais (2004) conducted a study to measure the impacts of certification on sustainable forest management and found that certification led to increased consumer demand for timber products from well-managed sources and improved forest management practices but only in developed countries. In developing countries, the notable improvement was in working conditions. However, he noted that in all cases, the positive improvements were not significant. This introduces another aspect linked with the level of success from EMS application. It cannot be assumed that an effective EMS in one setting will continuously perform in all other settings. In this case, the variations in performance of FSC in developed and developing countries were noted. However, Nel et al. (2007) studied small scale tea production in two South African communities and realised that both were producing a commodity that was environmentally sustainable, met ethical criteria and was destined for the international market.

Various factors ranging from a lack of commitment to continual improvement and failure to conduct a thorough assessment during certification audits may undermine the success of EMSs. In his study, Ozingais (2004) observed that certification has given a seal of approval to certain logging companies and forests that may not deserve it. Doubts have been raised over a number of certificates in countries such as Finland, Brazil, Canada and Indonesia (Harkki, 2004; Kill, 2004; Sierra Club Canada, 2004). There is still a problem of how to translate the concept of real improvements to on the ground performance.

3.4 The Rainforest Alliance Certification Programme in Kenya

Rainforest Alliance Certification was adopted in some of the large scale Kenya tea farms (e.g Unilever Tea Kenya Limited, Changoi and Lelsa Tea Farm, Tinderet Tea Estates 1989 Limited, Williamson; Kapchorua Tea Company Limited, Williamson; Kaimosi Tea Estate, Williamson Tea Kenya Limited, James Finlays Limited and Eastern Produce Kenya) to promote sustainably produced tea. The certification occurred when the Unilever Company, which buys approximately 12% of the world's black tea supply, committed to purchasing all of its tea from sustainable sources (Rainforest Alliance, n.d). Therefore, the introduction of the RFC to these farms was arguably market driven as expressed by Edward Millard, the

Rainforest Alliance's senior manager for sustainable landscapes (Rainforest Alliance, n.d). According to Edward Millard, Unilever asked Eastern Produce to become certified in order to help build the supply of certified tea because they (Unilever) wanted to have the highest possible percentage of certified tea in their blends.

3.4.1 Background to the Rainforest Alliance Certification Programme

As a management system, the RFC aims to achieve sound environmental practices as well as meeting the market requirements of Social Corporate Responsibility (SCR). The RFC has been defined by the Rainforest Alliance (n.d, p. 1) as:

> "A conservation tool whereby an independent, third party awards a seal of approval guaranteeing consumers that the products they are buying are the result of practices carried out according to a specific set of criteria balancing ecological, economic and social considerations."

According to the Rainforest Alliance organisation's web page (http://www.rainforest-alliance.org/certification.cfm?id=about, accessed on 15th October 2009), the RFC is a form of EMS administered by the Rainforest Alliance organisation. The Rainforest Alliance organisation is not for profit and was established in 1987 in New York. The main reason for its establishment was biodiversity conservation and ensuring sustainable livelihoods. In order to achieve this, its efforts are directed towards transforming land use practices, business practices and consumer behaviour. It runs nine programs including agriculture and forestry. In agriculture, the organisation works with farmers to incorporate environmental considerations into their activities while paying attention to economic and social aspects as well. As a certifying body, the Rainforest Alliance recognises the achievements of farmers in terms of sound environmental practices by awarding them certificates attesting that the farmers have achieved and maintained certain prescribed standards (http://www.rainforest-alliance.org/certification.cfm?id=about, accessed on 15th October 2009).

Only a few authors, e.g., Giovannucci & Ponte (2005), have analysed the RFC programme. With reference to the information obtained from the Rainforest Alliance web page, there is a lack of precision in the use of terms such as, 'sound environmental practices', 'balancing ecological, economic and social considerations' and 'to incorporate environmental considerations'. However, the RFC programme is one of the few EMSs with a set of clearly defined standards (see Appendix A for a summary of the RFC standards).

3.4.2 Certification standards

The standards against which the RFC programme is operated are provided by a coalition of independent non-profit conservation organisations known as the Sustainable Agriculture Network (SAN). SAN promotes the social and environmental sustainability of agricultural activities by developing standards (Network, 2005). Rainforest Alliance as an organisation holds the standard and policy secretariat for SAN. The structure of the RFC standard consists of ten principles, each of which is composed of various criteria and indicators as summarised in Appendix A. These criteria and indicators form the standards to be met by companies for certification. The broad areas covered by the ten principles are presented in Table 3.1.

Table 3.1 The ten principles of the RFC certification standards

No.	Principle	Details	Critical criterion
1	Social and environmental management system	Requires planning, monitoring and evaluation of agricultural activities. The plans should incorporate economic, social and environmental aspects and demonstrate compliance with the law and certification standards.	A chain-of-custody system to avoid mixing of products from certified farms with those from non-certified farms is required.
2	Ecosystem conservation	Agricultural activities should improve conservation and recuperation of ecosystems on and near the farm.	A farm must have an ecosystem conservation programme to protect the integrity of natural ecosystems.
3	Wildlife protection	There are measures to protect biodiversity particularly threatened and endangered species and their habitats.	It is forbidden to hunt, gather, extract or traffic wild animals.
4	Water conservation	Water sources to be protected from pollution and contamination.	Discharging untreated effluent and deposition of solid substances into water bodies are prohibited.
5	Fair treatment and good working conditions for workers	Well-being and standards of living for farmers, workers and their families should be improved.	Non-discriminatory hiring policies, workers paid at least the minimum wage or higher, child and forced labour are prohibited.
6	Occupational health and safety	Safe working conditions, trained workers and provision of the appropriate tools.	Workers must use personal protective equipment
7	Community relations	Farms must be ‘good neighbours’ to the nearby	-

No.	Principle	Details	Critical criterion
		communities and support their economic and social development	
8	Integrated crop management	Use of integrated pest management techniques and strict control of the use of agrochemicals.	Only permitted agrochemicals can be used on certified farms. Genetically modified organisms are prohibited.
9	Soil management and conservation	Control of soil erosion and enrichment of soil health and fertility.	New agricultural production must be located on suitable land.
10	Integrated waste management	Farmers must have a waste management programme to reduce, re-use and recycle whenever possible and properly manage all wastes.	-

Source: Tischner, Stø, Aernes & Tukker (2010)

The development of the RFC standards takes a participatory approach as they are normally adapted in each country of application. This practice of adapting the SAN's standards in different countries makes it difficult to effectively compare performance across countries of application. The RFC has been used to certify various crops and farms in different countries including cocoa in Ecuador, coffee in Brazil, ferns and cut flowers from Columbia, bananas from Ecuador and all of Chiquita's farms in Guatemala, Honduras, Costa Rica and Panama (Tischner et al., 2010). The certification of the tea program was launched in 2007 and Kenyan tea farms in Kericho were the first to be certified (Rainforest_Alliance, n.d). Although the RFC of Kenyan tea is considered to be the first in large scale production, more than 300 small scale tea producers had sought Fair Trade certification by mid-2004 (Nel et al., 2007).

3.4.3 Rainforest Alliance Certification practice

The RFC is available to individual farms or groups of farms with an administration system. The farms' administrators apply voluntarily and have their farms evaluated for compliance with the Sustainable Agriculture Standard of SAN (Rainforest Alliance, 2007). The certification programme provides an option for the clients to choose the crops to which the certification seal will be applied, or those that will be presented as certified, at the time of the certification audit request (Rainforest Alliance, 2007). This is another instance where the provision weakens the certification programme because it is possible for clients to commit a portion of their farms' produce but present all of their produce as certified. However, the

certification requirement is against the mixing of certified and non-certified products; but how can that be made effective? The certification cycle is three years and constitutes: certification audit at year 0 and annual audits in years 1 and 2. In the third year, the RFC audit experts conduct an audit exercise to determine whether a farm still meets the standards and hence remains certified. Other audits are: a verification audit, which verifies progress made towards fulfilling the requirements of the corrective action plan; an investigation audit, usually conducted as a response to a complaint or accusation laid against a certified farm; and a quality audit, which helps the Rainforest Alliance to fulfil its obligations to control quality and supervise (Rainforest Alliance, 2007). Quality audits are organised and conducted at random by the Rainforest Alliance. The SAN members are responsible for organising the monitoring team. Arguably, this is another source of weakness arising from the potential conflict of interest (Raynolds et al., 2006). EMSs can be effective instruments for achieving environmental improvements when they have a certification component and performance reports that are externally audited (Rondinelli & Berry, 2000).

The certification cycle of the RFC programme presumably presents a practical procedure for ensuring compliance. However, the loose definitions of the expected outcomes pose unanswered questions. For example, in their words: "A certified tea farm means that there is or should be less water pollution, less soil erosion, reduced threats to the environment and human health, wildlife habitat is protected, less water use, more efficient farm management, improved conditions for farm workers, improved profitability and competitiveness for farmers and more collaboration between farmers and conservationists" (http://www.rainforest-alliance.org, accessed on 15th April 2010). Such goals of course beg a difficult question – what does "less ..." mean? Is "less ..." sustainable?

Features known to strengthen EMSs include written environmental policy, external audits, a monitoring system, environmental training programs, environmental performance indicators/goals, benchmarking of environmental performance, environmental criteria used in evaluation, environmental accounting and a public environmental report (Darnall et al., 2008). While the RFC program has most of these features, it does not undertake public reporting making it less accountable than some systems (e.g., Eco-Management and Audit Scheme (EMAS)) to the public. Reporting environmental performance is considered good corporate citizenship and a number of international corporations adopted it in the early 1990s (Axelrod, 1998 as cited in Rondinelli & Berry, 2000).

In seeking certification, a farmer is not only committing to the potentially extra costs of improving the social, economic and environmental status of the farm but also meeting the

direct costs of audits including auditors' fees and logistics, and the annual fee. The annual fee costs farms US $ 7.50 per hectare (Rainforest Alliance, 2007). The cost of certification has been identified as an impediment to the adoption of voluntary EMSs (Nel et al., 2007; Hughey et al., 2004; Mutersbaugh, 2002). They also noted another source of inconvenience to farmers as the amount of paper work usually associated with process oriented EMSs. However, these costs can be managed by large scale producers as they pay greater costs but also receive greater benefits (Mutersbaugh, 2002), and most likely also have economies of scale advantages. To the farmers, one of the benefits from the certification programme is labelling products or packaging with the certification seal or use of the seal in other promotional materials. "Eco-labelling allows a company to market the environmental soundness of their operation, product or service" (Hughey et al., 2004, p. 8). This is also the reason, as reported by Raynolds et al. (2006), motivating producers around the world to comply with supermarket standards although such compliance is not legally required. Certified products also receive a premium as Raynolds et al. (2006) observed in the case of certified coffee. The premium is meant to compensate farmers for the added labour requirements and to encourage producers to adopt sustainable standards (Mutersbaugh, 2002).

3.5 Approaches to studying EMSs

EMSs, being sustainability tools, can be studied using many approaches. Some of the commonly used approaches include: environmental or extended cost-benefit analysis (ECBA), multi-criteria decision mechanisms (MCDM), and sustainability indicator analysis (Praneetvatakul et al., 2001). The sustainability indicator analysis has been considered the least formal approach but the most flexible analytical tool when applied to any locality with given specific economic, environmental, and social conditions (Praneetvatakul et al., 2001).

Studies have been conducted to assess the contribution of EMSs in resource management with several directed to forest resources. For example, Nebel et al. (2005) compared export prices of timber products from certified forests to those from non-certified forests, for an important forest region - Santa Cruz Department in the eastern lowland of the Amazon basin in Bolivia. They found that higher prices, in the range of 5-51%, were paid for the majority of exported certified timber products. There were also indications that the price premiums exceeded the direct operational costs of certification. They further argued that only small ecological improvement was obtained through certification itself. One of the few studies of agricultural products was conducted in the coffee sector. Raynolds et al. (2006) found the comparative evaluation approach useful in examining five major third-party certifications – Organic, Fair Trade, RFC, Utz Kapeh, and Shade/Bird Friendly initiatives. A comparison approach to

studying EMSs has also been used by many others, for example Darnall et al. (2008), Schwarzbauer & Rametsteiner (2001), Emilsson & Hjelm (2005), Mutersbaugh (2002) and Giovannucci et al. (2008). Carruthers (2005) interviewed over 40 farmers using a non-systems approach and those applying EMS. The interview responses were then compared to determine differences between the two groups. Furthermore, the use of semi-structured interviews using open questioning to allow participants to add questions and responses as they wish has been identified as one of the methods of evaluating the performance of the Rainforest Alliance Certified farms (Network, 2005).

Comparison approaches require specific criteria, i.e., indicators upon which the comparison is based. In this study, farm management indicators provide the basis to compare certified and non-certified tea farms. OECD & MAF (2004) advise that a large amount of data needs to be collected in order to study farm management indicators and the environment. They recommend sources of data as: surveys, census and other data sets which are both qualitative and quantitative. These data should be collected in a timely manner, therefore, making survey the preferred option. However, in as much as surveys are less costly and can generate a great deal of information quickly, they have been found inferior in terms of accuracy (OECD & MAF, 2004). Some of the impediments to using a survey are its requirement for farmers to possess a great deal of knowledge about their land and environmental management activities, and the fallibility of self reporting. To farmers without environmental training, this requirement can be a tall order. Nevertheless, with a good design of survey tools and proper attention paid to its known weaknesses, a survey is the most preferred method of conducting a study within a short period.

As opposed to the usual norm where information from the field is compared with the reference values to determine sustainability level, this study compares sustainability indicators between certified and non-certified tea farms. Therefore, it is concerned less with the reference values such as threshold values or critical values of indicators, target values or certain standard values set by the government, and historical values meant to represent a sustainable situation (Praneetvatakul et al., 2001). This approach limits the possibilities of objectively illustrating the level of sustainability, but rather is a mere comparison of the two cases (certified and non-certified tea farms). However, a critical analysis of the farms' activities and conditions can indicate the presence or absence of sustainability.

3.6 Evaluative Framework

In order to compare the results of adopting various EMSs, analytical frameworks have been needed and related indicators developed, with the aim of monitoring the environmental effects of agriculture (Brouwer & Crabtree, 1999). The indicators need expanding to cover social and economic aspects in order to aid in monitoring the sustainability of agricultural activities. Yunhong and Smit (1994) observe that a broad consensus has emerged, which regards the concept of sustainability as embodying three main dimensions – environmental, economic and social. Given the intention of developing EMSs, which is pursuing sustainability in the operations of businesses and organisations (Darnall et al., 2008; Mutersbaugh, 2002; Raynolds, 2000; Rondinelli & Berry, 2000; Tee et al., 2007), their evaluation needs to be based on Triple Bottom Line (TBL) sustainability considerations (Hughey et al. 2004). Yunlong & Smit (1994, p. 305) assert, "Sustainable agriculture can be viewed from ecological, social and economic perspectives, and should be assessed relative to all three." This is the basis on which most studies evaluating voluntary standards have been conducted (e.g., Hughey et al., 2004; Raynolds et al., 2006; Rondinelli & Berry, 2000; Wagner, 1998).

Furthermore, the RFC programme targets all three pillars of sustainability, hence certified tea farms were evaluated against not certified ones in Kenya, using a TBL framework informed by advances in the understanding of sustainable agriculture and by contributions from the Sustainable Livelihoods Approach. The research involved reviewing literature to identify an indicator framework to help measure RFC performance. "Indicators are part of a continuum ranging from basic data to indicators that usually combine data within some conceptual framework and, finally, knowledge that encompasses validated information around which a broad consensus has formed" (Bonnen, 1989 as cited in Brouwer & Crabtree, 1999, p. 28). An indicator has further been defined as a quantitative measure against which some aspects of policy performance or management strategy can be assessed (Glenn and Pannell, 1998 as cited in Rigby, Woodhouse, Young, & Burton, 2001). However, Rigby et al. (2001) explain that an indicator can also be qualitative in nature. For example, a visual assessment of soil erosion is a valid tool to assess performance of a management system. Brouwer & Crabtree (1999, p. 4) explain the origin and importance of sustainability indicators as:

> "The United Nations Commission on Sustainable Development (CSD) initiated efforts to create sustainable development indicators. It has requested countries to use indicators in their attempts to measure progress in achieving sustainable development. Agenda 21 comments specifically on the need for indicators in Chapter 40, where reference is made to indicators of sustainable development need to be developed to

provide solid bases for decision making at all levels and to contribute to self-regulatory sustainability of integrated environment and development systems."

Ramos, Caeiro, & de Melo (2004) identify one of the main aims of environmental indicators as to communicate information about the environment and human activities. Some of the environmental impacts cannot be directly linked to agriculture; therefore, Brouwer & Crabtree (1999) suggest that there is a need for a systematic approach with high flexibility in studying sustainability in agriculture. The systematic approach should conceive not only single factors but also complex functions and processes with various interactions between elements (von Wirén-Lehr, 2001). This makes studies of sustainability in agriculture difficult. Brouwer & Crabtree (1999) further observe that formulation of agri-environmental indicators provides useful tools to facilitate the monitoring of agriculture and environmental policies.

The use of these indicators has not only been limited to monitoring but has also been found useful in conducting evaluative studies. For example, Gómez Tovar et al. (2005) examined large and small producers in Mexico's organic agriculture sector based on a diagnostic census of Mexican organic agriculture in 668 production zones and field surveys in 256 production zones in which they analysed 28 indicators. From this study, they discovered that Mexican organic agriculture reproduces existing social inequalities between large and small scale producers as in conventional Mexican agriculture. However, they also observed that certification as a technological practice proves malleable and can reinforce the social and economic advantage of large producers, rather than supporting equity among producers. This study together with others based on the analysis of indicators, e.g., Galan, Peschard, & Boizard (2007), Duraiappah & Roy (2007), and Bhandari & Grant (2007) underpin the importance of indicators especially in evaluative studies. The main aim of using indicators is to make the evaluation of environmental impacts simpler and more objective (Galan et al., 2007).

Depending on the nature of indicators and how they are studied, indicators can provide a more or less reliable result. This element has made it possible to categorise indicators as "strong" or "weak". As an example, when evaluation is based on farm practices, it remains indirect just as if it were based on pressure indicators (actions and processes causing stress on natural resources) (Galan et al., 2007). It does not describe the state of the environment but indicates its possible status given the nature of management. In other words, the indicator is weak given its indicative nature. On the other hand, when a laboratory test is conducted to determine soil fertility, the exact status is established making it a strong indicator. These differences have

been categorised by Von Wirén-Lehr (2001) as goal oriented and means oriented approaches. In his own words, Von Wirén-Lehr (2001, p. 116) argues:

> "While means-oriented concepts a priori determine which agricultural measure is sustainable and provide defined prescriptions on how to achieve sustainable agriculture production, goal-oriented concepts aim to empirically evaluate the sustainability of agricultural measures regarding the corresponding case-and site specific conditions."

In either case, indicators provide a reasonable basis for evaluating the performance of management systems on the environment and the choice will only depend on the nature and objectives of a particular study. The amount of time and financial resources required for the goal-oriented approach is enormous given the complexity in agriculture and wide breadth of sustainability studies. Goal-oriented approaches are more suitable when studying few indicators of sustainability. The choice to use either goal-oriented or means-oriented indicators is a preserve of the researcher, but dependent on the objectives of the study and the available resources (time and financial). Indicators in general remain reliable means of conducting sustainability studies in agriculture. The United Nations (UN) Commission on Sustainable Development for example, requested countries to develop indicators to measure progress in reaching sustainable development, including for agriculture (OECD, 1999). In order to ensure that the indicators serve the purpose for which they are intended and to control the way they are specifically selected and developed, Ramos et al. (2004) advise that it is important to organise them in a consistent framework. The use of agri-environmental indicators has provided an alternative to the costly monitoring programmes (Legg & Parris, 2006).

A long term quantitative examination of biophysical indicators is the most preferred method for evaluative studies such as this one (Hughey et al., 2004). However, as already hinted, such an approach can take a long time, e.g., at least three years and with a huge financial implication which is far beyond the scope of this research. Nevertheless, many studies similar to this, have been carried out using a survey approach of qualitative and quantitative interviews (e.g. Gómez Tovar et al., 2005; Hughey et al., 2004; Mutersbaugh, 2002; Tee et al., 2007). In addition, similar studies have been conducted by analysing a range of data sources such as: materials produced by the initiatives under study, including web sites, internal documents and press releases (Raynolds et al., 2006).

Although a survey method with qualitative and quantitative interviews is faster than an examination of biophysical indicators, attention needs to be paid to its associated four standard criticisms. Darnall et al. (2008, p. 370) report the criticisms as: common method variance (bias), non-response bias, social desirability bias and lack of generalisability. Common method variance is the variance attributed to the measurement method, social desirability bias explains the situation where interviewees respond to the survey questions in ways they deem socially desirable, non-response bias refers to the possibility that subjects who answer the survey differ from respondents, and finally, lack of generalisability makes it impossible to apply conclusions from one study to a broader sector (Darnall et al., 2008). All four concerns can be addressed in the study design, for example, guaranteeing respondents anonymity addresses social desirability, face-to-face interviews deal with the non-response bias, sampling with reference to study objectives determines whether generalisation will occur, and testing study tools through pilot study will help eliminate common method variance.

3.6.1 Sustainability indicator frameworks

Sustainability in development has been viewed as an approach that allows people and organisations to pursue their current needs without compromising the ability of future generations to meet their needs (WCED, 1987). The concept of sustainable development over a period of time has been understood to include the simultaneous consideration of economic growth, environmental protection, and social equity in business planning and decision making (Rondinelli & Berry, 2000). This is consistent with a broad interpretation that agriculture is a complex of processes that take place within a threefold environmental framework (Yunlong & Smit, 1994). These are the biophysical environment, which comprises resources essential for agriculture such as plants, animals, soil and water; the socio-political environment, which concerns the role that human populations play and considers that agricultural modifications of the environment are undertaken to produce commodities to meet human needs; and finally, the economic and technological environment, which in most cases constrains the feasibility or viability of agricultural activities (Yunlong & Smit, 1994). The last aspect compels farmers to assess the costs of various combinations of inputs and actions against the expected outputs with the likelihood of receiving acceptable levels of returns. Maintaining healthy ecological relationships has been the main feature from a sustainability perspective.

Therefore, sustainable development entails conservation of natural resources, maintaining economic viability and ensuring improved livelihoods. A number of conceptual frameworks have been developed to help measure sustainability. For example, the Sustainable Livelihoods

framework (SLF), which is people centred, has been used by developmental organisations such as CARE International and the United Kingdom (UK) Department for International Development (DFID) mostly in the rural areas. Through the SLF, it is possible to identify a number of indicators to study people's livelihoods (social aspects). Other conceptual frameworks for indicators useful in measuring sustainability of the biophysical components include: Pressure-State-Response (PSR), Driving forces-Pressures-State-Impacts-Responses (DPSIR), Pressure-State-Response-Effects (PSR/E), Pressure-State-Impacts-Response (PSIR) and Driving force-State-Response (DSR). For this study, a series of disaggregated indicators are selected from the DSR and SLF frameworks are used.

3.6.2 Sustainable livelihoods

Assessing the performance of social aspects within the estates can be based on the SLF. This is because sustainable livelihoods approaches focus on people (Brocklesby & Fisher, 2003) and the interest in the social performance is on the tea farms' employees. A sustainable livelihood, as proposed by Chambers & Conway (1992, p. 7), is:

> "A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term."

The idea of sustainable livelihoods was consolidated into an approach that acts as an operational tool to assist work on poverty reduction (Brocklesby & Fisher, 2003). The approach identifies five capital assets upon which a sustainable livelihood can be drawn: social capital (social networks and relationships of trust), natural capital (natural resource stocks), financial capital (savings, income and credit), physical capital (transport, shelter, water, energy and communications) and human capital (skills, knowledge and labour) (Brocklesby & Fisher, 2003). The DFID (1999) sustainable livelihoods guidance sheet lists elements for sustainable livelihoods as: policies and actions which promote sustainable livelihoods, better education, health and opportunities for poor people and protection, and better management of the natural and physical environment (DFID, 1999). Proceeding with the guidance sheet, the DFID (1999, p. 23) also identifies the following components as essential for sustainable livelihoods:

- Affordable transport

- Secure shelter and buildings
- Adequate water supply and sanitation
- Clean, affordable energy, and
- Access to information (communications).

The social dimension of sustainability needs to address the continued satisfaction of basic human needs, food and shelter, including higher level social and cultural necessities such as security, equity, freedom, education, employment (Yunlong & Smit, 1994), access to safe water, access to sanitary facilities, clean energy, health services, and access to communication and technology. In addition, the SAN's Sustainable Agriculture Standard version 2008 (Network, 2005) elaborates a wide range of social aspects that the certification aims to achieve. These can be summed up as better employment and working conditions. It specifies that workers must receive pay in legal tender greater than or equal to the regional average or the legally established minimum wage, whichever is greater, according to their specific job.

3.6.3 Driving force-State-Response indicators framework

This is an indicator framework for measuring sustainability which was adapted from the PSR in order to include human activities, processes and patterns that impact on sustainable development (Ramos et al., 2004). It is among the commonly used conceptual indicators frameworks within the context of environmental assessments (Niemeijer & de Groot, 2007). In the DSR framework, the indicators are divided into: driving forces, which represent human activities, processes and patterns that impact on sustainable development; state indicators that indicate the "state" of sustainable development; and response indicators that indicate policy options and other responses to changes in the state of sustainable development (United Nations, 1996 as cited in Brouwer & Crabtree, 1999). The DSR indicator framework was preferred over those listed in section 3.6.1 to help identify and define the boundaries of the state indicators that can be compared between farms.

The DSR framework covers both on-farm and off-farm components including: the ecosystem, which comprises biodiversity, natural habitats and landscape; natural resources, which consist of soil, water and air; and health and welfare. Based on these state components, specific indicators that have been used in other studies are selected to help investigate the environmental and ecological systems in tea farms.

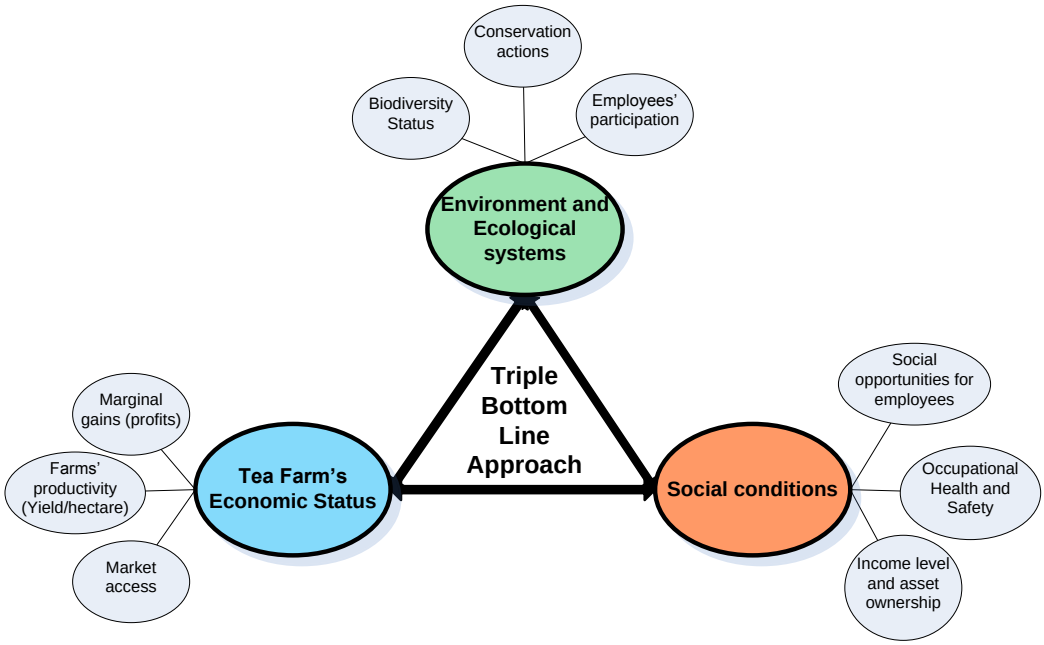
3.6.4 Economic indicators

In order to achieve sustainable agriculture, economic viability to allow for continued production is equally important. The economic performance of a farm can be studied from a number of indicators. For example, the consequences of soil degradation can be reflected by the economic trend of a farm (Brouwer & Crabtree, 1999). This can be measured using the trends in yields over a period of time and the cost of rehabilitation of soil degradation. Productivity in particular is an important measure of sustainability in agriculture (Praneetvatakul et al., 2001). Brouwer & Crabtree (1999, p. 40) further observe that the indicators addressing farm financial resources and the environment include, "net farm and off-farm income, policy transfers, average rate of return on capital employed and the average debt/equity ratio". Total Gross Margin (TGM) which is the difference between income and variable costs is also identified by Gómez et al. (1996) as an economic indicator for measuring the performance of a management system applied on a farm. Others include a farm's contribution to the Gross Domestic Product (GDP) and Public subsidies.

3.6.5 Conceptual framework

In order to investigate the contributions of the Rainforest Alliance Certification programme to the Kenyan tea farms, a triple bottom line approach is adopted and a set of indicators selected as discussed in the previous sections. Figure 3.1 shows a sustainability conceptual framework with some aggregated sets of indicators adapted from the sustainable livelihoods and DSR frameworks.

Figure 3.1 Proposed conceptual framework linking some of the indicators to the sustainability components



In this study, a set of disaggregated indicators within the confines of the 'state' component were selected, all of which have been used in other studies especially in evaluating environmental performance in OECD countries. These indicators helped to focus specific items for investigation under the environmental component of the Triple Bottom Line framework.

3.7 Summary of the evaluation indicators

Based on the above, i.e., section 3.6 and Figure 3.1, in the context of the Kenyan tea farms, the set of selected indicators and the rationale for their selection are summarised in this section. The indicators are coded: EN for environmental and ecological systems, SO for social conditions, and EC for a farm's economic status.

3.7.1 Environmental and ecological systems indicators

3.7.1.1 Preservation of biodiversity

Features of the landscape that were of high value for biodiversity, recreation and for aesthetics have often been altered or removed due to agriculture (Dramstad et al., 2002). The importance of biodiversity was realised during the United Nations Conference on the Environment and Development (UNCED) Rio Summit in 1992 and 150 countries have ratified the Convention on Biodiversity. The impact of agriculture on the biodiversity of wild species, therefore, becomes a key indicator against which sustainability of a farm can be measured (OECD, 1999). In this regard, farmers should be aware of, and support the existence of tree and animal species that can be found within their farms' boundaries (EN 1 and EN 2 respectively) (Network, 2005). Also in this respect, the OECD has identified two indicators for monitoring biodiversity and landscape management:

1. Number (area) and proportion of farms (agricultural land area) under public and private biodiversity management plans.

2. Number (area) and proportion of farms (agricultural land area) under public and private schemes committed to natural and cultural landscape maintenance and enhancement (OECD & MAF, 2004, p. 9).

Given the importance of maintaining native tree species, the proportion of land under which indigenous tree species are maintained by the tea farms indicates their efforts in biodiversity protection and is hence selected as the third environmental indicator (EN 3).

Agriculture can impact on the quality of wildlife habitats through increased fragmentation (OECD, 1999). This can lead to damaging effects on species population size and distributions, and the potential loss of species diversity. The situation is more serious where agricultural land was once a natural habitat for wildlife, as in the case of tea farms which were initially forested lands. In order to address the potential loss of wildlife species, farm managers need to undertake practical measures to ensure non-interference with the remaining natural areas within the farms such as forests and wetlands. Some measures include introducing buffer zones (EN 4), and regulations such as bans on hunting (EN 5). Concerted efforts to maintain biodiversity are crucial because the level of biodiversity is an indicator of the state of ecosystem functioning, therefore, its ability to provide ecosystem services (Duraiappah & Roy, 2007).

3.7.1.2 Agricultural land use and conservation

The pattern and trends in agricultural land use can either help conserve or deplete resources. For example, agricultural land can be retired from production and maintained for conservation purposes (OECD, 1999). Specific practices on agricultural land can also help enhance environmental status for example, cultivation practices such as terracing can minimise soil erosion and introduction of crop and pasture land may provide a wildlife habitat (OECD, 1999). Therefore, land retired from production and maintained for conservation purposes, total agricultural land area in relation to the total land area, and shifts in land use from wetlands to farmland are some of the indicators that can monitor changes in agricultural land use. The percentage of forest reserves relative to the total land area is an indicator of the resilience of the ecosystem (EN 6) (Praneetvatakul et al., 2001).

3.7.1.3 Conservation of natural resources

Organisations that are environmentally conscious initiate strategies for conserving natural resources, mostly via reduction in the use of energy, water and other natural resources (Rondinelli & Berry, 2000). Intensification of agriculture is associated with environmental problems such as accelerated soil erosion, water quality and quantity, and biodiversity loss (Manderson, Mackay, & Palmer, 2007; OECD, 1999). Crop production can lead to loss of soil nutrients. This can be replenished through the application of chemical fertiliser and other farming practices such as planting cover crops and use of green manure (OECD, 1999). However, the use of chemical fertiliser should be suppressed because it can lead to excessive nutrients in the soil which in turn contributes to problems of eutrophication, pollution of drinking water, soil acidification and climate change (OECD, 1999). Whilst a nutrient balance as an indicator offers a concrete parameter to measure the impact of agricultural activities, it

requires more resources and time to measure. Therefore, alternative ways of assessing methods used by farmers to conserve resources such as soil (soil management practices) are preferred. These include the proportion of land on which soil conservation practices are adopted including the use of cover crops, and appropriate tillage practices (EN 7) (OECD, 1999). This approach has a limitation, which is the measurement of risk rather than the state. However, it can be used to indicate the most probable outcome of a management system.

3.7.1.4 Environmental management policy

Hughey et al. (2004) advise that other than considering the Triple Bottom Line concept, there is a need to identify existing unsustainable practices; and then identify the short term goals which in turn will lead to achieving the long term goal of sustainability. The environmental policy commits organisations and firms to a significant degree of social responsibility in managing their environmental impacts (UNCTAD, 1993 as cited in Carruthers, 2003; Rondinelli & Berry, 2000). It was used by many organisations to respond to the upsurge in environmental concern in the late 1980s (Hunt & Johnson, 1995). The Royal Commission on Environmental Pollution as cited by Hunt & Johnson (1995) encourages the preparation of environmental policies and a plea to all industrial enterprises to have a written environmental management policy (EMP) which is well publicised (EN 8). Some of the attributes of the EMP identified by Hunt & Johnson (1995) are: relevance to the environmental effects of the organisation, being publicly available, and committing the organisation to continual improvement. Therefore, the presence of an EMP in itself is not sufficient; Rondinelli & Berry (2000) reinforces that the EMP must be clearly articulated and communicated to all employees in understandable terms.

3.7.1.5 Solid Waste Management System

In order to respond to changes in the environment, farmers need to adopt more effective production and processing practices including recycling of wastes (Wagner, 1998). Sustainability requires a closed system whereby by-products are consumed on the farm (Webster, 1997). Management of waste through reduction, recycling, or re-use relieves pressure on natural resources and eliminates problems associated with poorly disposed of wastes (Rondinelli & Berry, 2000). In this light, farms must initiate solid waste management systems and train their employees to manage waste appropriately (EN 9).

3.7.1.6 Employees' participation in environmental activities

Participation of employees in environmental activities is an important aspect in sustaining good environmental practices within and outside the organisations. Based on this premise, some companies have offered incentives to their employees in various forms so as to increase

their interest in environmental activities. Incentives offered to employees to work with external and local communities in order to improve environmental conditions and prevent or remediate environmental degradation as reported by (Rondinelli & Berry, 2000, p. 76) are:

> "… (a) awards to and financial support for employees participating in community environmental activities; (b) corporate technical assistance to community, educational, and environmental groups; (c) corporate financial matching programs for employee's contribution of time or money to environmental projects; (d) employee education and training programs in environmental management that reduce or eliminate negative environmental impacts on the communities in which they work."

Therefore, participation of the tea farms' employees in environmental activities (EN 10) is important for the farms' management teams to succeed in their conservation efforts.

3.7.1.7 Employee training in environmental resource conservation

Training is the first step in committing employees in the implementation of the EMS. While top management support is vital in ensuring organisation wide commitment to environmental issues, they need to be complemented with efforts from non-management employees (Darnall et al., 2008). Employees are required to work in teams in addressing environmental issues and hence, the need for knowledge based-skills (Darnall et al., 2008). Environmentally responsible organisations view environmental management as the responsibility of all employees (Rondinelli & Berry, 2000). The need for employee training for environmental management (EN 11) is well explained in Perron, Côté, & Duffy (2006, pp. 551-552)'s words:

> "One key aspect or necessary condition for a successful environmental management effort is the presence of an effective environmental education and awareness training initiative which provides employees, at all levels of the organisation, with the tools and understanding necessary to conduct themselves in an environmentally aware manner and make environmentally responsible decisions in the organisation."

3.7.2 Social Indicators

3.7.2.1 Employee training in work safety

A majority of accidents in work places are due to faulty work practices and the agricultural sector is a high risk work place owing to unsafe farm machinery, unfenced slurry pits, faulty electrical installations, lack of a safety statement and lack of personal protective equipment among others (Kelleher et al., 1999). Workers' safety is a top priority at least for workers' unions (Sinclair et al., 2009) who bargain for employee training in safe practices. This is

consistent with the requirements of some certification programmes. For example, Nebel et al. (2005) report one of the conditions imposed on forest operators in Bolivia as the need to build the capacity of workers in the use of security equipment. RFC standards also advocate for workers' training in safety issues as stated in section 6.2 of the Sustainable Agriculture Standard version February 2008:

> "The farm must have a permanent and continuous training programme to educate workers on how to carry out their work correctly and safely, especially regarding the handling of machinery and agricultural equipment. Workers must be familiar with the training requirements for their job, and must be trained before starting work on the farm (Sustainable Agriculture Network, 2008, p. 30)."

Therefore, in addition to performing their roles effectively, employees also need training to keep them safe at work (SO 1).

3.7.2.2 Occupational Health and Safety

With reference to occupational health and safety, a study conducted by Hope, Kelleher, Holmes, & Hennessy (1999) discovered that farmers differ significantly from other workforces. Farmers have lower levels of training on safety issues and yet are exposed to risks such as use of chemicals and machines. Development of appropriate health and safety interventions, for example, use of personal protective equipment (PPE) and training for farmers, are important world-wide. In a responsibly managed business, employees are not only trained in safety issues but also provided with PPE (SO 2).

3.7.2.3 Adequate housing

The need for shelter is a basic right and is increasingly recognised as a social asset; without it, it is difficult to participate fully in a society (Beall & Kanji, 1999). This means housing is at the centre of the sustainable development concept and needs proper attention (Li & Shen, 2002). Sustainable housing encompasses: sustainable development patterns, sustainable construction of residential buildings and sustainable living environments (Li & Shen, 2002). The status of a house has a direct impact on the health of its inhabitants. Housing, among other indicators, i.e., labour, social, economic indicators and infrastructure, has been found essential for livelihood analysis (Bhandari & Grant, 2007). The farm workers' housing needs to ensure their comfort, i.e., be spacious enough for the whole family and with good living conditions. Although a spacious house cannot be precisely defined, a family with one or two children should have at least a three-roomed house. That is basically a sitting room, parents' bedroom and a room for the children. Whether the employees are provided with the houses

(SO 3) or not, the housing type (SO 4), conditions (SO 5), and the number of rooms (SO 6) are operational indicators for adequate housing. The housing conditions are further described by the status of their floors (e.g., good, pot-holed), walls (good, cracked, smudged), and roofs (e.g., good, leaking, darkened by smoke).

3.7.2.4 Access to safe water, health services, sanitary facilities and clean energy

There is a need to resolve several environmental and social issues in order to win the support of a community (Wagner, 1998). These issues include, but are not limited to: public education and policy development, nutrient/waste management alternatives and water quality protection (Wagner, 1998). For a particular social group to live a better life and be productive, it needs social opportunities involving access to education, health and other vital services and resources (Duraiappah & Roy, 2007). Therefore, employers should ensure that their employees have access to health services (SO 7).

Inadequate access to services such as water and energy can lead to deterioration of human health as many hours will be spent on non-productive activities such as collection of water and fuel wood (DFID, 1999). There has been an interest in the household energy sources because of the health and environmental impacts of fuel wood consumption and harvesting (Masera, Díaz, & Berrueta, 2005). People with low incomes especially in the developing world depend mostly on open fires from firewood, which leads to very high indoor air pollution levels, particularly for women and children (Masera et al., 2005; Sagar, 2005). The deaths of approximately 1.6 million people have been attributed to indoor air pollution, according to the World Health Organisation (WHO) as cited in (Sagar, 2005). In light of the importance of access to health services, i.e., clean and safe water (SO 8), distance travelled to access water (SO 9) and proper sanitation (SO 10), their analysis is essential (Bhandari & Grant, 2007). Sanitary facilities, especially a toilet, can be assessed conveniently depending on the number of people sharing it (SO 11), and its distance from the house. For the tea farm employees, the main source of cooking (SO 12) and lighting (SO 13) energy, provision of health services and convenient access to sanitary facilities are indicators used here to describe their livelihood status.

Howard & Bartram (2003) explain that water, in particular its quantity influences hygiene and therefore public health. The volume of water used by households largely depends on accessibility as determined primarily by distance and time (Howard & Bartram, 2003). Where individuals have to travel long distances to access water, it is most likely that the amount of water used in households will be inadequate to support basic personal hygiene and also

marginally adequate for human consumption. A reliable and safe water source should be accessed within the homestead as observed by Howard & Bartram (2003, p. 4):

> "Health and other benefits from improved water supply are significantly greater when there is a supply of continuous access to safe drinking water within the home, a level of service that can be defined as optimal."

3.7.2.5 Access to education

Education is a key to achieving sustainable livelihoods (Bebbington, 1999) and has been identified by the Department for International Development (DFID) as one of the main factors for consideration in order to increase the sustainability of poor people's livelihoods. In this regard, one of the DFID objectives is to improve access to high-quality education, information, technologies and training, and better nutritional health (DFID, 1999). This objective is consistent with the second Millennium Development Goal (MDG), which is to achieve universal primary education. Therefore, the employees' children have a right to education and the tea farms' management teams need to support this stance by discouraging child labour (SO 14) and supporting the establishment of schools (SO 15) (Network, 2005). One expected social benefit of eco-labels is "no child labour" (Barham, 2002). In this regard, the presence of a written policy against child labour and exclusion of those under age (below 18 years) in the farms' operations are important. According to Kenyan laws, an adult is an individual who has attained 18 years of age.

3.7.2.6 Community members

The importance of community empowerment in the gradual improvement of local conditions and more sustainable environmental management has been emphasised by different authors (Roseland, 2000; Wint, 2002 as cited in Nel et al., 2007). This is partly because environmental issues have the potential to cause increased tensions between farm and non-farm residents and hence decrease the ability for both sides to maintain the needed dialogues (Wagner, 1998). A responsible business maintains good relationships with the local communities and effectively addresses their interests/requirements (Tee et al., 2007). Based on this argument, several Multinational Corporations (MNCs) have created voluntary environmental programs, in most cases under the label of 'corporate citizenship' (Rondinelli & Berry, 2000). Through these programs, the MNCs directly address public concerns about the potential impacts of their facilities, and operations. It is against this background that the tea estates are expected to collaborate with the local communities in addressing their needs and also involving them in various development initiatives (SO 16). In this way, the tea

estates' relationships with the local communities will be managed so as to minimise negative impacts and maximise positive benefits (Marsden & Andriof, 1998).

3.7.2.7 Asset ownership

Assets such as land, mobile phone, bicycle, car and radio are part of useful indicators of livelihood status. A long-standing assumption is that the solution to global poverty lies in the invigoration of farming and the redistribution of land especially in the developing countries (Rigg, 2005). According to the DFID (1999), land is a fundamental livelihood asset. Therefore, secure, safe, and affordable land is a necessity (Rigg, 2005). Although employees of the estates are living on the companies' plots, land still remains a key asset to them (SO 17). Land offers a sense of security and provides individuals with a degree of resilience. From personal experience at various work places, I realised that employees with pieces of land were less affected by dismissal threats from their seniors. They more often mentioned their alternative source of livelihood (land) in case they lost their jobs. The importance of ownership and control over land in sustaining livelihoods cannot be overemphasised. The Chilean Ministries of Agriculture and Finance categorised peasants into viable and non-viable peasants based on the land and water assets they controlled (Bebbington, 1999).

According to Bebbington (1999), the basis of a life free from poverty is access and entitlement to a range of assets and livelihood strategies that can sustain households and individuals through the stresses and shocks of life. Assets such as a radio (SO 18) and television set (SO 19) are important because they are channels for receiving information. A mobile phone (SO 20) offers an opportunity for communication and can be useful in time of need, i.e., emergency. On the other hand, a car (SO 21) or a bicycle (SO 22) provides individuals with mobility and are also useful in enhancing accessibility. For example, a sick person can be easily transported to a health facility when such assets are available. People require a range of assets to achieve positive livelihood outcomes (DFID, 1999). Duraiappah & Roy (2007) identify access to media and telecommunications as essential constituents of well-being.

3.7.2.8 Workers' union

Employees' membership of a workers' union has positive gains because it allows for collective bargaining. Through collective bargaining, unionised workers have more chances of receiving information from employers and more opportunities to influence their working conditions (Ebbinghaus & Visser, 1999). Consistent with the claim is Bebbington's (1999) view that the situation can be improved by pressuring for greater work place security and control of health hazards, support for work place organisation, and special skills training.

Workers' unions provide an avenue for employees' participation in making decisions that affect their livelihoods (Duraiappah & Roy, 2007). Other roles of the workers' union as identified by Sinclair, Martin, & Sears (2010, p. 1478) are: making workplace safety a high priority in contract bargaining, stimulating knowledge and awareness about safety issues through many sources including union-sponsored safety training programmes, and increasing the likelihood that the existing policies are followed. Employers should therefore allow their employees to join a workers' union of their choice, and use it to ensure some of the benefits identified by Gonzalez-Perez & McDonough (2006, p. 16) as follows:

> "… to be sure that workers have the right to bargain for health and safety, decent wages, and increasingly issues concerned with women workers like maternity leave, child care, and education for children."

Following the illustrated importance, employees' membership of a workers' union (SO 23) is one of the key indicators in this research.

3.7.2.9 Income level

On many occasions, poverty has been assessed against income or consumption criteria such as a person being considered poor only if his/her income level falls below the defined poverty line (Farrington, Carney, Ashley, & Turton, 1999). In as much as the income level gives an indication of a person's well-being, it should be noted that it is only one of a range of aspects contributing to an individual's well-being (Beall & Kanji, 1999; Farrington et al., 1999). Other aspects include: levels of health, literacy, education and access to assets. However, among the five categories of capital given in the sustainable livelihoods framework, i.e., natural, social, financial, physical and human, the financial capital proves to be the most versatile. This is because it can be converted into other types of capital and can be used directly to achieve livelihood outcomes (Ali, Ahmad, Shahbaz, & Suleri, 2007). From their study which aimed to analyse the impact of participatory forest management on financial assets of rural communities in Northwest Pakistan, Ali et al. (2007) report that 'good living' was interpreted by the majority of the respondents as higher or additional (and regular) income. This makes the amount of income an important measure of a person's well-being. Bebbington (1999) concurs that it is difficult to achieve sustainable livelihoods when wages are low and health hazards are high. The SAN's standards (2008) require that employees of the Rainforest Alliance (RFA) certified farms are paid amounts equal to or greater than the national wage rates. Employees' monthly income (SO 24) therefore, is one of the social indicators in this research.

3.7.3 Economic Indicators

3.7.3.1 Market

Certification has greatly influenced the marketability of products and therefore, market access is one of the main driving forces to certification uptake. Gómez Tovar et al. (2005) report that in Mexico, certified organic agriculture has been viewed as a short term solution to export and foreign exchange concerns. This is because market pressures that encourage facilities to adopt EMSs have increased as consumers are becoming increasingly aware of the natural environment (Darnall et al., 2008). According to Berry & Rondinelli (1998), market and business factors play the most important roles, but a wide array of forces is driving organisations to adopt environmental management systems. Consequently, ease of gaining access to products' markets is a useful indicator of the economic performance of a farm (EC 1).

3.7.3.2 Income

At the farm management level, the financial resources available to the farm may determine the type of technology used. Environmentally friendly technologies tend to have high cost implications on a short term basis and thus may not be preferred where there is a financial constraint. According to Legg & Parris (2006), farmers are under pressure to reduce costs while improving on production and yet there exists little opportunity to increase prices. Therefore, the situation sets a short term economic interest which has damaging environmental implications. In this case, net farm and off-farm income, average rate of return on capital employed and policy transfers are some of the key indicators for environmental performance (OECD, 1999). According to Yunlong & Smit (1994), lack of sufficient returns to at least cover costs of production will deprive farmers' incentives and ultimately their ability to engage in agriculture. Economic viability measured in terms of annual profits made by the farms becomes one of the key indicators (EC 2).

3.7.3.3 Farms' productivity

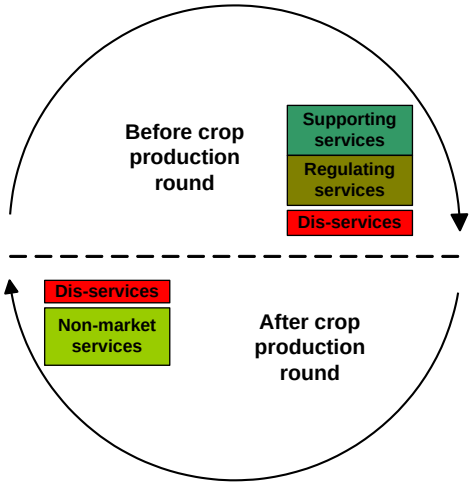
A well functioning ecosystem has a benefit of increased yields which is one of its ecosystem services, referred to as provisioning (Duraiappah & Roy, 2007) and includes provision of food (yield cereals/hectare), fibre, forest coverage rate and water supply. Yunlong & Smit (1994, p. 302) state:

> "Long-term ecological sustainability requires the maintenance of the resource base quality, and eventually its productivity, especially the sustained yield of the land."

Agriculture, especially crop production, depends on important ecosystem services (ES), which are basically "the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life" (Zhang, Ricketts, Kremen, Carney, & Swinton, 2007, p. 253). ES can be categorised into four groups: provisioning (food and fibre, and fuel), supporting (soil structure and fertility, nutrient cycling, water provision and genetic biodiversity), regulating (soil retention, pollination, dung burial, natural control of plant pests, water purification and atmospheric regulation), and cultural (recreation and spiritual) (Swinton, Lupi, Robertson, & Hamilton, 2007; Zhang et al., 2007). At the same time, there are ecosystem dis-services that can reduce productivity such as herbivory and competition for water and nutrients by other species (Zhang et al., 2007).

With the presence of both ES and ecosystem dis-services, emphasis must be placed on the way the two are managed. The management of ES and ecosystem dis-services will determine the future of crop production at a specific location. This is because from agricultural ecosystems, emanate non-marketed services (water supply, soil conservation, climate change mitigation, aesthetic landscapes, wildlife habitat), which are also important for the sustenance of crop production. In this regard, agriculture both provides and receives ecosystem services (Swinton et al., 2007). There are also ecosystem dis-services from agricultural ecosystems such as habitat loss, nutrient run-off and pesticide poisoning of non-target species (Zhang et al., 2007). These have a negative impact on the sustenance of agricultural production at a particular location. Therefore, the aim is to manage ES and ecosystem dis-services in order to increase provisioning and non-marketed services while suppressing the ecosystem dis-services from agricultural ecosystems. Figure 3.2 illustrates the cycle of the ecosystem services important for crop production.

Figure 3.2 A cycle of the ecosystem services that influence farm productivity



Adapted from Zhang et al. (2007)

According to Figure 3.2, a farmer needs to maximise the non-market services while minimising the dis-services in order to continue experiencing high yields in the following crop production rounds. Inferring from this argument, one can expect that farms with good functioning ecosystem services (ES exceed ecosystem dis-services) are more likely to produce higher yields than those in poorly functioning ecosystem services. Environmental degradation is one of the many causes of the loss of agricultural productivity (Bhandari & Grant, 2007). Based on the performance of ecosystem services and crop yield, productivity (EC 3) can be used to compare the performance of certified and non-certified tea farms. However, there are many factors that can cause variations, for example, application of fertilisers, water supply, technological inputs and seed-crop genetic differences.

3.7.4 Evaluation indicators

Table 3.2 presents a summary of the evaluation indicators identified and coded EN, SO and EC in the previous sections.

Table 3.2 Evaluation indicators used in this research

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
Environment	Biodiversity protection	List of tree species within the boundaries of a farm (EN 1)	Create and maintain an inventory of wildlife and wildlife habitats	SAN's Standard, 2008; Nebel et al., 2005; OECD, 2001	Categorical: Yes or No	Qualitative description
		List of animal species within the farms' boundaries (EN 2)		SAN's Standard, 2008; OECD, 2001; Nebel et al., 2005	Categorical: Yes or No	Qualitative description
		Proportion of land under indigenous tree species (EN 3)	Farms must have a minimum of 70 individual trees per hectare that must include at least 12 native species per hectare	SAN's Standard, 2008; Nebel et al., 2005; OECD, 2001	Categorical: Yes or No; with size of land under indigenous tree species	Quantitative
	Protection of natural water channels and forestlands	Presence of buffer zones (EN 4).	As part of a conservation program, a farm must establish and maintain vegetation zones between crops and areas of human activities.	SAN's Standard, 2008; OECD, 1999	Categorical: Yes or No	Qualitative description
		Existence of regulations such as bans on hunting (EN 5).	Hunting, capturing, extracting and trafficking wild animals must be	SAN's Standard, 2008; OECD, 1999	Categorical: Yes or No	Qualitative description

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
			prohibited on the farm			
		Percentage of forest reserve relative to the total agricultural land area (EN 6)	Dedicate at least 30% of the farm area for conservation or recovery of the area's typical ecosystems	SAN's Standard, 2008; OECD, 2001; Praneetvatakul et al., 2001	Categorical: Yes or No; but with size of land under forest reserve	Quantitative
	Soil conservation	Existence of soil conservation practices other than use of artificial fertilisers (EN 7)	A farm must use and expand its use of vegetative ground cover to reduce erosion and improve soil fertility, structure and organic material content, as well as minimise the use of herbicides	SAN's Standard, 2008; Brouwer and Crabtree, 1999; OECD, 1999	Categorical: Yes or No	Qualitative description
	Environmental Policy	Existence of a written Environmental Management Policy (EN 8)	A farm must have a social and environmental management system that contains the necessary policies, programs and procedures for complying with the RFC standard and with respective national legislation	Carruthers, 2003; SAN's Standard, 2008; Hunt & Johnson, 1995; Rondinelli and Berry, 2000	Categorical: Yes or No	Comparison of averages between certified and non-certified farms

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
	Solid waste management system	Existence of an integrated waste management program (EN 9)	A farm must have an integrated waste management program for the waste products it generates. This must be based on the concepts of refusing or reducing the use of products that have actual or potential negative impacts on the environment or human health waste as well as reusing and recycling waste	SAN's Standard, 2008; Wagner, 1998; Webster, 1997; Rondinelli & Berry, 2000	Categorical: Yes or No	Qualitative description and comparison of averages between certified and non-certified farms
	Participation in environmental management activities	Tea farms' employees participation in environmental management activities (EN 10)	-	Rondinelli & Berry, 2000	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
	Resource conservation	Employee training in environmental resource conservation (EN 11)	-	Darnall et al., 2008; Rondinelli & Berry, 2000; Perron, Côté, & Duffy, 2006	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
Social	Occupational Health and Safety	Employees trained in work safety and	A farm must implement a training	SAN's Standard, 2008; Brouwer	Categorical: Yes or No	Comparison of averages between

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
		other duty specific issues (SO 1)	and education program in order to guarantee effective execution of the social and environmental management system and its programs. In addition, a farm must have a permanent and continual training program to educate workers on how to carry out their work correctly and safely	and Crabtree, 1999; Nebel et al., 2005; Sinclair et al., 2009; Kelleher et al., 1999		certified and non-certified farms
	Workers safety	Provision of personal protective equipment (PPE) to workers (SO 2)	All workers that come into contact with agrochemicals, including those who clean or wash clothes or equipment that have been exposed to agrochemicals, must use personal protection equipment	Kelleher, Holmes, & Hennessy, 1999; SAN's Standard, 2008;	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
	Adequate housing	Provision of adequate housing or house allowance to	Housing provided by the farm for permanent or	Nebel et al., 2005, SAN's Standard, 2008; Monteiro &	Categorical: Yes or No	Comparison of averages between certified and non-

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
		workers (SO 3)	temporary workers living there must be well-designed, built and maintained to foster good hygienic, health and safety conditions. The dormitories must be constructed with wooden floors above the ground or floors made from asphalt or concrete, roofs in good condition without leaks, and with appropriate ventilation and lighting	Rodrigues, 2006; Beall & Kanji, 1999; Bhandari & Grant, 2007		certified farms
		Type of house (Permanent or semi-permanent) (SO 4)			Observe the house type	Comparison of averages between certified and non-certified farms
		Conditions of the house (SO 5), i.e., statuses of the roof, wall, floor and electric wire insulation			Observe the house conditions	Comparison of averages between certified and non-certified farms
		Number of rooms (SO 6)	-		Ask for the number of rooms	Comparison of averages between certified and non-certified farms
	Access to health services	Provision of health care services to the employees (SO 7)	All workers and their families must have access to medical services during working hours and in case of emergency	Nebel et al., 2005, SAN's Standard, 2008; Monteiro & Rodrigues, 2006	Categorical: Yes or No	Comparison of averages between certified and non-certified farms

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
	Access to potable water	Perceived water quality (Need to treat drinking water) (SO 8)	All workers and persons living on a farm must have access to potable water	SAN's Standard, 2008; Monteiro & Rodrigues, 2006; Howard & Bartram, 2003	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
		Distance to a water source (SO 9)	-	Howard & Bartram, 2003	Categorical: distance ranges	Comparison of averages between certified and non-certified farms
	Sanitary facilities	Access to sanitary facilities (SO 10)	Workers must have access to sanitary facilities which comply with the following characteristics: one toilet for every 15 persons, one urinal for every 25 men, sufficient supply of toilet paper, a minimum distance of 30 metres from houses and one washbasin per family	SAN's Standard, 2008; Monteiro & Rodrigues, 2006	Categorical: Yes or No	Comparison of averages between certified and non-certified farms

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
		Number of households sharing one toilet (SO 11).	-	Monteiro & Rodrigues, 2006	Counts	Comparison of averages between certified and non-certified farms
	Clean energy	Source of cooking energy (SO 12)	-	Masera et al., 2005; Sagar, 2005	Counts	Comparison of averages between certified and non-certified farms
		Source of lighting at night (SO 13)	-		Counts	Comparison of averages between certified and non-certified farms
	Child labour	Existence of a policy against child labour (SO 14)	It is prohibited to directly or indirectly employ full or part-time workers under the age of 15	SAN's Standard, 2008; Barham, 2002	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
	Education to workers' children	Ownership and/or support to schools by the farms' management teams (SO 15)	A farm must have mechanisms to guarantee access to education for the school-age children that live on the farm. Schools established and administered by certified farms must	SAN's Standard, 2008; Bebbington, 1999; DFID, 1999	Categorical: Yes or No	Comparison of averages between certified and non-certified farms

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
			have the necessary resources, personnel and infrastructure			
	Community relations	Existence of cooperate responsibilities programmes to help in economic development of local communities (SO 16)	A farm must contribute to the protection and conservation of community natural resources, collaborate with the development of the local economy, and contribute fairly towards the costs of the community infrastructure and local shared resources, i.e., schools, pathways, aqueducts and other infrastructure	SAN's Standard, 2008; Rondinelli and Berry, 2000; Monteiro & Rodrigues, 2006; (Marsden & Andriof, 1998	Categorical: Yes or No; with the programmes or development projects identified	Qualitative description
	Asset ownership	Ownership of land (SO 17)	-	Rigg, 2005; Bebbington, 1999	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
		Ownership of a radio (SO 18)	-	Bebbington, 1999; DFID, 1999; Duraiappah & Roy, 2007	Categorical: Yes or No	Comparison of averages between certified and non-certified farms

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
		Ownership of a television set (SO 19)	-	Bebbington, 1999; DFID, 1999; Duraiappah & Roy, 2007	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
		Ownership of a mobile phone (SO 20)	-	Kenny, 2002	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
		Ownership of a car (SO 21)	-	Bebbington, 1999; DFID, 1999	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
		Ownership of a bicycle (SO 22)	-	Bebbington, 1999; DFID, 1999	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
	Workers' freedom to organise and negotiate working conditions	Employees' membership of a workers' union (SO 23)	Workers must have the right to freely organise and voluntarily negotiate their working conditions in a collective manner as established in ILO Conventions 87 and 98	SAN's Standard, 2008	Categorical: Yes or No	Comparison of averages between certified and non-certified farms
	Income	Employees' monthly income (SO 24).	Workers must receive pay in legal tender	SAN's Standard, 2008; Farrington,	Ask for the employees	Comparison of averages between

Sustainability component	Proposed criterion to be used in this study	Indicator(s) and coding	RFC standard	Source (Who invented/used this indicator?)	How measured/data source	Analysis mode
		Greater than or equal to the regional average rate.	greater than or equal to the regional average or the legally established minimum wage, whichever is greater, according to their specific job	Carney, Ashley, & Turton, 1999; Ali, Ahmad, Shahbaz, & Suleri, 2007	monthly income level	certified and non-certified farms
Economic	Marketability	Ease of access to markets (EC 1)	-	Tovar et al., 2005; Ozinga, 2004; Nebel et al., 2005	Ask for the market information from the farm managers	Qualitative description
	Income	Average rate of return on capital employed/profit (EC 2)	-	Brouwer and Crabtree, 1999; Gómez Tovar et al., 2005; Gómez et al., 1996	Ask for the financial information from the managers	Comparison of averages between certified and non-certified farms
	Productivity	Changes in tea farms' productivity (EC 3)	-	Brouwer and Crabtree, 1999; Rigby et al., 2001; Gómez et al., 1996	Ask for the information from the managers	Comparison of averages between certified and non-certified farms, and analysis of trends

3.8 Chapter summary

In this chapter the challenges facing tea production, ranging from natural resource degradation to occupational, and health and safety issues, are identified. The possibilities of developing and adopting sustainability standards to address sustainability problems in agriculture have also been discussed. The central argument is that achievement of the sustainability standards have the potential to contribute to sustainability in agriculture depending on their types and objectives and practice. The RFC, being the principal EMS of focus in this research, is discussed including a presentation of its background and practice. The RFC has a broad goal of achieving sustainability in the operations of the farms that apply it. It targets all three pillars of sustainability, i.e., environmental, economic and social; consequently, in order to develop an evaluative framework to help in assessing its performance, the TBL approach is adopted. The developed evaluative framework relies on the use of indicators borrowed from the DSR and sustainable livelihood frameworks. Owing to the broad nature of the study, the means oriented indicators rather than the more preferred goal oriented indicators are used. This poses a challenge, i.e., the study is more indicative than determining the actual existing status of investigated components.

The following chapter discusses the research methodology and presents a rationale of the research methods used. It also presents details of the research procedures and the challenges encountered.

Chapter 4
Methodology

4.1 Introduction

This chapter identifies and provides a rationale for the study methods used in this research. Therefore, it sets out to explain the study approach, which is based on comparative evaluation and triangulation (a mix of quantitative and qualitative methods). This is then followed by a discussion of the planned survey, sampling procedures and interviews. The chapter outlines the way quantitative interviews were conducted with tea farm employees, semi-structured interviews with farm managers and qualitative interviews with government officials. Other sources of data proposed and discussed under this chapter are secondary and biophysical observations. In addition, methods for data analysis are discussed. There are mainly Chi-square tests for the quantitative data and descriptive analysis of the qualitative data. The chapter also identifies some of the research limitations and ends with a summary.

4.2 Study approach

> "Through the use of multiple methods the robustness of results can be increased; findings can be strengthened through the cross-validation achieved when different kinds and sources of data converge and are found to be congruent or when explanation is developed to account for divergence" (Gable, 1994, p. 4).

A number of studies evaluating the performance of various EMSs have found a comparative approach effective (for example Carruthers, 2005; Darnall et al., 2008; Emilsson & Hjelm, 2005; Giovannucci et al., 2008; Kenya Human Rights Commission, 2008; Raynolds et al., 2007; Schwarzbauer & Rametsteiner, 2001). A comparative approach involves comparing two or more groups of research units or populations to determine possible differences. Therefore, a comparison of environmental, economic and social performance indicators across RFA certified and non-certified tea farms approach was adopted. Environmental and social indicators communicate information about the environment and human activities (Ramos et al., 2004). For this study, a set of indicators were selected from a range of sources such as OECD agri-environmental indicators and organised in three categories: environmental, social and economic in order to measure sustainability (see Table 3.2). Studying a wide range of indicators within a short period of time requires a validation system and hence a mix of methods as shown in Figure 4.1 was preferred.

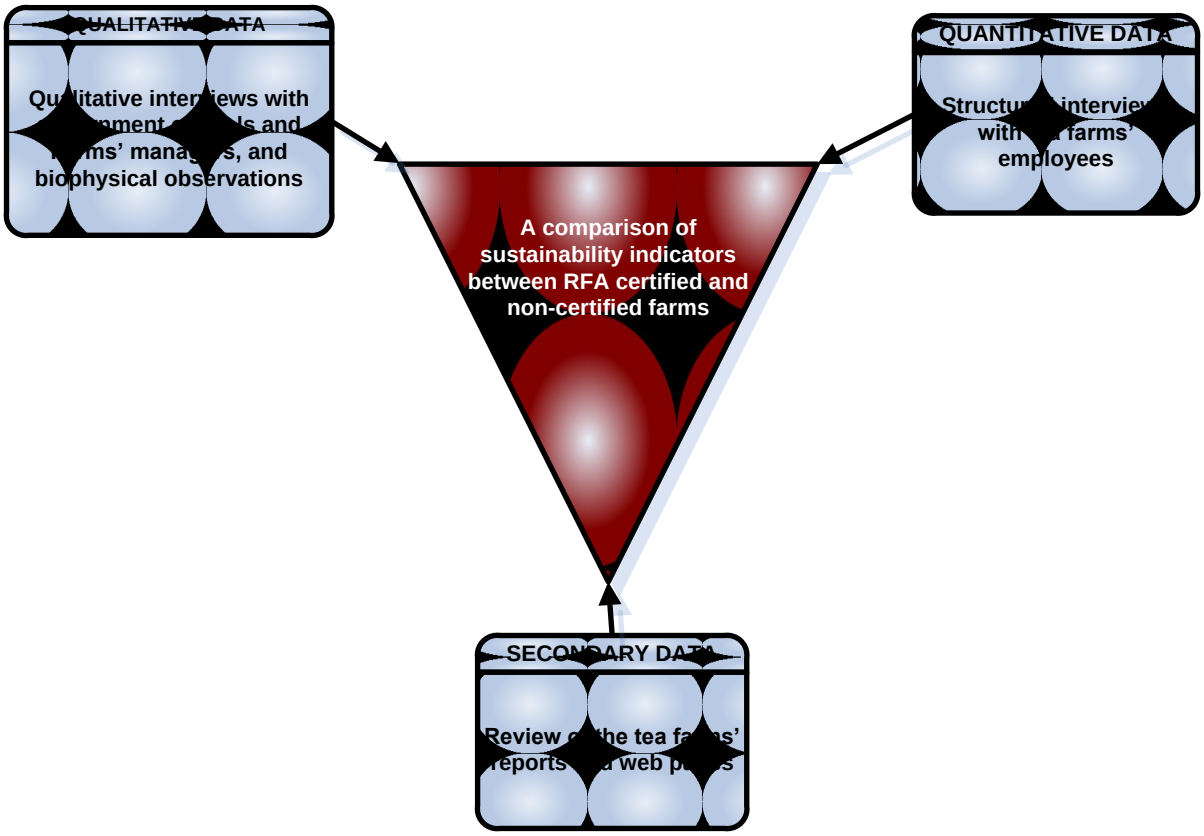


Figure 4.1 Sources of data

Triangulation, a common term for integrating mixed methods in research, combines study methods generally, and in particular qualitative and quantitative. It has been found to work well in the field of evaluation research (Bryman, 2006; Gray & Densten, 1998). This is because the use of quantitative methods in isolation emphasises 'objectivity' and testability at the cost of a deeper understanding of the events taking place (Gable, 1994). Gable (1994) further argues that integration of quantitative and qualitative analyses helps elucidate the ways in which individual behaviour impacts on organisational phenomena, and the ways in which macro phenomena have effects through individuals. In this study, the triangulation approach was deemed appropriate in order to help explain the differences and similarities realised by quantitative methods and hence, for complementarities. According to Bryman (2006, p. 8), complementarity in the triangulation approach means, "seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from another."

Morse (1991, p. 1) offers a simple definition of methodological triangulation as, "the use of at least two methods, usually quantitative and qualitative to address the same research problem." Methodological triangulation can either be simultaneous or sequential (Morse, 1991) and is used when a single research method is inadequate. Simultaneous triangulation undertakes both qualitative and quantitative methods at the same time while in sequential, one method follows the other. Most sequential studies are designed so that one method follows up specific

issues discovered by the other method. In as much as there were issues followed up by qualitative methods, the study design employed in this research was not specifically meant to follow that order. Instead, it took more or less the simultaneous approach for the sake of convenience, especially in securing appointments with the participants. Triangulation has been realised to have many benefits including greater validity, completeness, credibility, diverse views and the improved usefulness of findings among others (see Bryman, 2006, pp. 8-10). Therefore, it was deemed appropriate for this research, which was constraint in terms of time.

4.3 Survey

Many definitions of "survey" emphasise that the methods result in quantitative data. For example, Gable (1994, p. 2) defines a survey as follows:

> "The survey approach refers to a group of methods which emphasise quantitative analysis, where data for a large number of organisations are collected through methods such as mail questionnaires, telephone interviews, or from published statistics, and those data are analysed using statistical techniques."

Surveys have become popular research tools owing to the need to collect data systematically, cheaply and quickly (Groves et al., 2004). Therefore, the survey as a study method was chosen owing to time constraints and its ability to allow replication. According to the OECD (2004), data meant for comparison studies need to be collected in a timely manner and at a spatially appropriate level. This is a limitation in the use of surveys but in this research, data were collected from six tea farms (three RFA certified and three non-certified) only, helping to make the data collection period short. The OECD (2004) also observes that surveys have the potential to generate a great deal of accurate information quickly, cheaply and are repeatable. These features of a survey made it appropriate for this research. Furthermore, the ability of the survey method to discover relationships that are common across groups and thus to provide generalisable statements about the object of study (Gable, 1994) made it useful. However, the survey results are only as good as the survey design and implementation process. As an illustration, Groves et al. (2004) clarify that survey data are usually produced or created at the time of the interview or completion of the questionnaire. In this case, survey data are seen as a product of the data collection process. Consequently, the quality of the data collection process has a significant impact on the data presented for analysis.

The design of this research, therefore, considered four areas identified by Groves et al. (2004) as keys to improving the quality of a survey: coverage, sampling, non-response, and

measurement, processing and adjustment errors. Figure 4.2 illustrates the survey process that was followed. There were no issues arising from coverage since individuals from the targeted population had a common feature of living together in housing estates. Therefore, all individuals had an equal chance of being sampled. A case of under-coverage, where there are individuals in a target population that do not, or cannot appear in the sampling frame (Groves et al., 2004) was not experienced. As earlier reported, the study tool (questionnaire) was constructed using sustainability indicators, which sought answers to research questions e.g., 1. Does the farm have a written policy against child labour? 2. Do you need to treat drinking water? 3. How far away from your house is the source of drinking water? 4. What is your main source of cooking energy? 5. Are you a member of a workers' union? (see Appendices C and D). Unfortunately, there was no chance to test the study tool in the study area given the vast distance between New Zealand, where the tool was developed and Kenya, where the study was conducted. Nevertheless, the study tool was pre-tested for validity, consistency, clarity and flow by interviewing 15 Lincoln University students, who played the role of the targeted individuals.

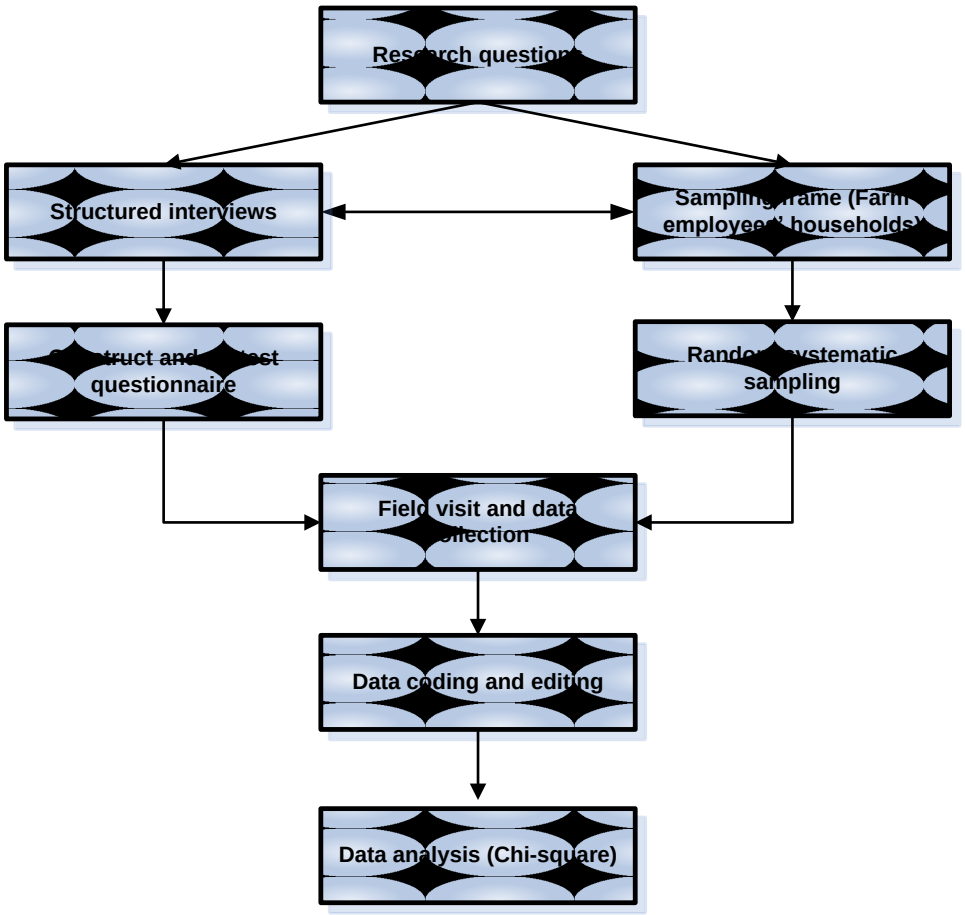


Figure 4.2 A survey from a process perspective (Source: Groves et al., 2004)

4.3.1 Sampling tea farms/estates

A sample can be categorised either as probability or non-probability (Kothari, 2005). In a probability sample, each individual has a known probability or chance of being included in the study while non-probability does not allow for the probability knowledge. After seeking approval of the research study from the Human Ethics Committee (HEC), identification of the tea farms was carried out using the non-probability sampling method referred to as "convenience sampling". Convenience sampling is when population elements are selected based on the ease of access (Kothari, 2005). This method was preferred because the study targeted the tea farms whose managers consented to participate, besides an attempt to also limit transportation cost for the researcher. The main weakness of the non-probability sampling method is its ability to introduce bias especially when the population is not homogenous (Babbie, 2007). However, tea production processes in the large scale tea farms are assumed to have very similar characteristics.

A report of the tea and coffee industry in Kenya by the Export Processing Zones Authority (2005) identified 18 tea companies operating in Kenya. Six of the tea companies were identified as having attained RFC for their farms (http://sustainablefarmcert.com/findfarms.cfm, accessed on 15h November 2009). Therefore, five of the companies with tea farms/estates in the study area were approached and requested through a formal letter to participate in this research. In addition, five non-certified tea companies were also invited using the same procedure. Three certified and two non-certified companies consented to participate. One more non-certified company was then contacted in order to equalise the number of both groups. Details of the participating companies are concealed in order to maintain confidentiality. Instead, pseudonyms, i.e., A, B and C for the certified farms, and D, E and F for the non-certified farms are used. Table 4.1 presents some characteristics of the sampled tea farms.

Table 4.1 Characteristics of the sampled tea farms

Characteristics	CERTIFICATION STATUS					
	CERTIFIED			NON-CERTIFIED		
	A	B	C	D	E	F
Year of establishment	1952	1920	1958	1928	-	1947
Number of employees	512	630	644	925	450	-
Area under blue gum (ha).	150.66	135.10	104.50	90.00	-	390.00
Area under tea (ha).	426.16	428.00	424.00	321.50	-	1015.00
Area under housing (ha).	28.00	30.00	175.00	-	-	184.00
Area under natural (ha).	108.00	88.50	6.00	-	-	201.00
Total size in Hectares	**712.82**	**681.60**	**709.50**	**498.00**	**320.00**	**1790.00**
- = **Data not available**						

4.3.2 Sampling farm employees

The study participants, i.e., farm employees whose managers consented to participate, were sampled using a random systematic method. In random sampling, each individual in the population has a known probability of being included in the study (Kothari, 2005), while in the systematic sampling method, a sample is selected by taking every K^{th} individual in the population (Groves et al., 2004). The random systematic sampling method, therefore, combines the two by selecting the first participant randomly and then taking every K^{th} individual. Kothari (2005) and Babbie (2007) observe that by using random numbers to select the first participant with which to start, an element of randomness is usually introduced.

The study units were defined as households which are social constructs consisting of a group of people who eat from the same pot (Beall & Kanji, 1999). Such a group of people have a common structure they refer to as their main house. In the tea estates, houses are clustered and each cluster has a uniform arrangement. This made it possible to pick the first house randomly and then skip four to pick the 5^{th}, 10^{th}, 15^{th}, etc., until 10 houses were visited in each estate. The sample design resulted in 31 employee interviews from certified farms and another 30 from non-certified farms. Some houses did not qualify as a household according to the operational definition in this study. These were mainly houses/structures used as sleeping locations by individuals who eat from a different household. Such locations/houses were skipped and the next household sampled.

4.3.3 Interviews with farm employees

Despite the relatively high cost implications associated with face-to-face personal interviews (Groves et al., 2004) as compared to other data collection modes such as telephone interviews, it was deemed appropriate for two main reasons. Face-to-face interviews are known to improve the quality of data and also reduce the rate of non-responses (Babbie, 2007; Groves et al., 2004). During the face-to-face interviews, availability of the interviewer increases the chance of the interviewee seeking clarification and also the interviewer can probe in order to obtain a more useful response. Groves et al. (2004, p. 141) add to this argument by noting that the interviewer can assist with clarifying, probing, and motivating respondents to provide complete and accurate responses.

The study involved administering closed ended questionnaires (Appendix D) to the households' heads or administrators who met the eligibility criteria of having attained at least 18 years and over and having been present at the tea plantation for at least the last three months. The household head or administrator was perceived as an adult in charge of making most decisions in a household. The presence of a household head or administrator in the study area for at least the last three months was crucial given that the study was seeking data on the households' economic status among other things.

Although the farm managers had given consent for the study, the household heads/administrators were also asked for consent independently. They were visited at home and the study contents discussed with them. After the study discussions, most participants agreed to participate while a few others (four in number) asked for more time to consider their options. Contact details of these four were taken and a follow up by phone made, which saw three of them booking an interview date and one declining to participate. In total, the study recorded five refusals with two main reasons: the research study would not improve living conditions of the tea farms' employees and lack of time for the interview.

The interviews were conducted in places isolated from the rest of household members, in most cases at the back of the house under a tree. The respondents' names were not recorded and as discussed with the farm managers, the consenting participants did not record any of their details on the consent form and hence, a successful completion of a questionnaire denoted consent.

4.3.4 Interviews with farm managers

Being cognisant of possible differences in experience with a management system among tea farms, the study was designed to allow for the unique circumstances in specific farms to be

captured as well as allowing for comparisons to be made across the farms. For this purpose, the use of an open-ended questionnaire (Appendix C) to interview farm managers was deemed appropriate. Wengraf (2001, p. 60) advises that:

> "Lightly structured interviews are also perfectly appropriate for testing highly developed theories, if those theories require data that a heavily structured interview schedule discourages."

It was important to give the farm managers a chance to describe their experience with the RFC programme and also compare indicators' performance as per their reports. The target was to interview all the farm managers who gave consent for their farms to participate. Other than consenting on behalf of the farm, their individual consent to be interviewed was also sought. Although the plan was to conduct interviews with all the farm managers who consented, two from the non-certified farms did not have time for the interview. Therefore, only one farm manager from the non-certified farms and all three from the certified farms were interviewed. The research study therefore relied on secondary data (internal reports and company websites) to obtain information that could have been given by the farm managers.

4.4 Interviews with Government Officials

Qualitative interviews were conducted to improve on the data collected through the survey. Gable (1994, p. 1&3) argues that "surveys can accurately document the norm, identify extreme outcomes, and delineate associations between variables in a sample" but "are greatly improved when used in conjunction with other qualitative research methods". Qualitative research interviews are believed to help in the interpretation of meanings of central themes and provide nuanced descriptions of different aspects of interest (Kvale, 1996). Therefore, it was of interest to determine how the government officials in the ministries impacted on by the tea production process perceive situations and relevant action sequences.

District officers in charge of labour, wildlife, water, agriculture, environment and forestry were the main targeted key informants. However, interview sessions were secured with three officers (in charge of Environment, Water and Wildlife) only. An officer in the District Agriculture office reported that their office does not work together with the large scale tea farms. The District Labour Officer was not found given the short period of time for the study.

4.5 Secondary data

Secondary data are those that were not collected with a specific research purpose but more often collected for 1) management claims, administration and planning; 2) evaluation of

activities, 3) control functions, and 4) surveillance or research (SØRensen, Sabroe, & Olsen, 1996). When such data are available and suit study objectives, they offer a potentially efficient and cost effective method (McArt & McDougal, 1985; SØRensen et al., 1996). Although secondary data present a more convenient option for conducting research, they have limitations that researchers interested in using them need to be wary of and approach them with caution. Atkinson & Brandolini (2001) concur that the secondary data must be subjected to careful scrutiny and this includes understanding the relationship between different data-sets and the origins of their contents, which are not always obvious. Some of the desired characteristics of secondary data identified by Atkinson & Brandolini (2001, pp. 25-26) and SØRensen et al. (1996, p. 2) are: their compilation should take a cumulative approach, it should be a consolidation of the previous work, it should be fully documented with precise table numbers and full accounts of adjustments made,, and there is also a need to address the replication problems with online data.

With regard to the above concerns, information about tea estates were sought from their web pages, annual environmental audit reports and management reports. In particular, annual environmental audit reports of the two non-certified farms whose managers were not interviewed were considered important. These data were meant to fill the information gaps and also verify some of the survey study findings. However, caution was taken and their use limited given that their selection and quality, and methods of their initial generation were not under the control of the researcher, and that they were sometimes impossible to validate (SØRensen et al., 1996).

4.6 Biophysical environmental observations

Another source of data was from the observations of environmental aspects including working conditions/environment, housing status and that of other resources such as surface water sources, woodlots/forests surrounding the farms, soil and handling of waste. Observations were less structured and dwelt on the environmental status that could be compared between the two groups of farms (RFA certified and non-certified). The aspects of interest were captured using a digital camera to help illustrate findings from other methods used in this research. Observation as a data collection method has the challenge of ensuring validity but is important as a check on, and supplement to, information obtained from other sources (Sapsford & Jupp, 2006).

Ideally, biophysical scientific monitoring would be employed to measure the attributes identified above, i.e., surface water resources, woodlots/forests and soil conditions. However, this was not possible given the time and other resource constraints involved with this study.

4.7 Data analysis

4.7.1 Quantitative data

Quantitative data from the farm employee survey were analysed using Statistical Package for Social Scientists (SPSS) version 17. Other quantitative data obtained from the interviews with farm managers and government officials, and secondary data were analysed using the Microsoft Excel spread sheet application. This mainly entailed comparison of averages. Various factors determine the mode of quantitative data analysis. These include: amount and type of units, number of variables, research design, sample design and sample size, and the research questions (Sapsford & Jupp, 2006). Since this study was designed to compare the performance of sustainability indicators between two groups of farms, collected categorised data, and had a small sample size, chi-square (cross-tabulation) was used to test any possible differences. According to Rowntree (1981, p. 150):

> "Chi-square (χ^2) is a kind of significance test that is used when our investigation concerns category-variables rather than quantity-variables (that is when we are concerned not with a measurement but with counting how many numbers fall into each of a number of descriptive categories)."

Chi-square (χ^2) is a popular test of significance in social science (Babbie, 2007) which is based on the null hypothesis; the assumption that there is no relationship between two variables in the total population. Sapsford & Jupp (2006) described chi-square as an important test that establishes whether or not two variables of the contingency table (or cross-tabulation) are independent of each other. This was useful in testing whether the two groups of tea farms had any association regarding sustainability performance given their certification status. Therefore, certification status became the independent variable while other performance indicators such as access to safe water, existence of an environmental policy, or presence of a solid waste management system were the dependent variables. The test for significance of independence between the two groups of tea farms was set at a p-value of 0.05 ($p<0.05$).

The practice of categorising data has been criticised because it leads to the loss of detailed information. This may make a researcher fail to notice a difference or an association where it actually exists. This fact is elucidated by Rowntree (1981, p. 126):

> "Non-parametric tests require differences to be much bigger if they are to be accepted as significant. In this case, non-parametric tests increase the risk that the null hypothesis is accepted when it is false (Type II error)."

Although sensitivity of the chi-square test is viewed as a limitation, the design of this research study and the main research question are less impacted on by this factor. This is because the research study aimed at finding significant differences between the two groups of farms. The following are the two assumptions considered during the design of this research and analysis:

Assumption one: The observations for two-way contingency table analyses are independent of each other.

Assumption two: Two-way contingency table analyses yield a test statistic that is approximately distributed as a Chi-square when the sample size is relatively large.

However, Green & Salkind (2004) observe that there is no simple way of knowing what sample size is large enough. Therefore, they advise that the size of the expected cell frequencies rather than the total sample size needs to be examined. In such cases, for a table with two rows and two columns, all expected frequencies should be equal to or greater than five; on the other hand, for large tables, more than 20% of the cells should not have expected frequencies of less than five.

4.7.2 Qualitative data

In qualitative research, data collection, analysis, and theory are more intimately intertwined (Babbie, 2007). However, it should be noted that in this research, the theory was defined before data collection and research questions formed around specific indicators. Therefore, the research study employed the qualitative method, i.e., in-depth interviews, but does not embrace all the principles of pure qualitative research. The descriptive approach was preferred in the analysis of the collected information as it was meant to help understand the quantitative data. Babbie (2007) observed that qualitative research can sometimes be undertaken for purely descriptive purposes.

4.8 Limitations

One of the limitations of this research design was noted as possible bias associated with self reporting. Environmental managers could have exaggerated their farms' environmental activities (KHRC, 2008; Darnall et al., 2008). However, measures were undertaken to check this, i.e., the triangulation approach. Another limitation was the short period for data

collection as the New Zealand Agency for International Development (NZAID) scholarship arrangement allowed for a maximum data collection period of three months. This directly impacted on the sample size as companies that needed more time to make a decision regarding participation were left out. Also, studies focusing on sustainability issues by definition can be strong in breadth because they investigate the three sustainability facets (environmental, social and economic). Therefore, this research had a wide scope but undertook shallow in-depth investigations to make it manageable within the available time of three months for data collection. Finally, the research study adopted more of a perception approach than an examination of biophysical statuses to determine actual conditions. Given the cited limitations especially those touching on sample size and depth of analysis, the results from this research study should be treated as indicative.

4.9 Chapter summary

The methodology chapter has discussed how a comparative study was designed using a mix of methods, i.e., quantitative and qualitative approaches. A set of environmental, social and economic indicators selected from a range of sources such as OECD agri-environmental indicators were key in this research. The researched tea farms were selected using convenience sampling. That is, a number of tea farm managers were contacted and only those who consented were included in the research study. Three certified and three non-certified tea farms participated. However, only one non-certified farm manager was interviewed. The tea farm employees were in turn sampled using a random systematic sampling method, where the first household was randomly selected and thereafter four skipped to pick the fifth one until 10 households were visited. In total, structured interviews using a standard questionnaire were conducted with 31 certified and 30 non-certified tea farm employees. Three government officials (the Kenya Wildlife Officer, the Water Resource Management Officer and the District Environment Officer) were also interviewed. Additional sources of data were secondary, i.e., tea company websites, annual environmental audit reports, and biophysical observations. The quantitative data were analysed using Chi-square (cross-tabulation) and the rest used to describe various conditions on the tea farms.

The following chapter presents an analysis of the results of the data collected using the methods discussed in this chapter. The results are presented in three categories: environmental performance, social performance and economic performance.

Chapter 5
Results

5.1 Introduction

In this chapter, demographic information of the participants, findings from the quantitative and qualitative interviews, secondary data, and observation are presented. As reported in Chapter 4, structured interviews were conducted with 61 employees of six tea farms, 31 and 30 from certified and non-certified farms respectively, and semi-structured interviews with four farm managers (three from certified farms and one from a non-certified farm). The secondary data were sourced from internal reports and websites, while biophysical observations were made on the farms during the survey. The findings are organised into three broad categories, i.e., environmental and ecological system performance, social conditions and economic performance. An exception occurs under the sub-section: challenges experienced by the certified tea farms' managers with the Rainforest Alliance Certification (RFC) programme. Under this sub-section, the reported challenges include environmental, social and economic aspects.

In each of the three broad sustainability categories (environmental and ecological system performance, social conditions and economic performance), the findings from all the stated data sources that relate to a particular research question are presented, hence reflecting the triangulation approach used in this research. However, the information obtained from the government officials, despite contributing to the same research questions, is presented separately. This is because with the government officials, open discussions were conducted without a formal guide. Moreover, the government officials in most cases generalised information about the tea farms given that they did not know the individual farms' certification status. Nonetheless, they could be asked to comment on certain issues regarding specific tea farms. From such specific cases, the interviewer was able to link certified and non-certified tea farms with the interviewees' responses.

All findings were aimed at comparing sustainability indicators outlined in Chapter 3 between the certified and non-certified tea farms. For the quantitative data, a Chi-square test was used to test the differences at a significance level of $p<0.05$. Chi-square test results are summarised in a table at the end of each sub-section. The information obtained from the semi-structured interviews with the farms' managers and non-structured discussions with the government officials were used to compare and contrast performance of the sustainability indicators

between the two groups of farms. At the end of the environmental and ecological system performance section, a table summarising management strategies in the tea farms as reported by the managers and secondary data is presented. In addition, the survey results are tabulated at the end of each subsection where they are reported. The economic performance section is summarised in text form because there is little quantitative data and it is brief. In order to further enhance the readers' understanding in this chapter, the research questions and their objectives are given first followed by the study findings from the various sources. The chapter ends with a summary of key findings in the three broad categories, i.e., environmental and ecological system performance, social conditions and economic performance.

5.2 Demographic information

This section presents the demographic characteristics of the interviewed tea farms' employees and their households.

The household interviews were conducted with a total of 61 respondents (males 29, females 32) of which 31 were from certified tea farms and 30 from non-certified tea farms. There were slightly more male respondents (58.1%) than females (41.9%) in the certified farms. In the non-certified farms, the number of female respondents (63.3%) outnumbered males (36.7%). A majority of respondents were 26 years or older as shown in Figure 5.1. There were insignificant differences among the age groups of the respondents between certified and non-certified tea farms.

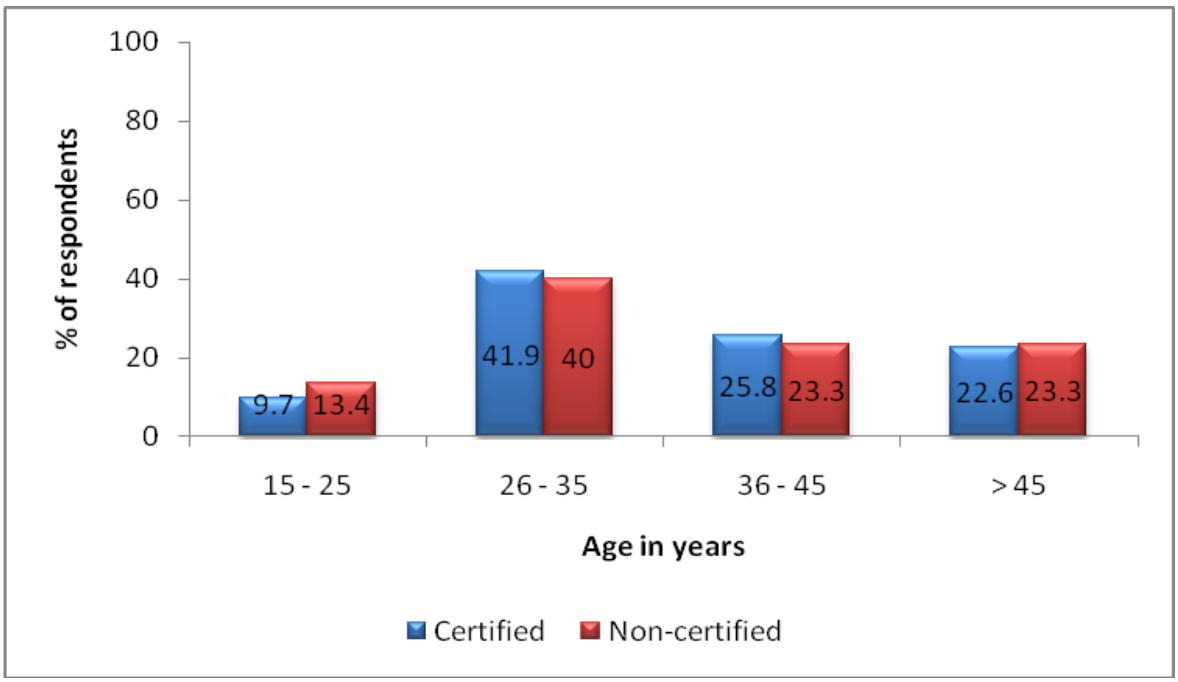


Figure 5.1 Age of respondents

The average number of household members was four ($\bar{x}$ = 4.08 SD = 1.9). The household with the least number of members had one resident while that with the highest had 10.

5.3 Environmental and ecological systems

Environmental and ecological system performance was based on the measures taken by the farms' managers to ensure natural resource conservation and protection. The basic actions included the existence of an environmental management policy (EMP), establishment of buffer zones, bans on hunting and training employees in environmental conservation. In the following sections, quantitative data collected from the farm's employees, secondary data and data collected using semi-structured interviews with the farms' managers are presented. The selected 11 indicators were investigated using data from the sources shown in Table 5.1.

Table 5.1 Sources of data

Indicator and code	Data source				
	Farm manager	Farm employees	Secondary data	Biophysical observation	Government officials
List of tree species within the boundaries of a farm (EN 1)	✓	X	X	X	X
List of animal species within the boundaries of a farm (EN 2)	✓	X	X	X	X
Proportion of land under indigenous tree species (EN 3)	✓	X	✓	X	✓
Presence of buffer zones (EN 4)	✓	X	✓	✓	✓
Existence of regulations such as bans on hunting (EN 5)	✓	X	✓	X	X
Percentage of forest reserve relative to the total agricultural land area (EN 6)	✓	X	✓	X	X
Existence of soil conservation practices other than use of artificial fertilisers (EN 7)	✓	X	✓	✓	✓
Existence of a written Environmental Management Policy (EN 8)	✓	✓	✓	X	X
Existence of an integrated waste management system (EN 9)	✓	✓	✓	✓	X
Participation in environmental management activities (EN 10)	✓	✓	X	X	X
Employee training in environmental resource conservation (EN 11)	✓	✓	X	X	X

5.3.1 Natural resource conservation strategies

Open-ended questions were discussed with the farm managers to identify the strategies they had for conserving natural resources on their farms. In addition, some data were obtained from secondary sources. The natural resource conservation strategies entail all the efforts meant to maintain or improve the quality and quantity of natural resources, i.e., water, wild animals, indigenous tree species and soil.

5.3.1.1 Record of tree species (EN 1) and wild animals within the farm boundaries (EN 2)

Given that the tea plantations replaced part of the habitat (including trees) of the wild animals, it was important to establish how the farms contributed to conserving such populations. The farm managers were asked if they kept a record of tree species found on their farms. Only certified farms had such records as the RFC programme requires it. In addition, the farm managers were asked, "Are there any wild animals within or around the farm?" All the managers admitted to the presence of wild animals on their farms and mentioned the common ones such as monkeys, baboons, elephants, jackals, wild dogs, wild cats, gazelles, hares, snakes and birds. A record of the mentioned wild animals was asked of the farm managers. All the certified farms maintained lists of wild animals that can be found within their farm boundaries. The non-certified farm manager reported that they did not keep records of the wild animals that can be found on their farm.

In order to establish how the tea farms employees related to the wild animals, the farm managers were further asked, "What are some of the environmental and social concerns regarding the wild animals in your farm?" The managers reported that occasionally, employees experienced conflicts with some of the wild animals such as monkeys, baboons and elephants as they destroyed vegetables and uprooted trees (elephants). This finding was common on all tea farms. One of the certified farm managers (C) reported that monkeys had an extreme habit of entering into the employees' houses through open windows and destroying food. Photo 1 shows monkeys visiting a certified tea farm's office compound. The non-certified farm manager reported that the animals caused anxiety on the nights that they became destructive. For the purpose of enhancing co-existence, one of the certified farm managers (B) reported that they planted wild bananas and fruits to feed the wild animals.

Photo 1. Monkeys visiting an office compound on a certified tea farm

5.3.1.2 Proportion of land with indigenous trees (EN 3)

Although blue gum occupied the largest proportion of tea farms after tea plantation, the certified farm managers reported that they also maintained indigenous species of trees on their farms. One of the certified tea farms (C) had a small and relatively less attended-to tree nursery where seedlings of other tree species were produced. Beside it was another big sophisticated and well-managed tree nursery for raising tea seedlings. Photos 2 and 3 allow for a visual comparison between the two nurseries maintained on the same certified tea farm.

Photo 2. A nursery for producing tea seedlings

Photo 3. A nursery for producing seedlings of other tree species

Limited analysis indicates that less attention was given to the tree nursery meant for producing other tree species (both indigenous and exotic to increase biodiversity) compared to

the tea seedlings' nursery. The tea seedlings' nursery was bigger and more properly maintained than the tree nursery. In addition to the tree nursery, this farm had a separate piece of land of approximately 0.4 ha. on which indigenous tree species were planted (included under natural resource category in Figure 5.3). The remaining tea farms did not have a specific area dedicated to indigenous tree species but the species were scattered throughout the farms.

5.3.1.3 Existence of riparian strips/buffer zones (EN 4) and resource management regulations (EN 5)

In order to establish whether the farm managers recognised the existence of natural resources within their farms in the first place, a question was asked: "Are there any environmentally sensitive areas within the farm, e.g., forests, animal parks or wetlands? If yes, which ones?" All the farm managers acknowledged having natural resources within their farms' jurisdictions which included portions of Mau forest, streams and rivers. Therefore, it was important to establish whether efforts were put in place to protect the resources from human impact.

The farm managers were asked: "Are there buffers or operating restrictions around the environmentally sensitive areas, and if so, what are they?" Strategies reported in the certified farms to manage the natural resources were: keeping rivers free from pollution, i.e., restrictions on waste disposal into the water sources, and fencing (C), maintaining a riparian strip of between 70 and 100 metres (A, B and C), imposing a ban on game hunting and illegal logging (A, B and C), and prohibiting swimming in the rivers (C). Furthermore, according to the certified farm managers, the rivers' water quality was monitored through laboratory tests of biophysical and chemical properties on a monthly basis. The non-certified tea farm manager (D) reported that they preserved natural resources such as streams by allowing them to exist naturally, i.e., without interference.

5.3.1.4 Percentage of forest reserves relative to farm area (EN 6)

The farm managers were asked, "Do you have tree plantations on your farm? If yes, what size of land is under the plantations?" Further information was sought from secondary data. The types of tree species were also sought. All the tea farms had tree plantations. The predominant tree species was reported to be blue gum (*Eucalyptus*) which served as a wind break and a source of energy. As a result of its value in the tea production process, blue gum and tea plantations occupied the largest proportions of the tea farms, and a minor portion was occupied by natural resources (rivers, streams and forests) and infrastructure including roads and employees' houses. In Figure 5.2, "others" comprise the natural resources including

native trees and infrastructure. On average, certified and non-certified tea farms had around 60.8% and 60.65% of their land in tea plantation respectively (see Figure 5.2).

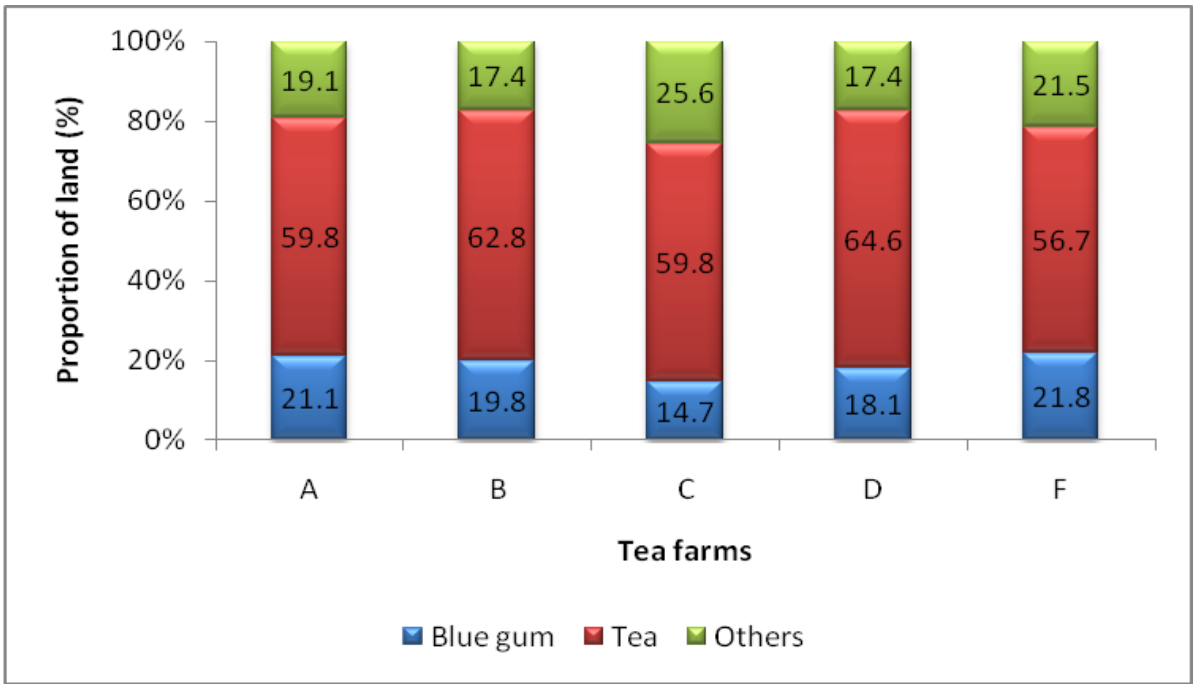


Figure 5.2 Proportion of tea farms under blue gum and tea plantation and other cover

Detailed information about land use was not accessed in the non-certified farms. In the certified farms, the proportion of land under natural resources, i.e., rivers, streams and forests including native trees was established as shown in Figure 5.3. As reported in the preceding section, tea occupied the largest proportion of land in the tea farms (62.8% in B and 59.8% in A & C). The blue gum plantation occupied the second largest land proportion, i.e., 21.1% in A and 19.8% in B. Natural resources, including native trees occupied the third largest proportion in A and B but the least in C at 0.8%. Figure 5.3 shows the proportion of land occupied by the natural resources in the certified tea farms. None of the certified tea farms had natural habitat occupying a land proportion of up to 30%. Instead, blue gum, which is a non-biodiversity plant species was preferred because of its utility purpose.

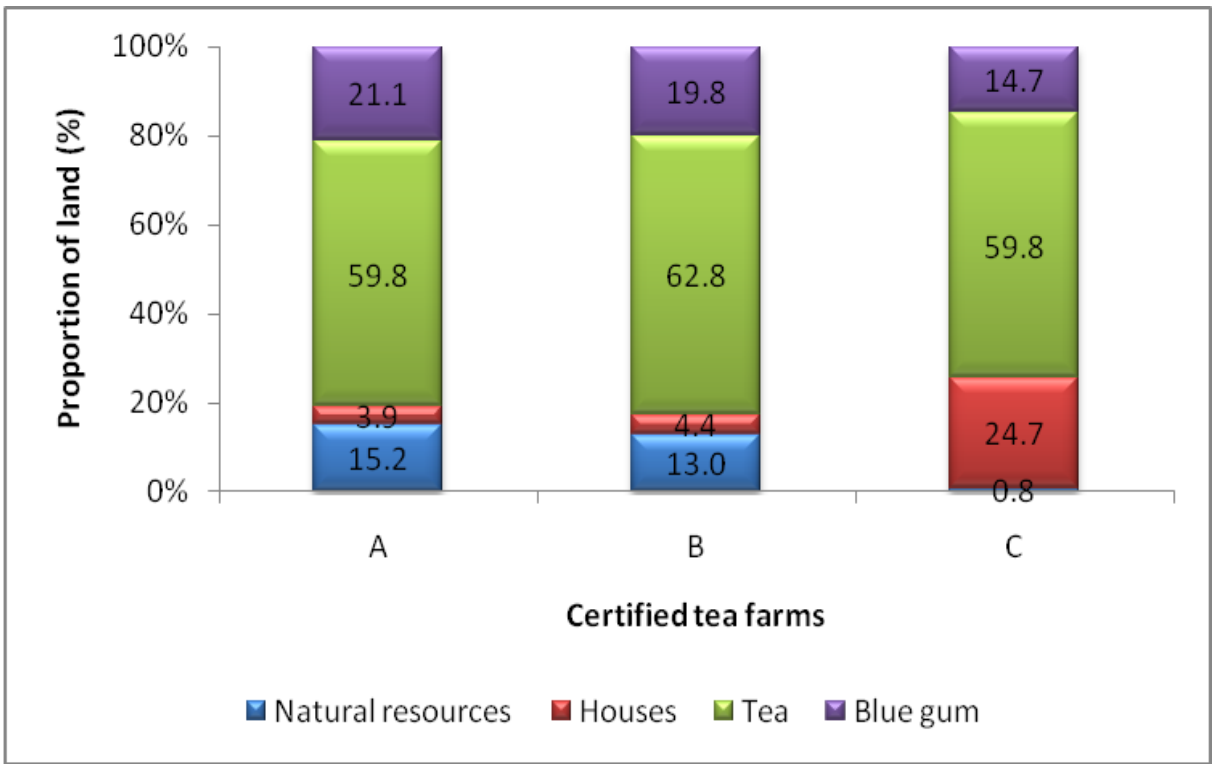


Figure 5.3 Land use in the certified tea farms

5.3.1.5 Use of cover crops and appropriate tillage practices (EN 7)

Attempts to improve and maintain soil fertility in agriculture in most cases have led to the use of chemical fertilisers. These fertilisers can be washed downstream and in turn pollute the natural water sources making water unpalatable for the downstream users. In this context, the farm managers were asked, "How do you manage/conserve soil on your farm?" The question was meant to determine whether there were sustainable measures for soil management in the tea farms and by which group of tea farms. Soil conservation measures applied in the three certified farms were: use of plant cover such as oat grass (A and B), use of bunds and drainage system (A and B), and ploughing across the slope and silt traps (B). Artificial fertilisers were used in all the certified tea farms to increase productivity. One of the certified farm managers (B) reported that they used aerial spray methods to apply fertilisers. In a non-certified farm (D), the farm manager reported that they applied good agricultural practice, which included ploughing across the slope and the use of plant cover. Although the non-certified farm manager did not mention chemical fertiliser, their annual environmental audit report (2009) indicated its use.

5.3.2 Natural resource conservation strategies

5.3.2.1 Existence of a written Environmental Management Policy (EN 8)

Sustainable agriculture considers the management of natural environmental resources in its activities. An EMP helps in the identification of environmental concerns and prioritisation of the management objectives. Therefore, employees were asked: "Does the farm have a written Environmental Management Policy?" The respondents were given the following three options to choose from: Yes, No and Don't Know. This research question was meant to establish which tea farms had a formal EMP that was known by the employees as well. All respondents from the certified tea farms reported the existence of an EMP. In the non-certified tea farms, only 33.3% of the respondents reported the existence of such a policy, 6.7% reported that their farm did not have an EMP, and the remaining 60% did not know whether the farm had an EMP or not.

The same question, "Does the farm have a written environmental management policy?" was also asked of the farm managers. All three certified farm managers stated that they had written environmental management policies. One of the non-certified farm managers said that they had an EMP although not written down (D). From the secondary data, it was realised that another non-certified tea farm did not have a written EMP because it was recommended in their 2009 environmental audit report (E). It was not possible to establish whether the third non-certified tea farm had an EMP or not because its manager was not interviewed. Furthermore, the policy was not present on their website as might have been expected if one existed.

5.3.2.2 Existence of an integrated waste management system (EN 9)

Since solid waste management is one of the environmental projects that most organisations and institutions find easy to initiate at the initial stages when incorporating environmental concerns in their operations, employees were asked if their farms had a solid waste management system. A "Yes" or "No" response was required. Almost all (93.5%) of the certified farm employees reported that their farms had a solid waste management system. Only 36.7% of the employees from the non-certified farms reported the existence of a solid waste management system. The farm managers were also asked, "How do you manage solid waste?" All three certified farm managers reported that they sort solid waste into organic and inorganic categories. The organic wastes are used on the farms as manure and the inorganic wastes sold out to a certified contractor. One of the certified farm managers (B) mentioned the 3Rs principle (Reduce, Reuse and Recycle). The non-certified farm' manager reported that

they dump solid wastes into a compost pit. All the certified farms and two non-certified (D and F) farms used septic tanks to manage liquid waste.

5.3.2.3 Participation in environmental management activities (EN 10)

Although important, employee training alone does not necessarily lead to improved management of natural resources. Understanding the participation of employees in environmental activities was sought by asking, "Have you ever participated in any environmental activities, i.e., awareness creation campaigns, tree planting, workshops, information exchange programs, etc, which are organised by the farm's management team?" In this question, the respondents were given a "Yes" or "No" option. More employees in the certified farms than in the non-certified farms reported having participated in environmental activities at 58.1% and 13.3% respectively. The same information was sought from the farms' managers, i.e., "Are there environmental programmes that involve farm workers? If yes, describe them." On all the certified tea farms, employees reportedly, were involved in environmental programmes such as solid waste management (A), annual tree planting (A and C) - which targeted the planting of 1000 seedlings on farm C - and water conservation by the use of mulches in the kitchen gardens (B). The interviewed non-certified farm manager stated that there were no environmental programmes that involved workers.

5.3.2.4 Employee training in environmental resource conservation (EN 11)

Employees can only play an important role in the management of environmental resources with the right skills, so it was important to find out whether the tea farm management teams had arranged for employee training in environment and resource conservation. The research question read: "Have you received training in environment and natural resource conservation?" To this question too, the respondents were expected to give a "Yes" or "No" response only. Again, the results indicated that most employees (93.5%) from the certified tea farms had received training. On the other hand, only 30% of the employees from the non-certified farms reported having been trained in environment and resource conservation.

As reported in the preceding sections, 33.3% and 30% of the non-certified tea farms reported the existence of an EMP, and to have received training in environmental and natural resource conservation respectively. These findings prompted cross-tabulation of the two variables (existence of a written EMP and training in environmental and natural resource conservation), which further revealed that 87.8% of the employees who reported the existence of an EMP had also been trained in environmental and natural resource conservation. The cross-tabulation results indicated a strong association ($p<0.001$) between the existence of a written EMP, and training in environmental and natural resource conservation. This suggests that one

of the non-certified farms had an EMP. Further investigations established that while the tea farm manager reported the existence of a non written EMP, employees reported that a written EMP existed.

Overall, the results indicated a significant difference between certified and non-certified tea farms with regard to the development of environmental resource management efforts. Employees' reporting existence of an EMP, employees' training on environmental and natural resource conservation, and the existence of a solid waste management system showed a strong association between the two groups of farms as represented by the phi values (Table 5.2). However, employees' participation in environmental activities indicated a weak association suggesting that the certified farms did not engage many of their employees in environmental activities.

Table 5.2 Comparison of Chi-square tests for environmental management indicators between the certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 31)*			*Non-certified tea farms (N = 30)*			*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes (%)	*No (%)*	*Don't know (%)*	*Yes (%)*	*No (%)*	*Don't know (%)*				
Existence of a written environmental management policy as reported by the employees (EN 9)	100	0	0	33.3	6.7	60	30.75	2	0.001	0.71
Existence of an integrated solid waste management system (EN 10)	93.5	6.5	NA	36.7	63.3	NA	21.85	1	0.001	0.60
Employees' participation in environmental activities (EN 11)	58.1	41.9	NA	13.3	86.7	NA	13.23	1	0.001	0.47
Employees' training in environmental resource conservation (EN 12)	93.5	6.5	NA	30	70	NA	26.21	1	0.001	0.66

NA = Not Applicable

Note: The proportion of the non-certified tea farm employees who reported "yes" to the research questions suggests that one of the non-certified farms was making progress toward certification or being more environmentally conscious.

5.3.3 Natural resource conservation from the perspectives of the government officials

Interviews conducted with three government officials provided an insight into the findings from the farm managers and employees. Although the government officials were unaware of the application of the RFC on some of the tea farms, they held key information with regard to the state of natural resources within the tea farms, specifically the information within the precinct of their Ministries. The findings from the government officials are presented in the following sections.

5.3.3.1 Kenya Wildlife Service Officer

The Kenya Wildlife Service (KWS) official did not know about the RFC programme and therefore, was unaware of certified and non-certified tea farms. However, while addressing the conservation issues on the tea farms generally, she pointed out that the baboons were problematic to the tea farm residents. Occasionally, the game wardens were called upon to help in chasing the baboons away from the residential units and in the process they killed some of the baboons. The residents had also been taught how to manage invasions by the wild animals, for example, by making fire and noise. However, she observed that the residents occasionally shot wild animals such as elephants using bows and arrows.

The interviewee contradicted the claim by one of the certified farm managers that they planted fruits to facilitate human co-existence with the wild animals. However, when asked to comment on the conservation status of the natural forests within, and at the borders of specific tea farms, it emerged that those associated with the certified farms were more protected and hence conserved more than those in the non-certified farms.

5.3.3.2 Water Resources Management Authority; Catchments Management Officer

The interview was conducted with one of the Water Resources Management Authority's (WRMA) staff who was serving as a catchment management officer. The interviewee reported his responsibilities as protection, conservation and allocation of water resources. He also monitored river flows, water quantity and quality, farming methods along the river banks and tree species. He observed that in 2005, the rivers experienced low flows due to poor farming and management of rivers' waters. In particular, the flow of the Mara River had dropped and as a consequence, some of the crocodiles died. Wild beasts had also migrated to the Serengeti and in general, there was an increased loss of wild animals in 2007.

While the Authority had a plan to monitor river waters every morning and afternoon, there were only seven officers to implement the plan. Therefore, the inadequate staffing led to the

formation of a collaborative structure of governance with the local communities. The people living near the water sources were now responsible for finding any threats and damage that existed along the rivers. The authority had also embarked on a programme to remove all the blue gums along the river banks as they were known to drain water sources owing to their nature of consuming large amounts of water. For example, according to the interviewee, one blue gum tree was estimated to consume approximately 50 litres of water per day.

The tea farms were identified as the main abstractors of water and the three certified farms were all mentioned. In addition, they were accused of using artificial fertilisers (EN 7) which eventually could get washed down into the rivers. With regard to preventing water pollution, the Authority encouraged the tea farm management teams to create buffer zones. They were also asked to replace the blue gums with natives along the river banks (EN 4). Furthermore, in 2009 all abstractors were sent a circular requiring them to install a meter that recorded the amount of water they drew from the rivers. The interviewee noted that before the requirement of installing a meter-reader, abstractors were permitted but the amount of water drawn was not controlled. Despite this, the interviewee expressed concern that some farms could have illegal connections, i.e., drawing water without permission from the Authority. Although one of the certified farms was mentioned as the main abstractor of water, it was praised for good performance in terms of prompt payment of water bills.

5.3.3.3 District Environment Officer

The District Environment Officer (DEO) knew about the RFC programme but did not know that some tea farms were certified. However, for the purpose of environmental management, he reported that the tea farms like any other businesses with the potential to cause harm to the environment are responsible for facilitating annual environmental audits of their farms and submission of the reports thereof. As the National Management Authority (NEMA) officials, they were not concerned with the various technologies employed by the tea farms but their compliance with the regulations. Therefore, as long as the farms' annual environmental audit reports indicated achievement of compliance, the Authority did not concern itself further. Unfortunately, the system did not offer any effective way of verifying compliance. The interviewee observed that they asked farm managers to facilitate the whole process of Environmental Auditing, which included testing and reporting the quality of water being discharged into the rivers. "Nobody can report himself to be in contravention of the legal requirements, and therefore, the reports though in most cases are accepted as they are, their value is questionable," said the interviewee. With reference to the tea farm managers' claim that they planted trees on certain parts of their farms to promote conservation efforts (EN 3),

the interviewee observed that the trees planted, mostly eucalyptus, were meant for utility purposes. “The tea farmers plant trees to support tea production process by acting as windbreaks and also for provision of energy,” he said. According to the interviewee, based on the annual environmental audit reports submitted by the tea farms, all farms complied with the National Environment Standards.

5.3.4 Summary of the environmental and ecological system management strategies as reported by the farm managers and secondary data

There were more strategies to manage natural resources on the certified farms than on the non-certified ones. The natural resource management strategies identified by this research are shown in Table 5.3.

Table 5.3 Summary evaluation of environment and ecological system management strategies undertaken on the tea farms

Environmental management activity (Indicator code)	Certified tea farms			Non-certified tea farms		
	A	B	C	D	E	F
List of wildlife species (plants) (EN 1)	✓	✓	✓	x	x	x
List of wildlife species (animals) (EN 2)	✓	✓	✓	x	x	x
Maintenance of native tree species (EN 3)	x	x	✓	x	x	x
Existence of buffer zones/a strip of riparian vegetation (EN 4)	✓	✓	✓	x	x	x
Existence of rules such as bans on hunting (EN 5)	✓	✓	✓	✓	-	-
Use of alternative soil management practices other than artificial fertilisers (EN 7)	✓	✓	✓	✓	✓	-
Existence of an integrated pest management technique (EN 8)	✓	✓	✓	✓	-	-
Written environmental management policy (EN 9)	✓	✓	✓	x	x	-
Existence of an integrated solid waste management system (EN 10)	✓	✓	✓	x	x	x
Employees' participation in environmental activities (EN 11)	✓	✓	✓	x	x	-
Employee training in environment and natural resource conservation (EN 12)	✓	✓	✓	-	x	-
Rivers' water quality monitoring more than once a year	✓	✓	✓	x	x	x
Non-use of chemical fertilisers	x	x	x	x	x	x
Non-use of pesticides	x	x	x	x	x	x
✓ = Yes **x** = No - = No information						

5.4 Social conditions

In a sustainable farm, workers' well-being needs to be prioritised alongside environmental considerations. Therefore, the tea farms' employees were asked about their social conditions encompassing terms of employment; occupational, health and safety; access to social opportunities such as health services, education of their children ,etc, and housing conditions. There were mixed results as some aspects displayed significant differences between the

certified and non-certified tea farms while others did not. The following sections present findings mainly from the tea farm employees, farm managers and biophysical observations.

5.4.1 Occupational health and safety

5.4.1.1 Employee training in work safety and provision of PPE (SO 1 & 2)

For the purpose of investigating occupational health and safety issues, employees were asked to state whether they had been trained in work safety (SO 1) and provided with personal protective equipment (PPE) (SO 2). The tea farm managers were also asked about specific occupational health and safety issues on their farms and the measures they took to avert them.

Some of the key safety issues reported by all farm managers arose from the usage of machines that had the potential to cause injuries mainly cuts, bruises and pricks. Workers who handled chemicals for example, fertilisers and pesticides could also get intoxicated in the absence of precautionary actions (C). Another source of hazard to workers was reported to be stacked wood fuel which could fall unexpectedly (C). Owing to the mentioned hazards, employers took precautionary actions including provision of PPE (A, B and C) and training employees (A and D) in key safety issues as reported by managers from both certified and non-certified tea farms. However, interviews with the employees revealed significant variations between the two groups. For example, only 26.7% of employees from the non-certified farms were provided with PPE and 36.7% trained in safety issues (see Figure 5.4), therefore presenting a significant difference between the two groups of farms.

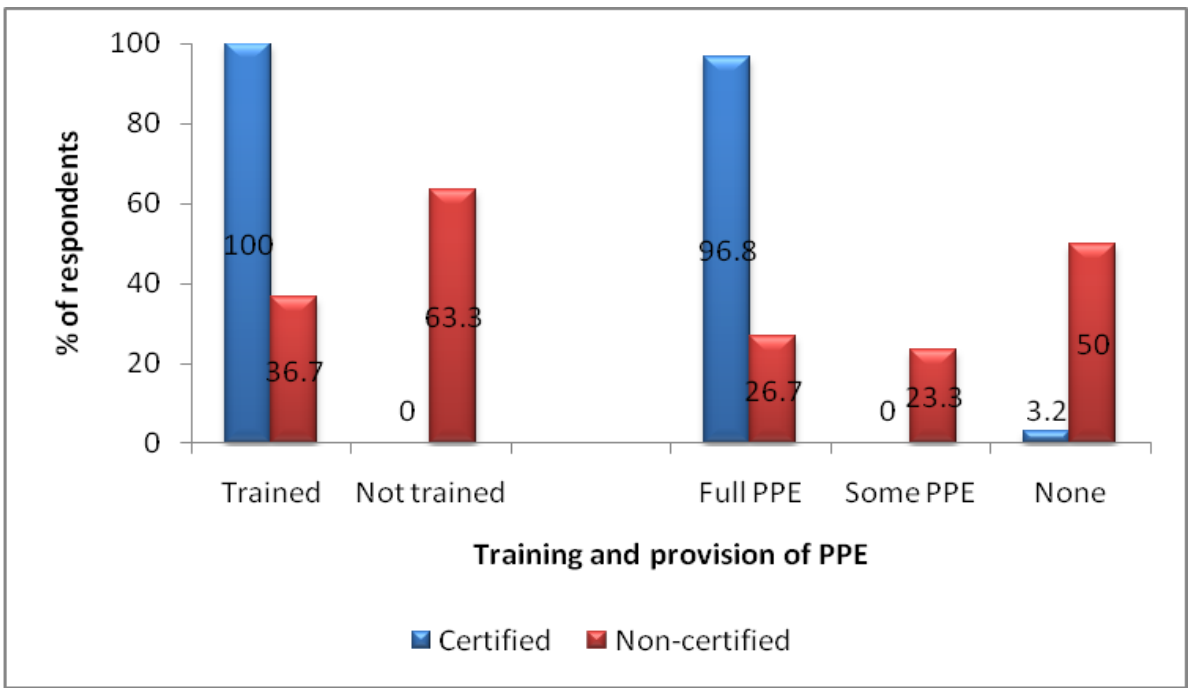


Figure 5.4 Proportions of the employees trained in work safety and provided with PPE

All respondents from the certified farms reported they had been trained in safety issues and only 3.2% claimed to have not been provided with the PPE. In photos 4 and 5, the differences in the provision of PPE to the employees are observable. The employees on a certified tea farm (Photo 4) have hand gloves and aprons. Moreover, they are working on a raised platform which saves them bending or kneeling for many hours while working. In Photo 5, employees from a non-certified farm can be seen to be lacking hand gloves and aprons. Furthermore, they are sorting tea at ground level which requires them to either bend or kneel while working. The non-certified tea farm employees' working station was not shielded from extreme weather conditions such as solar radiation.

Photo 4 Employees sorting tea in farm C (certified)

Photo 5 Employees sorting tea in farm D (non-certified)

Table 5.4 shows the differences between certified and non-certified tea farms in regard to employee training in work safety and provision of PPE.

Table 5.4 Comparison of Chi-square tests for occupational health and safety indicators between the certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 31)*			*Non-certified tea farms (N = 30)*			*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes (%)	*No (%)*	*Some/ Don't know (%)*	*Yes (%)*	*No (%)*	*Some/ Don't know (%)*				
Employee training in work safety (SO 1)	100.0	0.0	NA	36.7	63.3	NA	28.52	1	0.001	0.68
Provision of personal protective equipment (PPE) to employees (SO 2)	96.8	3.2	0.0	26.7	23.3	50.0	32.23	2	0.001	0.73
NA = Not Applicable										

5.4.2 Access to social opportunities

5.4.2.1 Employees provided with adequate housing and in good condition (SO 3, 4, & 5)

A house is a basic need, which all employees of the researched tea farms were provided with (SO 3). All houses were permanent (SO 4), i.e., built from concrete on the floor and the wall, and iron sheets on the roof. On both certified and non-certified tea farms, the house conditions were poor (SO 5), i.e., leaking roofs, smudged and cracked walls, and floors with potholes. More of these poor conditions were observed on the non-certified farms than on the certified ones. For example, 40% of respondents from the non-certified farms lived in houses with cracked walls. On the other hand, 29% of employees from the certified farms had cracked walls. The same trend was observed in the conditions of the roofs (see Figure 5.5).

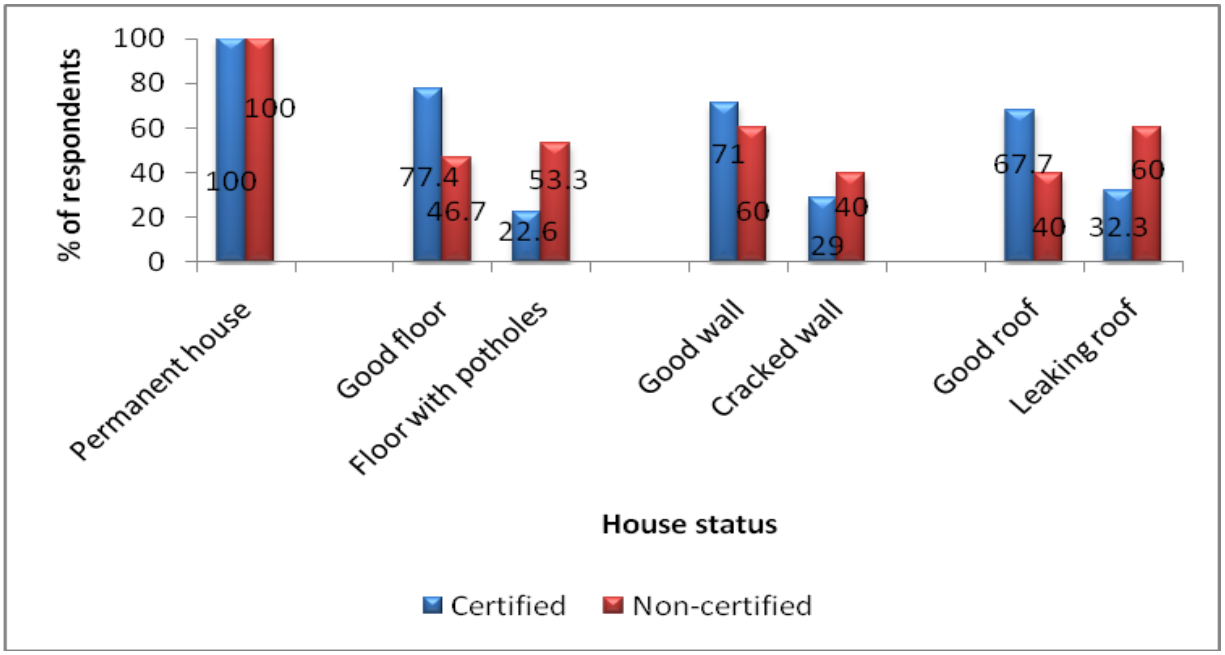


Figure 5.5 Observed conditions of employees' houses

5.4.2.2 Number of rooms in employees' houses (SO 6)

The number of rooms in the employees' houses also differed between the two groups of farms.. Most employees (66.7%) from the non-certified farms had single roomed houses while 77.4% of the certified tea farm employees lived in double-roomed houses (see Figure 5.6). A small proportion of 9.7% and 9% from the certified and non-certified farms respectively reported that their houses had three rooms. In both certified and non-certified tea farms, the room's size was approximately 25m^2.

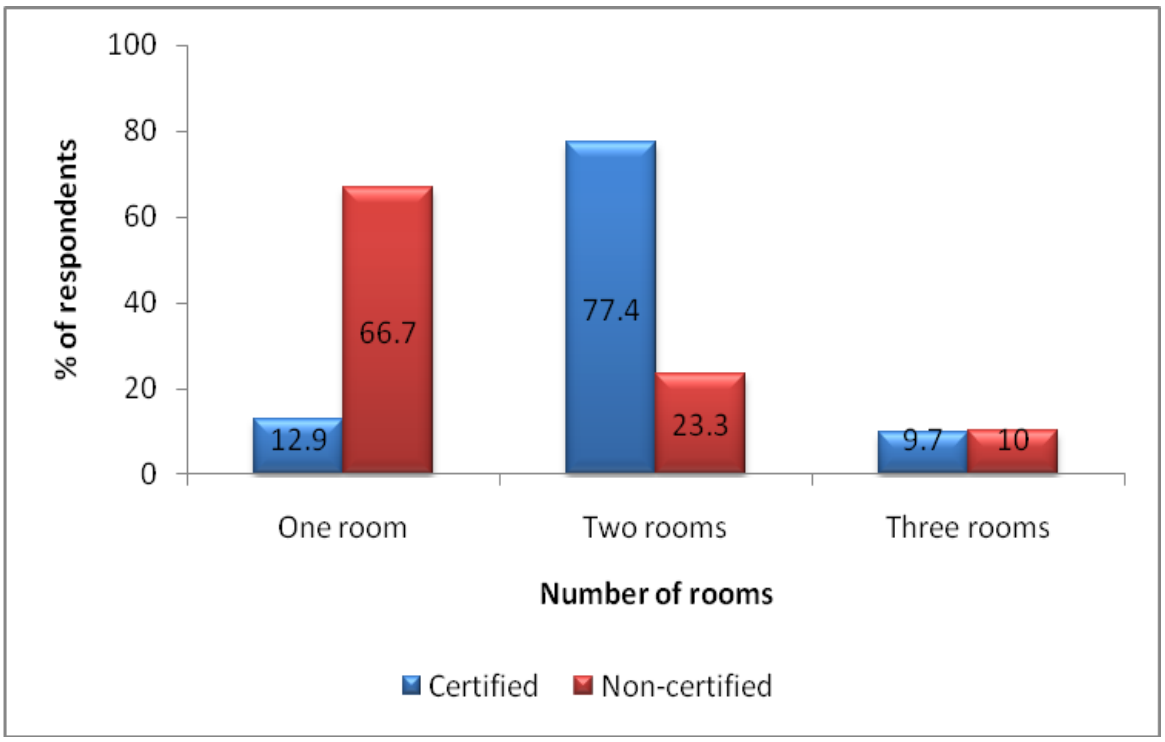


Figure 5.6 Number of rooms in employees' house

The Chi-square test in Table 5.5 indicates a significant difference exists only in terms of the status of the floor between the certified and non-certified tea farms' houses.

Table 5.5 Comparison of Chi-square tests for housing conditions between the certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 31) (%)*			*Non-certified tea farms (N = 30) (%)*			*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes	**No**		**Yes**	**No**					
Employees provided with a house (SO 3)	100.0	0.0		100.0	0.0		-	-	-	-
Employees' house type (P = permanent, S = semi-permantent) (SO 4)	**P**	**S**		**P**	**S**					
	100.0	0.0		100.0	0.0		-	-	-	-
Status of the wall (G = good, C = cracked, S = smudged) (SO 5^1)	**G**	**C**	**S**	**G**	**C**	**S**				
	71.0	16.1	12.9	60.0	30.0	10.0	1.67	2	0.434	0.17
Status of the floor (G = good, P = potholed) (SO 5^2)	**G**	**P**		**G**	**P**					
	77.4	22.6		46.7	53.3		6.14	1	0.013	0.32
Status of the roof (G = good, L = leaking, D = darkened by smoke) (SO 5^3)	**G**	**L**	**D**	**G**	**L**	**D**				
	67.7	29.0	3.2	40.0	53.3	6.7	4.73	2	0.094	0.28
Conditions of the wiring system (G = good, NA = Not Applicable) (SO 5^4)	**G**	**NA**		**G**	**NA**					
	6.5	93.5		3.3	96.7		0.32	1	0.573	0.07
Number of rooms in employees' houses (1 R = 1 room, 2 Rs = 2 rooms, 3 Rs = 3 rooms) (SO 6)	**1R**	**2Rs**	**3Rs**	**1R**	**2Rs**	**3Rs**				
	12.9	77.4	9.7	66.7	23.3	10.0	19.98	2	0.001	0.57
- = No measures of association (constant values)	**Sub-indicators for house conditions are shown using superscripts, i.e., SO 5^1 to SO 5^4**									

5.4.2.3 Access to health services (SO 7)

Access to health care services is another vital requirement for the well-being of any society. Employees were therefore asked if their companies provided them with health care services. All the respondents acknowledged that they were provided with health care services mainly medical treatment when sick and there was also provision of Anti Retroviral drugs (ARVs) to the People Living with HIV/AIDS (PLWHAs).

5.4.2.4 Access to clean and safe water (SO 8)

Access to potable water is a basic requirement for sustainable livelihoods of any society. The tea farm employees were asked whether they had access to clean and safe water (SO 7) and the distance they travelled to access it (SO 8).

The question, "What is your main source of drinking water?" was asked and options including tap, stream, borehole and shallow well given. The source of water, especially when it is a tap may indicate a better living standard. In addition, the respondents were asked if they had to treat water before drinking. This was meant to capture their perception of water quality. All employees, except one from the certified farm, reported a tap as their main source of drinking water. Most employees (83.9% on certified farms and 80% on non-certified farms) did not have to treat water before drinking because as a majority of them stated, water was treated before distribution through piping networks.

5.4.2.5 Distance between the employees' houses and the nearest water source (SO 9)

Because water sources could be located far away from the households and hence constraining access to water, the distance from the respondents' houses to the nearest water source was also examined. On the certified farms, 96.8% of the employees had water taps within their compounds. However, on the non-certified farms, 46.7% accessed water from taps within their compounds, while 50% travelled a distance of between 100 metres and 500 metres and the remaining 3.3% travelled more than 500 metres for water (see Figure 5.7). The distance travelled to access water as reported by the interviewees differed significantly between the certified and non-certified tea farms ($p<0.001$). However, the association was weak as indicated by the low phi value (0.58).

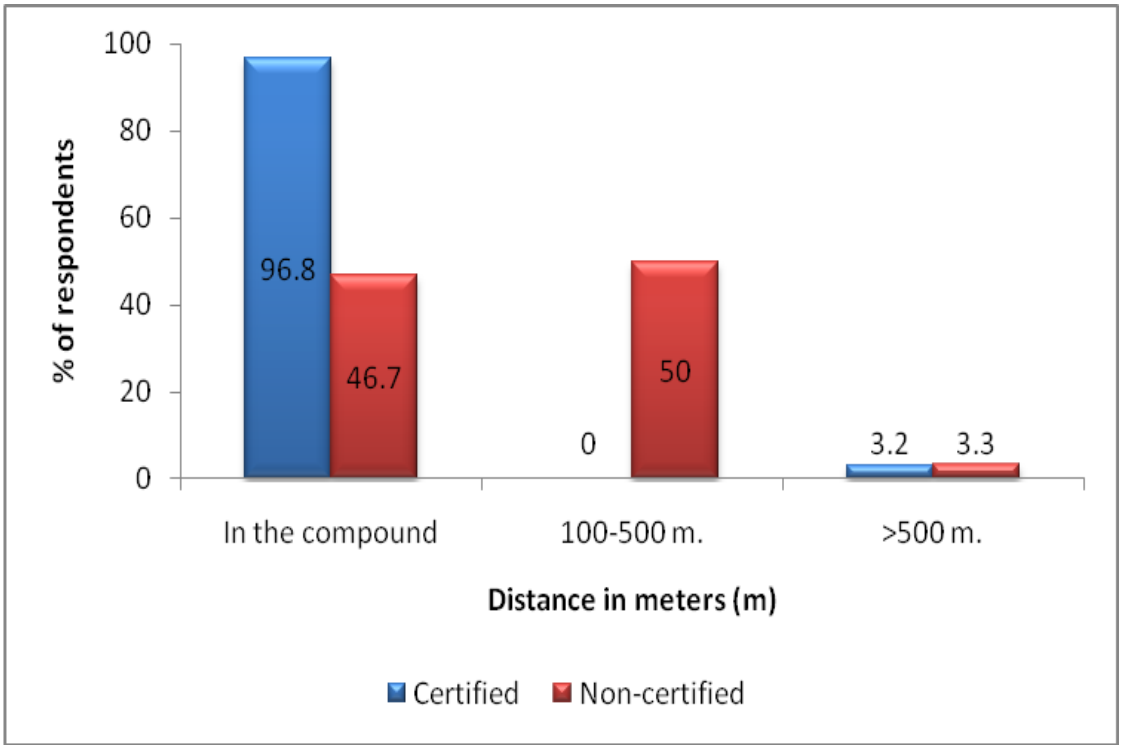


Figure 5.7 Distance from employees' houses to the nearest water source

5.4.2.6 Access to a sanitary facility (SO 10) and number of households sharing one facility (SO 11)

Access to a sanitary facility, particularly a toilet, promotes a decent living environment. Other than having access to a sanitary facility, the number of people using the same facility is also important as it relates to how well the service is accessed. The tea farm employees were asked if they had toilets in their houses or compounds (SO 9), and if available the number of households sharing one toilet (SO 10) was elicited. In both certified and non-certified farms, all employees reported having access to a toilet within their compounds. However, more than four households shared the toilets on 83.9% of certified farms and 76.7% of non-certified farms.

5.4.2.7 The main source of cooking (SO 12) and lighting (SO 13) energy

Different sources of energy have different levels of impact on human health. The use of wood fuel as the main source of cooking energy can have adverse impacts on human health due to the generated smoke. Employees were asked: "What is your main source of cooking energy?" (SO 12) and "What do you use for lighting at night?" (SO 13). All respondents on both certified and non-certified tea farms

reported firewood as their main source of cooking energy. There was no significant difference in the means used for lighting at night between certified and non-certified tea farms. Most employees (87.1% of certified farms and 86.7% of non-certified farms) used tin lamps for lighting. The remainder used hurricane lamps, pressure lamps and electricity (see Figure 5.8).

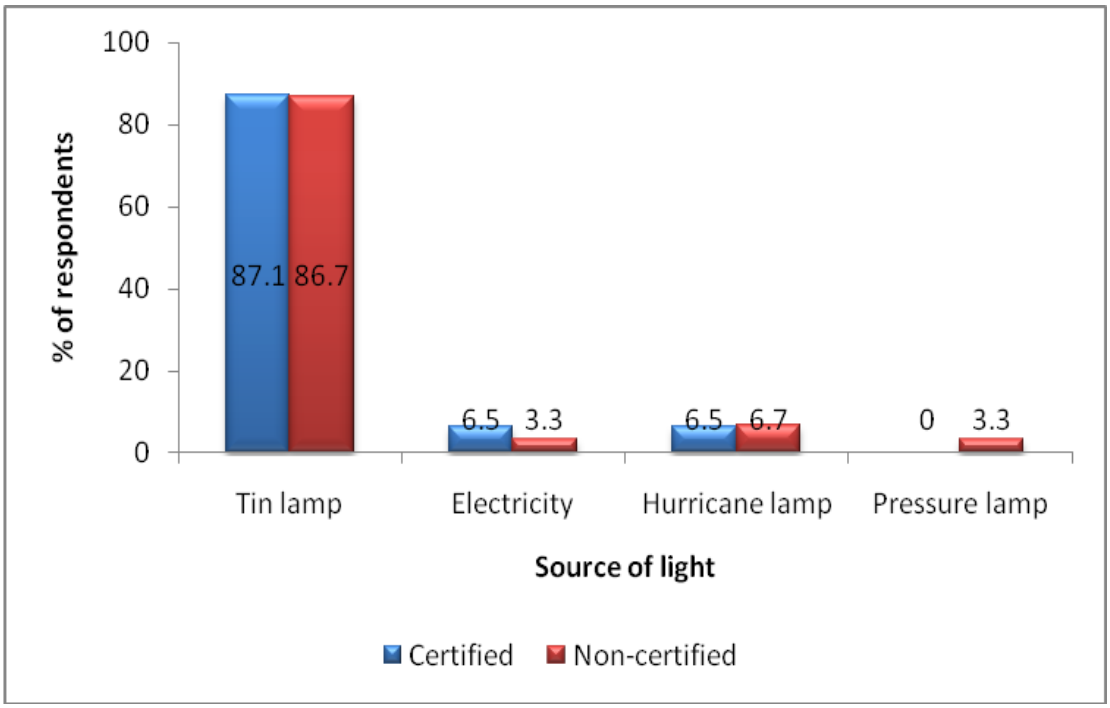


Figure 5.8 Employees' main sources of lighting at night

5.4.2.8 Existence of a policy against child labour (SO 14)

Accidents in work places can be minimised by employing adults but not children. Furthermore, children should be given a chance to access formal education. Therefore, employers including tea farms are prohibited from using child labour. This can be reinforced by putting in place a written policy against child labour as is a requirement of the RFC standards. The tea farm employees were asked if their farms had a policy against child labour. All employees on the certified farms reported the existence of a policy against child labour while in the non-certified farms, only 36.7% reported the existence of such a policy. A majority of the non-certified farm employees (60%) were not sure whether the policy existed or not, and the remaining 3.3% stated that their farms did not have a policy against child labour. The interviews with the farm managers and secondary data indicated that none of the tea farms

employed individuals under the age of 18 years. On one of the non-certified farms, a field supervisor observed that parents could occasionally involve their children to help them meet work targets. He further explained that such actions were discouraged especially when the schools were in session.

5.4.2.9 Support for schools (SO 15)

As education plays a key role in shaping the future of today's children, information regarding opportunities provided by the tea farms management teams was sought. The three sources of data indicated that all the tea farms supported schools, mostly the primary schools. A slight difference was noted where certified farms offered support to more schools than the non-certified farms. Nevertheless, all respondents acknowledged that their farms owned and managed at least a primary school. The same situation was reported by the farm managers. In addition, education levels of household members were sought and are shown in Figure 5.9.

Information about the education levels of all household members was collected from 246 (153 from certified farms and 93 from non-certified farms) individuals. As seen in Figure 5.9, most tea farm residents had a primary school education level. More household members from the certified farms (31.4%) than those from the non-certified (10.8%) farms had no formal education. However, the figures include children who had not reached school age. Pursuing education beyond primary school level remained a concern to the tea farm employees. Two respondents in non-certified farms (D and F) and one from a certified farm (A) commented on their inability to pay school fees for their children's secondary school education.

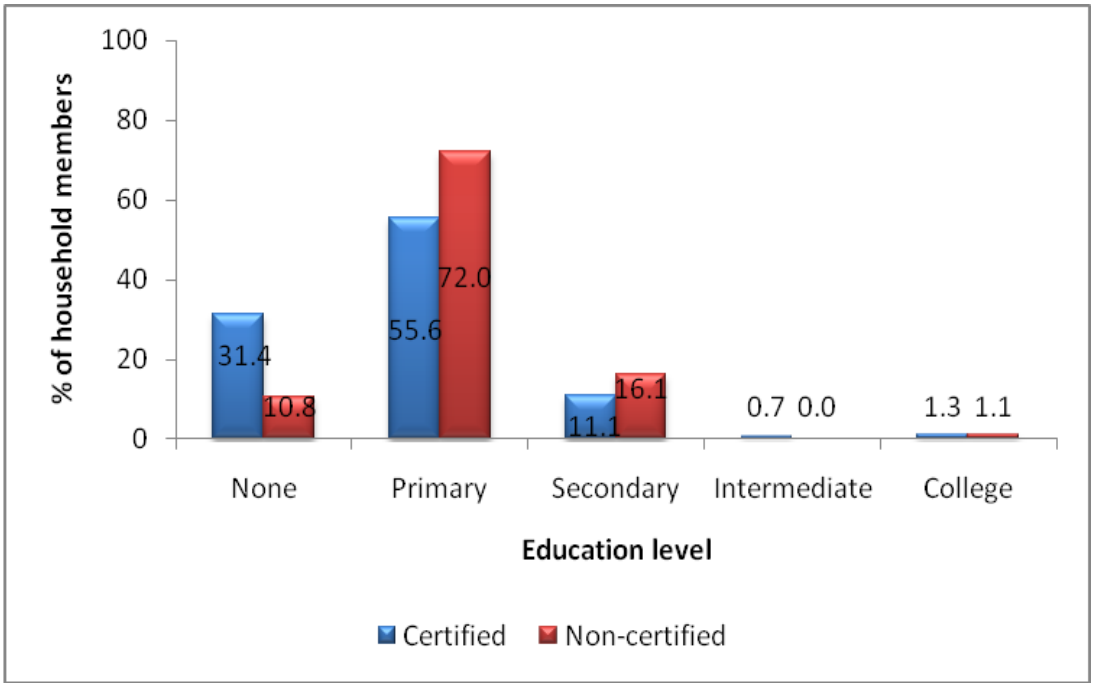


Figure 5.9 Education levels of household members

5.4.2.10 Support for the economic development of the local communities (SO 16)

Given the importance of considering the local communities in the development projects, the tea farm managers were asked if they had any special policy in relation to the local communities. They reported not having any but observed that the locals had higher chances of securing a job on their farms because of their proximity and hence ease of access to information (A and C). The two farm managers further explained that this was limited to the low cadre jobs which did not require highly specialised skills and did not need to be widely advertised. One of the certified farm managers stated their policy as non-discriminatory for jobs (B). The non-certified farm manager (D) reported that they had no policy. The tea farm management teams also extended their support to the neighbouring communities in the spirit of corporate social responsibility (CSR). One of the certified farms (A) made an agreement with the tea out-growers, who were mostly individual farmers from the neighbouring communities, to purchase their green tea at a higher price of Ksh. 30 per Kg (NZ $ 0.6). The same amount of green tea attracted Ksh. 24 (NZ $ 0.4) when sold to the Kenya Tea Development Authority (KTDA). The scholarship programme offered by one of the certified tea farms (B) to the employees' children was also extended to the

local community members. Other projects undertaken by the certified farms in the neighbouring communities included water (B), road maintenance (C), and provision of drugs to the health facilities (C and D). In addition, the certified farms reported that they supported community members to fund raise in times of need and also with material goods such as tents (C). On their part, the non-certified farms were reported to have supported the construction of a primary school (C), a building in a police station (C), housing for employees (C, D and F) and provision of health services through the association of tea growers (C, D and F). In comparison, the certified tea farms offered more support to the local communities than the non-certified farms with regard to the number and extent of support.

In order to further understand any differences in terms of services accessed by employees in the two groups of farms, the tea farm managers were asked to state any other services provided to employees. On the certified farms, the mentioned additional services were: credit facility on foodstuffs (A), health care services (A, B, C and D), education through the support of schools (A, B, C and D) and a recreation facility, e.g., a social hall (A and F). The reasons such services were provided to employees as reported by the managers were: to motivate and enhance the productivity of the employees (B), cultivate sense of belonging among the employees (C), support employees in times of need (C) and the fact that the tea estates were like closed communities (A) and situated far from the main shopping centres. The non-certified tea farm manager (D) also reported support for schools and provision of health services.

Other than the existence of policies against child labour and the distance travelled for water, there were no significant differences in access to social opportunities between the certified and non-certified tea farms (Tables 5.6 and 5.7). On all tea farms, employees had access to these services; the only slight difference was the degree to which the services were accessed. It was apparent that the certified farm employees had better and more effective access to the services.

Table 5.6 Comparison of Chi-square tests for the access to social opportunities' indicators between certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 31)*			*Non-certified tea farms (N = 30)*			*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes (%)	*No (%)*	*Don't know (%)*	*Yes (%)*	*No (%)*	*Don't know (%)*				
Provision of health care services to employees and their families (SO 7)	100.0	0.0	NA	100.0	0.0	NA	-	-	-	-
Need to treat drinking water (SO 8)	16.1	83.9	NA	20.0	80.0	NA	0.16	1	0.694	0.05
Distance from the house to the source of drinking water (A-compound, B-100-500M., and C->500M.) (SO 9)	A 96.8	B 0.0	C 3.2	A 46.7	B 50.0	C 3.3	20.81	2	0.001	0.58
Access to a sanitary facility (SO 10)	100.0	0.0	NA	100.0	0.0	NA	-	-	-	-
Main source of cooking energy (F=firewood) (SO 12)	F 100.0	NA	NA	F 100.0	NA	NA	-	-	-	-
Existence of a written policy against child labour (SO 14)	100.0	0.0	0.0	36.7	3.3	60.0	28.52	2	0.001	0.68
Ownership/support to schools by the tea farms (SO 15)	100.0	0.0	NA	100.0	0.0	NA	-	-	-	-
NA = Not Applicable							**- = No measures of association (constant values)**			

Table 5.7 Comparison of Chi-square tests for the access to social opportunities' indicators between the certified and non-certified tea farms

Indicator	*Certified tea farms (N = 31)*				*Non-certified tea farms (N = 30)*				*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	2 (%)	*3 (%)*	*4 (%)*	*>4 (%)*	*2 (%)*	*3 (%)*	*4 (%)*	*>4 (%)*				
Number of households sharing a toilet (SO 11)	6.5	6.5	3.2	83.9	3.3	10.0	10.0	76.7	1.70	3	0.637	0.17
Means of lighting at night	**T**	**H**	**E**	**P**	**T**	**H**	**E**	**P**				
T = tin lamp H = hurricane lamp E = electricity P = pressure lamp (SO 13)	87.1	6.5	6.5	0.0	86.7	6.7	3.3	3.3	1.34	3	0.721	0.15

5.4.2.11 Asset ownership

From the premise that people require a range of assets to achieve positive livelihood outcomes, employees were asked if they owned assets such as: a piece of land (SO 17), a radio (SO 18), a television set (SO 19), a mobile phone (SO 20), a car (SO 21) and a bicycle (SO 22). There were insignificant differences with regard to the ownership of all the assets except land in the two groups of farms. More employees from the non-certified farms reported owning a piece of land than from the certified farms (Figure 5.10). However, the difference as reflected by the low phi-value (0.34) was unreliable. The level of asset ownership indicated a similar level of wealth status, for example, none of the employees reported owning a car. In the main, a mobile phone and a radio were the assets owned by most of the tea farm employees. A small proportion of the employees owned a bicycle and a television set.

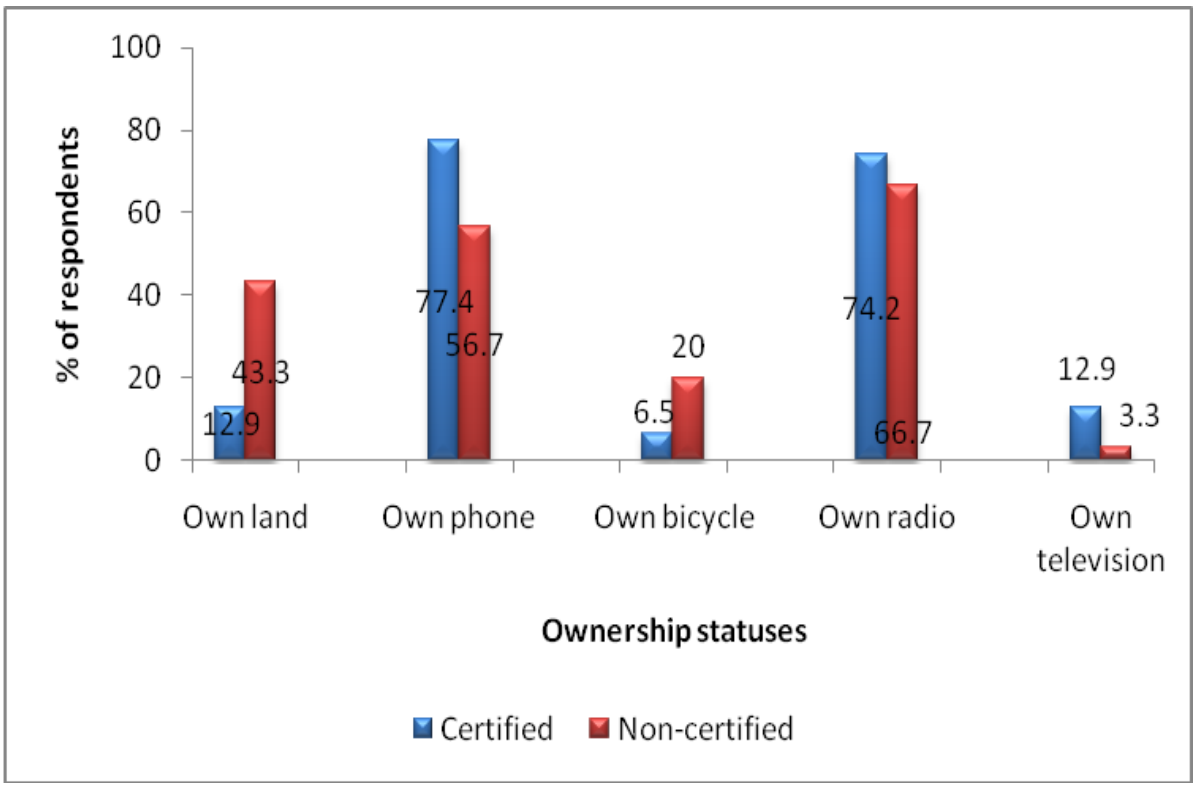


Figure 5.10 Asset ownership

Table 5.8 indicates a significant difference in the ownership of a piece of land between employees of certified and non-certified tea farms. More employees of the non-certified farms (43.3%) reported owning a piece of land than those of certified farms (12.9%).

Table 5.8 Comparison of Chi-square tests for asset ownership between the certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 30)*		*Non-certified tea farms (N = 30)*		*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes (%)	*No (%)*	*Yes (%)*	*No (%)*				
Do you own a piece of land? (SO 17)	12.9	87.1	43.3	56.7	7.02	1	0.008	0.34
Do you own a radio? (SO 18)	74.2	25.8	66.7	33.3	0.42	1	0.519	0.08
Do you own a television set? (SO 19)	12.9	87.1	3.3	96.7	1.86	1	0.173	0.17
Do you own a mobile phone? (SO 20)	77.4	22.6	56.7	43.3	2.98	1	0.084	0.22
Do you own a car? (SO 21)	0.0	100.0	0.0	100.0	-	-	-	-
Do you own a bicycle? (SO 22)	6.5	93.5	20.0	80.0	2.46	1	0.117	0.20
- = No measures of association								

5.4.2.12 Membership of a workers' union (SO 23)

A workers' union provides employees with a platform for collective bargaining. Through the workers' union, employees are more likely to effectively bargain with their employers on various issues affecting their work conditions. Therefore, employees should have the freedom of joining a workers' union of their choice. It is against this backdrop that employees were asked whether they were members of any workers' union. The findings revealed that slightly more employees from the non-certified farms than those on the certified farms were members of a workers' union (56.7% and 54.8% from non-certified and certified farms respectively). Employees paid a monthly subscription fee of Ksh. 120 (NZ $ 2.2), which was deducted directly from their pay for workers' union membership.

5.4.2.13 Employees' monthly income (SO 25)

Income as a measure of financial capital plays an important role in the individuals' well-being. In order to determine and compare the level of income of the tea farm employees, the respondents were asked to choose a range of their monthly income in Kenya shillings (NZ $ 1 is equivalent to Ksh. 54) from the following list: 3000-5000, 5001-8000, 8001-11000 and 11001-15000. It was necessary to use categories because of the perceived unwillingness of people to disclose the exact amount of their earnings. Figure 5.11 shows the monthly income levels of the employees from the two groups of farms.

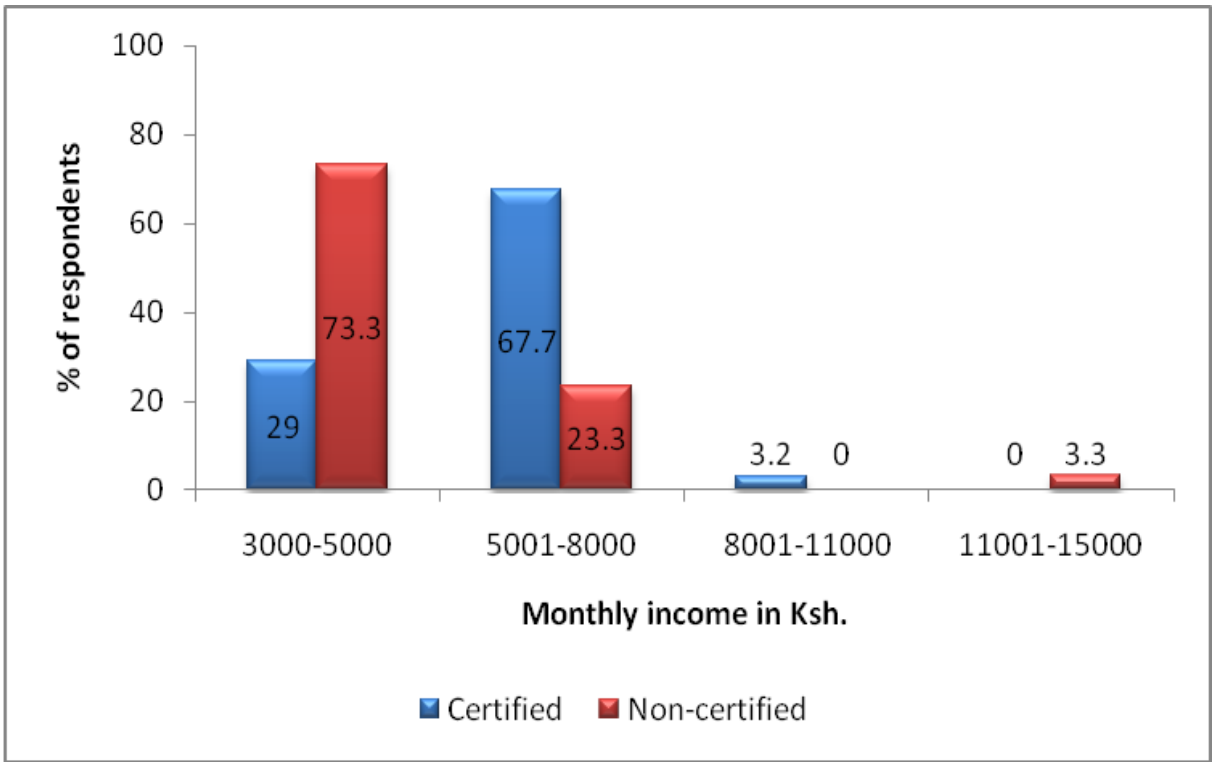


Figure 5.11 Employees' monthly income levels

There was a significant difference in the monthly income levels among the employees of the two groups of farms (see Table 5.9). Most employees (73.3%) from the non-certified farms earned between Ksh. 3000 and 5000 per month. On the other hand, a majority (67.7%) of the certified farm employees earned between Ksh. 6000 and 8000 per month. The certified tea farms had a minor percentage (3.2%) of employees earning between Ksh. 9000 and 11000 per month. It was interesting to note that 3.3% of the non-certified farm employees earned the highest at Ksh. 12000-15000.

Table 5.9 Comparison of Chi-square tests for terms of employment indicators between the certified and non-certified tea farms

Indicator (Code)	*Certified tea farms (N = 31)*			*Non-certified tea farms (N = 30)*			*Pearson χ^2 value*	*Degree of freedom (df)*	*p-value*	*Phi-value*
	Yes %	*No %*	*Don't know %*	*Yes %*	*No %*	*Don't know %*				
Employees' membership of a workers' union (SO 22)	54.8	45.2	NA	56.7	43.3	NA	0.02	1	0.866	0.02
Employees' monthly income (SO 23)	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**		
A = Ksh. 3000-5000 **B** = Ksh. 5001-8000 **C** = Ksh. 8001-11000 **D** = Ksh. 11001-15000	29.0	67.7	3.2	0.0	73.3	23.3	0.0	3.3	14.43	3	0.002	0.49
NA = Not Applicable										

5.5 Economic performance

5.5.1 Ease of access to a market (EC 1)

The interviews with the farm managers revealed that the RFC programme has direct economic gains in the form of premiums paid for the certified tea and it also ensures a market for the certified products. All certified farm managers mentioned assured markets as one of the advantages of becoming certified. Other reported benefits were: improved welfare of employees, and better management of the environmental resources. While all the non-certified farms depended on the Auction Centre in Mombasa as the main market outlet for their products, the certified farms in addition reported having direct links with customers from countries such as the United Kingdom, Pakistan and Egypt. Clients from these countries could make direct orders to the certified tea companies but the transaction had to pass through the Auction Centre in Mombasa.

5.5.2 Returns on invested capital/profits (EC 2)

Economic gain is the main focus for businesses and most organisations and hence impinges on the performance of any management system. Economic gains made by the tea farms in terms of profits were not disclosed by the tea farm managers making it impossible to analyse the direct economic benefits from the RFC programme. However, information concerning the market and productivity of the farms was provided as presented in the following section.

5.5.3 Productivity (EC 3)

As reported by the certified farm managers and as seen in Figure 5.12, certification had not influenced the tea farms' productivity. There was no unusual change in the productivity level from the year 2007 when the farms became certified that could be attributed to improved functioning of the ecosystem. The slight variations in productivity experienced were attributed to the climatic changes as reported by one of the farm managers. Furthermore, the magnitude of changes, as Figure 5.12 shows, had been experienced before.

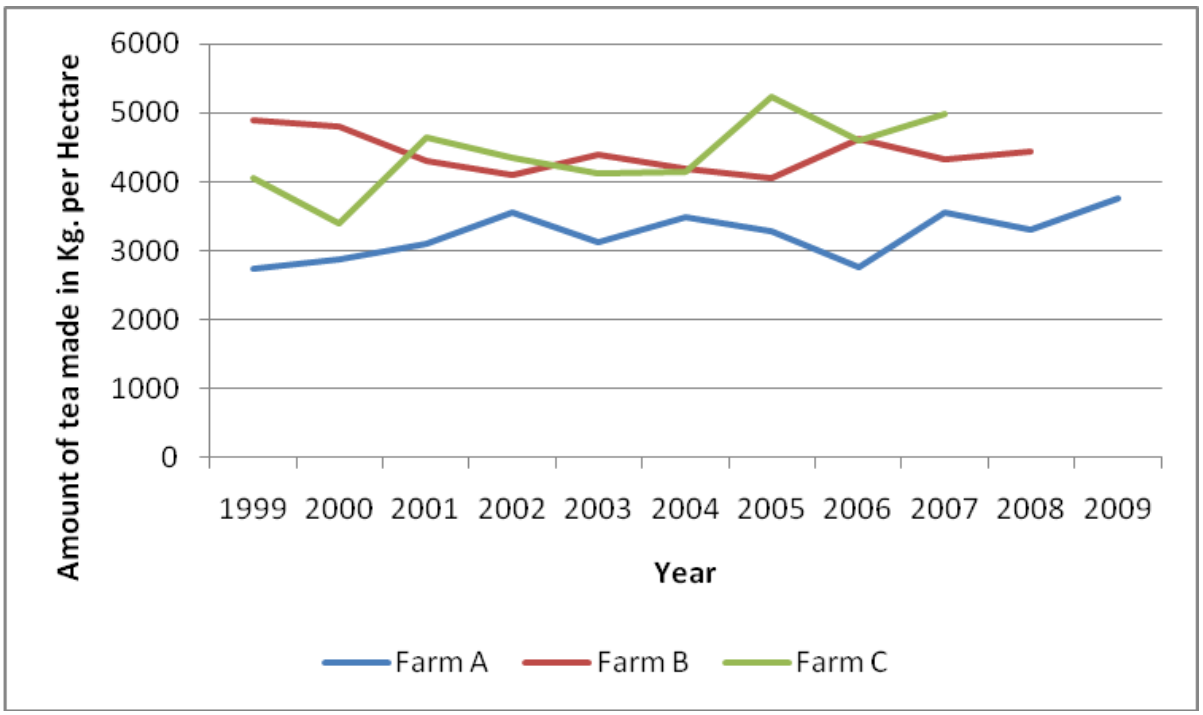


Figure 5.12 Productivity trend analysis of certified tea farms

5.5.4 Reasons for adopting the RFC programme

From the assumption that the reasons for adopting a sustainability standard may influence its outcomes, the farm managers were asked why they adopted the RFC programme. The reasons for adopting the RFC were reported as: a requirement by the mother company (A), to access global markets (A and B), for sustainable business and environment (B and C), to conserve natural resources (C) and to earn premium returns on certified tea (B). The certified farm managers were also asked whether they had considered adopting other EMSs. This question was meant to establish whether the RFC programme met all the farm managers' expectations. One of the managers stated that the RFC was adequate and there was no reason to seek another certification programme (A). Two of the certified farm managers reported that they were also ISO 22,000 certified because the factory which processed their tea required them to do so (B and C). In addition, one of the tea farms also applied Fair Trade so as to diversify in the market (B). On the other hand, the manager from the non-certified farm was asked, "Are you considering adopting any EMS? Explain why?" His response was "yes" but observed that the certification costs were prohibitive.

5.5.5 Challenges experienced with the RFC programme

In order to assess the success of the RFC programme from the farm managers' perspective, the certified farm managers were asked about the challenges they had experienced with the

programme, and how they addressed those challenges. The questions read: “What environmental issues were identified by the certification programme?” and as a follow up question, they were asked: “What is being done to address the issues identified by the certification programme?” The reported identified sustainability issues at the time of certification including: poor management of waste water, i.e., industrial and domestic waters were mixed and discharged into the river without adequate treatment (A and B); and social vices such as sexual harassment, low wages, child labour and poor housing of the employees (C). After certification, the issues were partly addressed, for example, domestic water was treated separately from the industrial discharge (A). There was also a monitoring system to ensure that waste water was adequately treated before discharging into the river (A). However, some of the issues had not been effectively addressed as observed by the farm managers (A and C). Provision of decent housing for the employees for example, was not successfully achieved on all the three farms. The situation was exacerbated by single (not married) employees who preferred living together in a house despite the fact that the farms allocated a house to each employee as observed by one of the managers (C).

Although there were measures to manage waste water before discharging it into the river, farm manager (A) did not claim 100% success. One of the managers (A) mentioned high labour costs as one of the impediments to the successful implementation of the RFC programme. All the farms still relied on casual labourers, whom they refer to as “temporary employees”, although it is against the RFC principle. Finally, there were some difficulties in making changes as observed by one of the field supervisors (in C), an example was closing down roads that were close to the residential locations and opening up new ones as required by the RFC programme. This included a garage, which according to the RFC standards, was not properly located.

5.6 Summary of results

The study results suggest that more environmental management efforts were undertaken in the certified tea farms than in the non-certified ones. These included the existence of a written EMP as well as involving employees in the environmental resource conservation activities. The certified tea farms also had enhanced measures for protecting wild animals and other natural resources such as bans on hunting, illegal logging, and maintenance of buffer zones. With regard to increasing biodiversity of the indigenous tree species, there were limited efforts on the certified farms while the non-certified farms had none. Blue gum plantations were the preferred tree species as they supported the tea production process.

The certified tea farm employees had relatively better terms and conditions of employment than their counterparts on the non-certified tea farms. For example, most of the employees from the certified farms were on permanent terms of employment and received a higher monthly income than those on the non-certified tea farms. In addition, the results show that more employees from the certified tea farms were trained in work safety and provided with the PPE than those on the non-certified farms. Although the certified farm employees seemed to have more advantages than their counterparts, there were circumstances with insignificant differences. These included the main sources of cooking energy and means of lighting at night. On both the certified and non-certified tea farms, employees relied on wood fuel as the main source of cooking energy and a majority used tin lamps for lighting at night. Asset ownership also indicated that the certified farm employees were not much better than the non-certified farm employees. In fact, more employees on the non-certified farms reported owning a piece of land than those on the certified farms.

Table 5.10 summarises results on a scale of zero to five (0 to 5) for quantitative data. The scale is derived from the percentage of respondents as illustrated by the key below the table. There is an exception in reporting the sixth indicator (EN 6), where a proportion of land has been reported in figures. For qualitative data, a tick (✓) is used to indicate that the farm adheres to the corresponding indicator. Consequently, a cross (**X**) denotes non-adherence. Furthermore, the numbers of ticks or crosses represent the number of farms, i.e., where all three farms adhere to an indicator, there are three ticks. Likewise, where all three farms do not adhere to an indicator, there are three crosses. For cases where data was not available, a hyphen (-) has been used. Finally, “NA” has been used as a short form of “Not Applicable”.

In cases where both quantitative and qualitative methods were used to collect data, the quantitative results are tabulated.

Table 5.10 Summary of results

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
Environment	Biodiversity protection	List of tree species within the boundaries of a farm (EN 1)	List of tree species within the boundaries of a farm (EN 1)	Create and maintain an inventory of wildlife and wildlife habitats	✓✓✓	X--
		List of animal species within the farms' boundaries (EN 2)	List of animal species within the farms' boundaries (EN 2)		✓✓✓	X--
		Proportion of land under indigenous tree species (EN 3)	Presence of a separate area of land under indigenous tree species and its size (EN 3)	Farms must have a minimum of 70 individual trees per hectare that must include at least 12 native species per hectare	✓XX (0.4 out of 709.5 ha.)	XXX
	Protection of natural water channels and forestlands	Presence of buffer zones (EN 4).	Presence of riparian strips/buffer zones (EN 4).	As part of a conservation program, a farm must establish and maintain vegetation zones between crops and areas of human activities.	✓✓✓	XXX
		Existence of regulations such as bans on hunting (EN 5).	Existence of regulations such as bans on hunting (EN 5).	Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm	✓✓✓	✓--
		Percentage of forest reserve relative to the total agricultural land area (EN 6)	Proportion of land under natural resources (%) (EN 6)	Dedicate at least 30% of the farm area for conservation or recovery of the area's typical ecosystems	**9.7%**	-
	Soil conservation	Existence of soil conservation	Existence of soil conservation	A farm must use and expand its use of vegetative ground cover to reduce	✓✓✓	✓✓-

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		practices other than use of artificial fertilisers (EN 7)	practices other than use of artificial fertilisers (EN 7)	erosion and improve soil fertility, structure and organic material content, as well as minimise the use of herbicides		
	Environmental Policy	Existence of a written Environmental Management Policy (EN 8)	Existence of a written Environmental Management Policy (EN 8)	A farm must have a social and environmental management system that contains the necessary policies, programs and procedures for complying with the RFC standard and with respective national legislation	✓✓✓	XX-
	Solid waste management system	Existence of an integrated waste management program (EN 9)	Existence of an integrated waste management program (EN 9)	A farm must have an integrated waste management program for the waste products it generates. This must be based on the concepts of refusing or reducing the use of products that have actual or potential negative impacts on the environment or human health waste as well as reusing and recycling waste	✓✓✓	XXX
	Participation in environmental management activities	Tea farms' employees participation in environmental management activities (EN 10)	Tea farms' employees participation in environmental management activities (EN 10)	Not stated	**3**	**1**
	Resource conservation	Employee training in environmental resource	Employee training in environmental resource conservation	Not stated	**5**	**2**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		conservation (EN 11)	(EN 11)			
Social	Occupational Health and Safety	Employees trained in work safety and other duty specific issues (SO 1)	Employees trained in work safety and other duty specific issues (SO 1)	A farm must implement a training and education program in order to guarantee effective execution of the social and environmental management system and its programs. In addition, a farm must have a permanent and continuous training program to educate workers on how to carry out their work correctly and safely	**5**	**2**
	Workers safety	Provision of personal protective equipment (PPE) to workers (SO 2)	Employees reporting having been provided with PPE (SO 2)	All workers that come into contact with agrochemicals, including those who clean or wash clothes or equipment that have been exposed to agrochemicals, must use personal protection equipment	**5**	**2**
	Adequate housing	Provision of adequate housing or house allowance to workers (SO 3)	Employees allocated a house by the tea farm management teams (SO 3)	Housing provided by the farm for permanent or temporary workers living there must be well-designed, built and maintained to foster good hygienic, health and safety conditions. The dormitories must be constructed with wooden floors above the ground or floors made from asphalt or concrete, roofs in good condition without leaks, and	**5**	**5**
		Type of house (Permanent or semi-permanent) (SO 4)	Employees provided with permanent houses (SO 4)		**5**	**5**
		Conditions of the house (SO 5), i.e., statuses of the roof,	Observed good wall conditions, i.e., not cracked (SO 5[1])		**4**	**3**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		wall, floor and electric wire insulation	Observed good floor conditions, i.e., no pot holes (SO 5^2)	with appropriate ventilation and lighting	**4**	**3**
			Employees reporting non-leaking roof conditions (SO 5^3)		**4**	**2**
			Observed electric wiring system in good conditions, i.e., not exposed (SO 5^4)		**1**	**1**
		Number of rooms (SO 6)	Employees' houses with at least three rooms (SO 6)	Not stated	**1**	**1**
	Access to health services	Provision of health care services to the employees (SO 7)	Employees provided with health care services (SO 7)	All workers and their families must have access to medical services during working hours and in case of emergency	**5**	**5**
	Access to potable water	Perceived water quality (Need to treat drinking water) (SO 8)	Employees perceiving their water quality as safe and hence do not need to treat drinking water (SO 8)	All workers and persons living on a farm must have access to potable water	**5**	**4**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		Distance to a water source (SO 9)	Employees with a water supply within their compounds (SO 9)	Not stated	**5**	**3**
	Sanitary facilities	Access to sanitary facilities (SO 10)	Employees with access to sanitary facilities, i.e., toilet (SO 10)	Workers must have access to sanitary facilities which comply with the following characteristics: one toilet for every 15 persons, one urinal for every 25 men, a sufficient supply of toilet paper, a minimum distance of 30 metres from houses and one washbasin per family	**5**	**5**
		Number of households sharing one toilet (SO 11)	Employees sharing a toilet with not more than two households (SO 11)		**1**	**1**
	Clean energy	Source of cooking energy (SO 12)	Employees relying on a cleaner source of energy rather than firewood (SO 12)	Not stated	**0**	**0**
		Source of lighting at night (SO 13)	Employees using a lighting source other than a tin lamp (SO 13)	Not stated	**1**	**1**
	Child labour	Existence of a policy against child labour (SO 14)	Employees reporting the existence of a policy against child labour (SO 14)	It is prohibited to directly or indirectly employ full or part-time workers under the age of 15	**5**	**2**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
	Education of workers' children	Ownership of and/or support for schools by the farms' management teams (SO 15)	Employees reporting that their farm management teams support schools (SO 15)	A farm must have mechanisms to guarantee access to education for the school-age children that live on the farm. Schools established and administered by certified farms must have the necessary resources, personnel and infrastructure	**5**	**5**
	Community relations	Existence of cooperate responsibilities programmes to help in the economic development of local communities (SO 16)	Tea farms supporting development of the local communities (SO 16)	A farm must contribute to the protection and conservation of community natural resources, collaborate with the development of the local economy, and contribute fairly towards the costs of the community infrastructure and local shared resources, i.e., schools, pathways, aqueducts and other infrastructure	✓✓✓	✓✓✓
	Asset ownership	Ownership of land (SO 17)	Employees reporting the ownership of a piece of land (SO 17)	Not stated	**1**	**3**
		Ownership of a radio (SO 18)	Employees reporting the ownership of a radio (SO 18)	Not stated	**4**	**4**
		Ownership of a television set (SO 19)	Employees reporting the ownership of a television set (SO 19)	Not stated	**1**	**1**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		Ownership of a mobile phone (SO 20)	Employees reporting the ownership of a mobile phone (SO 20)	Not stated	**4**	**3**
		Ownership of a car (SO 21)	Employees reporting the ownership of a car (SO 21)	Not stated	**0**	**0**
		Ownership of a bicycle (SO 22)	Employees reporting the ownership of a bicycle (SO 22)	Not stated	**1**	**1**
	Workers' freedom to organise and negotiate working conditions	Employees' membership of a workers' union (SO 23)	Employees reporting they are members of a workers' union (SO 23)	Workers must have the right to freely organise and voluntarily negotiate their working conditions in a collective manner as established in ILO Conventions 87 and 98	**3**	**3**
	Income	Employees' monthly income (SO 24). Greater or equal to the regional average rate.	Employees reporting they earn a monthly income which is greater or equal to the regional average rate (SO 24)	Workers must receive pay in legal tender greater than or equal to the regional average or the legally established minimum wage, whichever is greater, according to their specific job	**4**	**2**
Economic	Marketability	Ease of access to markets (EC 1)	Increased ease of access owing to the certification programme (EC 1)	Not stated	✓✓✓	**NA**
	Income	Average rate of return on capital employed/profit	Increased financial gains owing to the certification	Not stated	✓✓✓	**NA**

Sustainability component	Thesis criterion	Proposed indicator(s) (Code)	Emergent indicator	RFC standard	Certified farm score	Non-certified farm score
		(EC 2)	programme (EC 2)			
	Productivity	Changes in tea farms' productivity (EC 3)	Increased productivity owing to the certification programme (EC 3)	Not stated	XXX	**NA**
Key for survey results: 0% = 0	1 - 20% = 1	21 – 40% = 2	41 – 60% = 3	61 – 80% = 4	81 – 100% = 5	

Overall, the results provide compelling evidence that the RFC programme has resulted in important benefits particularly to the farm employees. For example, there were more natural resource management strategies on certified farms than on non-certified ones. Some of the natural resource management strategies were the existence of a written EMP, riparian strips (buffer zones) and a solid waste management program. In addition, more employees of certified farms reported access to social opportunities than those of non-certified farms. The social opportunities included training in work safety, provision of PPE, accessing a water supply and the existence of a policy against child labour. However, there are more expectations yet to be met by the certified tea farms. In the following chapter, such expectations are elucidated by discussing the findings. The discussions in the next chapter are carried out using the lenses of sustainable agriculture and sustainable livelihoods. Whether the RFC programme can lead to sustainable tea production in Kenya and in other developing countries with similar economic and environmental contexts is discussed.

Chapter 6
Discussion

6.1 Introduction

This study aims to assess whether the Rainforest Alliance Certification (RFC) programme makes a sustainability difference and its potential to achieve sustainability on Kenyan tea farms and in other countries with similar environmental and economic contexts. Therefore, a comparison of the environmental and ecological system, social conditions and economic indicators is carried out between certified and non-certified tea farms. Beyond the comparison between the two groups of tea farms, an evaluation of the certified tea farms is undertaken to determine whether the RFC has helped to achieve sustainability or not. In addition, the RFC standards are evaluated to determine whether if correctly implemented, they will result in weak or strong sustainability.

In this chapter, the results (again) are discussed in three broad categories: environmental and ecological system, social conditions and economic performance. Performance of the sustainability indicators in the certified and non-certified tea farms, and their implications are discussed. This discussion is then followed by an evaluation of whether the RFC has improved sustainability performance in two categories: at the farm level and in terms of the employees' livelihoods. Given that the study investigated the process indicators rather than the outcome, it offers a weak evaluation of sustainability. The sustainable livelihoods framework (SLF) is used jointly with the driving force-state-response (DSR) framework to evaluate employees' livelihoods and agricultural activities respectively. Overall, the chapter identifies areas where the RFC has enhanced the sustainability performance of the tea farms and those that are yet to be improved. Finally, the chapter ends with a brief summary.

6.2 Environmental and ecological systems

Farm management plans are needed to help limit the possible adverse impacts of farm activities on natural resources (Rondinelli, Berry, & Schneider, 1998). Hunt & Johnson (1995) assert that any company with an aim of improving environmental performance should start by establishing a realistic environmental management policy (EMP) to minimise the negative impacts of its operations. This notion is also shared by Berry & Rondinelli (1998), i.e., that proactive organisations begin with a policy and a plan that mirror sound environmental goals and secure top management commitment and long-term funding. The

content of the EMP and commitment of the management team in implementing the policy have a direct impact on the outcomes. Since only certified farms had written EMPs, a further step of investigating their contents was not undertaken. Although the contents of environmental management policies were not investigated in this research, their existence was considered a positive indicator of management of the natural resources. The marked difference between the certified and non-certified tea farms regarding existence of the EMP indicated that the certified farms had a higher chance of minimising adverse impacts and managing their natural resources more responsibly. As a requirement of the RFC programme, all certified farms had written environmental management policies of which the employees were aware. On the other hand, the non-certified tea farms did not have written environmental management policies because the government regulations, which governed their operations, did not require them and they were not certified. However, one of the non-certified tea farms had a non-written EMP as reported by the farm manager and also reflected in the employees' responses (100% of that farm). This underscores the importance of a policy in the guiding actions of organisations.

Development of the EMP must be followed by an implementation plan which involves all employees. Consequently, involving employees in environmental management issues requires a strategy to win their support. Therefore, employee training has been used as one strategy to help overcome the constraints inhibiting the transformation to an environmentally conscious and responsible organisation (Perron et al., 2006). Employee training is also common with the implementation of sustainability standards such as the RFC. Training helps employees to understand an environmental management initiative, environmental impacts and policies of an organisation. It also increases the chances of the employees' committing to the implementation of the environmental management initiative. The cited reasons make employee training an essential element in the implementation of an EMS (Sammalisto & Brorson, 2008). From the presented arguments, it is not surprising that more employees from the certified farms had received environmental management training and also participated in environmental activities than those from the non-certified farms. The fact that more certified tea farm employees had participated in the environmental activities than those in the non-certified tea farms could also suggest the existence of more concerted efforts to protect natural resources on the certified farms. Examples of environmental activities that the certified tea farms involved their employees in were solid waste management and tree planting.

One of the requirements for effective environmental protection is an approach that prevents pollution from waste materials. Therefore, safe disposal of the generated solid waste is not

adequate for an organisation but a holistic approach of reducing, reusing, and recycling (3Rs) materials is more desirable. This principle (3Rs) of solid waste management was reported by all certified farm managers but was not implemented in the non-certified farms. Arguably, the system of dumping solid wastes in pits as practised in the non-certified tea farms did not reflect positively the efforts to conserve resources. Some of the reasons organisations strive to find more effective means of preventing pollution have been the increasing legal liabilities, and the rising costs of pollution control and waste disposal (Berry & Rondinelli, 1998). However, where the legal liabilities are not enforced, the proponents can easily externalise their cost of pollution by evading the costs of establishing a waste management system. From the interviews conducted with the government officials, there was no pressure on the tea farms to adopt effective solid waste management systems.

The study findings show that the certified farms had more resource management strategies than the non-certified farms. Some of these management strategies include: bans on hunting and maintenance of a riparian strip between the natural resources and the areas for human activities. The management strategies were communicated to the public by the use of sign posts at strategic points. Although the effectiveness of such bans was not assessed, they have a greater potential for protecting the wildlife species than in the case where such bans are lacking. Maintenance of riparian strips (buffer zones), as practised in the certified farms, has a number of conservation benefits. Conservation buffers are a source of food, nesting cover, and shelter for many wildlife species. Buffers also provide connecting corridors that enable wildlife to move safely from one habitat area to another. They help stabilize a stream and also offer a setback distance for agricultural chemical use from water sources, making them essential on the tea farms where chemical fertilisers are used. In this light, the presence of riparian strips offered the certified tea farms an edge over non-certified tea farms in the area of natural resource management.

Before liquid waste water can be discharged into a natural water body, it needs to be treated to minimise its impacts on the natural water ecosystems. Therefore, liquid waste should be treated and its quality tested before it is discharged. Again, it is imperative to test the quality of the receiving water body after discharging liquid waste. This helps to monitor whether the discharged waste is polluting the water body beyond acceptable limits and hence attracts a corrective action. Only the certified farms reported monitoring the quality of their discharge and that of the receiving water bodies on a monthly basis. The National Environmental Management Authority (NEMA) requires all organisations, farms, companies, etc., whose activities have significant impacts on the environment to submit an annual environmental

audit report. In this audit report, the tea farms are required to report the quality of the natural water sources on their farms. Therefore, the non-certified farms too, undertake water quality tests but on an annual basis. The intervals between monitoring the water quality (one year) can make its results less meaningful and of limited use in natural resource management. Furthermore, there were doubts about the credibility of the water quality tests, given that the farms were responsible for testing and reporting. The same weakness was observed by Raynolds, Murray, & Heller (2006) in the practice of the RFC, i.e., it is the Sustainable Agriculture Network (SAN) members who are responsible for organising the RFC monitoring. This can raise a potential conflict of interest. Furthermore, the annual environmental audits might never be entirely objective as they involve (commercial auditors) assessing something for someone with a particular purpose (Font & Harris, 2004).

In order to maximise the benefits from the water quality tests, it was suggested by the District Environment Officer (DEO) that a third party with no interest should be responsible. One possible way to solve the challenge is involving a non-profit third party in the audits as practised by Fair Trade (Raynolds et al., 2006). The government of Kenya through the Water Resource Management Authority (WRMA) sought to solve this apparent problem by deploying its staff to monitor river and stream water quality. However, the high cost implication saw it resort to a collaborative approach with the local community members, whose work was then reduced to identifying and reporting the possible causes of water pollution but not testing the water quality. The same cost problem was mentioned by the certified farm managers as an impediment to instituting an effective system for managing wastewater. Therefore, the reports provided by the tea farm managers remained the main source of information about natural water quality.

Tea farming, as practised in Kenya, is a monoculture practice which replaces the indigenous vegetation on a large piece of land over a long period. The Kenyan tea farms were established on once-natural forest land, and therefore replaced a variety of indigenous tree species. Maintaining indigenous tree species is one of the key aspects in pursuing sustainable agriculture. In both certified and non-certified tea farms, blue gum was the main tree species (exotic) because of its utility purpose in the tea production process. All the tea farms claimed to maintain indigenous tree species, and the certified farms produced lists of the maintained indigenous tree species to that effect. However, on the ground, only one certified tea farm had a small piece of land set aside for planting indigenous tree species (0.4 ha.). The rest of the tea farms had indigenous tree species scattered around the farms, which did not indicate a concerted effort to increase and maintain biodiversity. With regard to the RFC standard

requiring tea farms to establish native vegetation on at least 30% of their farm, none of the certified farms met the condition. According to the position taken by the WRMA officials with reference to the blue gum plantation, the tea farms were perceived to contribute to the reduction of water quantity. The government, through WRMA, embarked on replacing the blue gum trees and also requested the tea farm management teams to follow suit because of their perceived desertification effect.

Some of the changes to farming systems and practices meant to enhance sustainable agriculture are: reduced usage of pesticides and adoption of integrated pest management (IPM), improved fertiliser efficiency; timing, placement and adoption of a global positioning system, and incorporation of legumes and catch crops to maintain soil stability and fertility (Wagner, 1998). These are concerns that the tea farms (both certified and non-certified) are yet to address in order to be on track in the pursuit of sustainability. The RFC standards do not wholly prohibit the use of chemicals but aim to control the types of chemicals applied on farms. The tea farms had not advanced their technology of monitoring fertiliser application thus raising a concern for river and under ground water pollution. As reported by the DEO, there was less interest by the tea farms in advancing their technology to ensure better environmental performance. On the other hand, the government was concerned with enforcing compliance but the system put in place for that purpose was weak. For example, the NEMA officials could not ascertain the authenticity of the annual environmental audit reports and the WRMA lacked the capacity to effectively monitor the natural water sources. This confirms the claims by Seymour & Ridley (2005, p. 318) regarding the disadvantages of using government regulatory approaches in natural resource management:

> "Regulation is often rigid and prescriptive and can be expensive to administer (Mech and Young, 2001). Enforcement of traditional regulation often takes place after a breach has occurred; this approach often does not address the cause of the problem."

Any benefits achieved from the application of the RFC depended entirely on the motivations of the certified farm management teams. The common motivational factor for adopting the RFC was ease of market access as reported by the certified farm managers. Given that sustainability standards are usually costly in the short-term (Gómez Tovar et al., 2005; Tee et al., 2007), market access as the main reason for certification can limit environmental and social performance of a sustainability standard. Without motivation on the part of the management team to pursue high sustainability standards, rarely are major costly changes initiated (Rondinelli et al., 1998). Perhaps, insufficient investment in the pursuit of high standards has been a major deterrent to the success of achieving sustainability in most

organisations. In a study of cooperative approaches to environmental protection, Harrison (1999) concluded that there is little empirical evidence of the environmental benefits from voluntary agreements. Harrison (1999) attributed this finding to the inadequate nature of the policy reforms. Some of the weaknesses specific to the RFC programme's practice include: self audits, non-disclosure to the public, and failure to provide means of regulating the use of artificial fertilisers. In addition, those dependent on proponents include the strong commitment of the certified farm management teams to achieve high standards, which could not be guaranteed.

6.3 Social conditions

A house, mostly referred to as a shelter, is one of the very basic necessities for a human life. Richards (1995) emphasises the need for every household to enjoy certain minimum conditions in terms of housing, nutrition, health and education in order to participate with economic freedom in the market place. Therefore, housing is identified as one of the few important basic necessities for people's well-being. Access to or ownership of a house in itself does not necessarily meet a person's need, thus its condition also matters. For example, a good house should be adequate to accommodate its inhabitants, well ventilated, safe, promote good health (i.e., be devoid of cracks on the wall, pot-holes in the floor and have a roof that does not leak), and be long lasting (permanent). On all tea farms, employees were allocated permanent houses.

However, the housing conditions were poor in the sense of cracked walls, leaking roofs and pot-holed floors. The conditions of the non-certified farm employees' houses were poorer exposing them to greater health risks. The house size and number of rooms were inadequate on both certified and non-certified farms. Most households comprised four occupants, i.e., father, mother and two children. Arguably, a family of four requires at least a three-roomed house (a sitting room and two bedrooms), yet few employees (9.7% in certified and 10% in non-certified farms) had houses with three rooms. The size of the sitting room, also used by most employees on all tea farms as the kitchen, measured approximately only 2.5m^2. By whatever standards, the observed housing conditions had the potential of causing discomfort to employees on all tea farms. This concern was also raised by one of the certified tea farm managers.

Human health is one of the human capital elements in a sustainable livelihoods framework, as ability to labour requires good health. In order to reduce employees' vulnerability to poor health status, there is a need for easy access to health care services. In both certified and non-

certified tea farms, employees had access to health care services, which reflected the efforts of the tea farm management teams in ensuring their employees have a better productive life (Duraiappah & Roy, 2007).

Water is one of the basic human needs and the most essential requirement for any form of life. A number of studies have established an intricate relationship existing between access to safe water and sustainable livelihoods. For example, Wescoat Jr, Headington, & Theobald (2007) reported that poverty and water problems are correlated in complex ways, and have complications for all nations striving for universal access to safe water and sanitation. It is undeniable that water quality and quantity have a direct impact on human life. Poor water quality can result in waterborne diseases such as typhoid and diarrhoea while inadequate water can lead to unhygienic conditions that in turn promote disease infections such as cholera. Access to safe water therefore, is an important factor in the employees' livelihoods. All tea farm employees perceived water quality as safe, which was a positive indicator of their well-being. However, on the non-certified farms, more than half of the employees were yet to access water from their compounds. The time spent on fetching water can impact negatively on the workers' productivity, especially when they have to travel long distances (DFID, 1999).

Another important aspect in promoting and maintaining a good quality of health is access to a sanitary facility. Hoek, Konradsen, Ensink, & Mudasser (2001) concur that good quality drinking water provides health benefits, but only when the supply is in sufficient quantities and most important, when a toilet is available. Their study in the southern Punjab in Pakistan revealed a strong association between the prevalence of diarrhoeal diseases and availability of toilets. All the tea farms ensured that their employees had access to a toilet despite their sharing among more than four households. In order to improve on the services of the toilet facility, all tea farms needed to improve on the access by reducing the ratio of a toilet to the number of users, i.e., one toilet per household.

Firewood is heavily relied on as the main source of cooking energy in most poor households in developing countries. Although firewood is a renewable source of energy the low technological approach used by poor households, i.e., an open fire, makes it unsustainable. Therefore, the use of firewood is not only posing a threat to the existing forests where eucalyptus is not used, but is also a potential danger to the health of users, mostly women and children. In their words, Masera, Díaz, & Berrueta (2005, p. 26) explain:

> "The current dominant pattern of household fuelwood use presents several problems. People depend mostly on open fires, leading to very high indoor air pollution (IAP) levels, particularly for women and children."

This problem is caused because smoke from the incomplete burnt wood fuel contains air pollutants that can cause respiratory infections, low birth weight, chronic obstructive pulmonary disease, cancer and eye infections. Some of the key biomass fuel pollutants with adverse health impacts are: sulphur dioxide, nitrogen oxides, carbon monoxide and volatile organic compounds (Anozie, Bakare, Sonibare, & Oyebisi, 2007). It is common for people to shift from the use of firewood to other sources of energy such as kerosene and electricity as they experience improved income (Hosier & Kipondya, 1993). All the tea farm employees relied on firewood, probably because of its cheap availability as the tea farms also depended on wood fuel to process tea, and hence enhanced its production through the blue gum plantations.

While it is not clear whether the employees relied on firewood because of its cheap availability or because of their low income, it is a fact that the source of energy had some adverse impacts on their health. Masera et al. (2005) discovered that higher incomes do not necessarily result immediately in change in main energy source, i.e., from firewood to kerosene, because the kitchen has a low priority within the family. Other authors, for example Hosier & Kipondya (1993); Masera, Saatkamp, & Kammen (2000) have also expressed different opinions that with increasing affluence, a progression is expected from traditional biomass fuels to more advanced and cleaner energy sources such as kerosene, solar and electricity. The adverse impact of firewood was experienced by the researcher during one of the interviews held in a smoke filled single-roomed house. In this house, there was a baby in a bed also exposed to the smoky conditions.

Access to social opportunities such as education, safe drinking water, adequate sanitary facilities, clean energy and health services play an important role in promoting the well-being of any society. Education for example, is a key tool for achieving sustainable development. It has been described as the greatest resource to achieve a just and ecologically rich society, and for that reason, a series of major international reports have emphasised the critical role education can play in the search for sustainable living (Tilbury, Stevenson, Fien, & Schreuder, 2002). With this understanding, it is not surprising that access to education (the achievement of universal primary education) became one of the eight Millennium Development Goals (http://www.un.org/millenniumgoals/education.shtml, accessed on 21st August 2010). In both certified and non-certified tea farms, employees' children had access to primary education and

all tea farms either owned or offered support to schools. A policy against child labour provided further opportunities for employees' children of school age to go to school. Without a strictly enforced policy against child labour, it is possible that employees could involve their children in tea picking. Such an interest was reported on a non-certified tea farm, although the incidences were limited to during the school holidays.

Education level is important because it can influence the level of income an employee receives. Highly educated individuals can secure better paying jobs than those with low education levels. Moreover, promotion at work is mostly based on work experience and education level. In both groups of tea farms, most employees had primary education, perhaps helping to explain the low monthly salary package, which slightly surpassed the minimum established by the Kenyan government on the certified farms but was slightly below on the non-certified farms. Although the amount of pay can be considered very low in both cases, the RFC certified farms reportedly had significantly higher pay levels.

Given the importance of education as explained, the employees' children needed to pursue higher education levels beyond primary school in order to better their future lives. Although they had access to primary education, it was not clear what happened after completing this. Only one certified tea farm offered scholarships to some of the academically capable students (35 students including those from the neighbouring communities on an annual basis) to pursue secondary education. Three sets of parents (two from non-certified farms and one from a certified farm) expressed concern over their inability to pay secondary school fees for their children. With a low level of education, it is difficult for the employees' children to compete in the future job market. This raises questions over the sustainability of the employees' children's future livelihoods.

Among other aspects, sustainable development emphasises the quality of human life. Some of the qualities of a sustainable farm include a well functioning ecosystem and secure employees who can access basic needs. Working conditions on the tea farms have been jeopardised by low world market prices and high production costs, which have led to casualisation of labour, and inadequate health and safety conditions (Export Processing Zones Authority, 2005). This research established that certified tea farm employees had better work conditions than their colleagues on non-certified farms e.g., most received a higher monthly salary.

The differences in the monthly salary between certified and non-certified farms could be directly attributed to the certification status because in both groups of farms, employees shared similar characteristics. These included education level, of which most employees had

primary education only. Furthermore, most of the employees were within the same job group, mainly serving as tea pickers. It is common to offer the same amount of pay to employees delivering similar services and in the same job group. The RFC standard demands that workers are paid at least a minimum wage or more, as established by the government according to the type of activity carried out. While Kenyan laws do not specify the amount of money that should be paid to tea farm employees, they require that the lowest paid person should receive a monthly salary of Kenya shillings (Ksh.) 5,400.00 (NZ $ 100). Therefore, the study findings suggest that the non-certified tea farm employees were underpaid as most of them (80%) were earning a monthly salary of Ksh. 3000-5000 (NZ $ 55.60-92.60).

In both certified and non-certified tea farms, employees had freedom to join the workers' union, in which case we should expect to see it playing its role and ensuring similar working conditions on all tea farms. This role of the workers' union was observed by Gonzalez-Perez & McDonough (2006, p. 15):

> "Trade unions are the best way for workers to win their rights and to be sure that their rights are enforced and monitored because the trade unionists are in the plantations everyday."

However, that was not the case, suggesting that the RFC has achieved some important benefits for the certified farm employees. Besides, the fact that the non-certified farm employees earned lower amounts than the minimum wage stipulated by the labour laws of Kenya meant that the workers' union was ineffective. It failed to bargain on behalf of the non-certified tea farm employees even when it could receive strong legal backing.

The ineffectiveness of the workers' union was also demonstrated by the significant differences in the occupational health and safety measures between the certified and non-certified farms. Many workers' unions have championed safety policies, practices, and procedures that protect their members (Sinclair et al., 2010). However, in the case of the non-certified tea farms, the situation was different as most employees did not have personal protective equipment (PPE). The use of the PPE is important to minimise injuries, meaning that most of the non-certified farm employees were vulnerable to occupational health risks. In addition, safety training has been promoted to enhance workers' safety (Sinclair et al., 2010), yet only 36% of the non-certified tea farms' employees had been trained. In this respect, the RFC achieved a remarkable benefit for the certified farm employees because all were trained in safety issues.

Lower asset holdings including productive assets such as land, savings, and forms of capital make people susceptible to shocks (Devereux, 2001). Land ownership in particular is important to ensure continued livelihoods of the tea farm employees even after retirement. It can also diversify the employees' income sources and hence improve their livelihoods (Bebbington, 1999). In a study to generate information needed by decision makers to assess the needs and opportunities for public investments, and design policies that stimulate natural resource conservation, Jansen, Pender, Damon, Wielemaker, & Schipper (2006) concluded that widening access to land is one means to increase per capita income. This research finding established that more employees on the non-certified tea farms owned a piece of land than those on the certified farms. This suggests that more of the non-certified tea farm employees were seeking to diversify their livelihoods' sources. Perhaps the uncertainty, which most likely emanated from the temporary employment terms and low monthly income levels, prompted the non-certified farm employees to seek means of sustaining their future lives. This finding suggests that the tea farm employees, especially of the non-certified farms could have engaged in other income generating activities. In this research, the employees' income was limited to that earned from the tea farm's activities.

Information and communication technologies are powerful tools for empowerment in developing countries (Kenny, 2002). Transportation means such as a car or a bicycle, and means of communication are necessary to improve people's livelihoods. Ellis & Mdoe (2003) discovered that in Tanzania, which is also a developing country neighbouring Kenya, the poor possess little or no land, have little or no formal education, and do not possess bicycles. The tea farms' employees had access to communications means, mainly a mobile phone and a radio. A radio is by far the cheapest electronic communications technology (Kenny, 2002) and hence owned by most employees. Very few tea farms' employees reported owning a bicycle (6.5% in certified and 20% in non-certified farms), and none owned a car. This could imply that the tea farm employees had limited means of mobility, and therefore could not respond promptly to emergency situations. However, the tea farms' nature of a closed community with most of the services provided, as reported by one of the certified farm managers, could have contributed to the low number of people who owned bicycles. The fact that more employees of the non-certified farms reported owning a bicycle than the certified farm employees provides further evidence that they (non-certified farm employees) were seeking to diversify their livelihood sources. A bicycle as a means of transport can be used to transport goods for trade, or passengers, and can also ferry an individual from one work place to another. Interviews with the tea farm managers revealed that one of their aims was to provide all the market services because the tea farms are like closed communities, distant from the main

shopping centres. The monthly income levels implied that ownership of a car was beyond the employees' reach.

6.4 Economic performance

> "In commercial economies, farms which are unable to generate sufficient profits, because of low farm product prices, reduced yield, higher cost of production, or whatever reason, are not self-sustaining" (Yunlong & Smit, 1994, p. 304).

Adoption of sustainability standards and implementation of the required changes can lead to some loss of income for farmers (Webster, 1997). However, in the long term, farmers who operate sustainably have higher chances of surviving in the market than those with short term goals (Berry & Rondinelli, 1998). Certification costs have been viewed as additional costs and hence expensive to undertake. The certification cost was mentioned by the non-certified farm manager as the main reason they did not seek certification. The certified farm managers too mentioned high cost as the reason they had not conformed to all of the RFC standards. Some of the areas of non-compliance were building adequate houses for employees and instituting an effective system to manage wastewater. The RFC also increased production costs in the sense that it requires employees to be paid either the minimum wage as legally stipulated by the government, or more. Arguably, the certification cost can be recovered from the increased financial gain associated with certification. Unfortunately, the farms' managers declined to provide data on the farms' financial performances.

One of the benefits of the RFC is enhanced access to the global market as reported by all certified farm managers.

> "Private regulatory systems are often characterised as being "market-driven," meaning that participation is promoted via higher prices, market access, and positive publicity rather than legal requirements" (Raynolds et al., 2006, p. 157).

Therefore, it is not surprising that all certified farm managers mentioned market access as one of the reasons for adopting the RFC. This finding is not unique to this research as many authors (e.g., Berry & Rondinelli, 1998; Gómez Tovar et al., 2005) have arrived at the same conclusion. In a study to establish whether corporate environmental standards create or destroy market value, Dowell, Hart, & Yeung (2000) realised that firms adopting a single stringent global environmental standard have much higher market values. Sustainability standards can earn organisations a good reputation in the global markets. There is also growing evidence that organisations that adopt proactive environmental management

strategies become more efficient and competitive (Berry & Rondinelli, 1998). Increased access to the market by the certified farms enabled them to further purchase tea leaves from the local farmers, which was both a positive and a negative undertaking. On the one hand, it was positive in the sense that the local community members had relatively easy access to the market. On the other hand, it was possible that the tea leaves from the non-certified farms could be mixed with those from the certified farms and be presented to the global market as certified tea. In such a case, the purpose of the RFC can be defeated. Nevertheless, market availability contributes to the sustainability of a business and as such makes the RFC beneficial to the tea companies.

Soil conservation can help improve a farm's yield under favourable climatic conditions. Soil erosion can cause a decline in agricultural productivity which in turn impacts adversely on the farmer's income (Jansen et al., 2006). Although productivity data from the non-certified farms were missing, that of the certified farms did not indicate any significant improvement since certification in 2007. The variations in productivity in different years were explained by the certified farm managers as a result of climate variability. From this research, it cannot be conclusively stated that the RFC did or did not improve the tea farms' productivity. This is because it has only been three years since the tea farms undertook certification. Some of the changes such as improvement in productivity may require a longer period to demonstrate. Despite this uncertainty, it was obvious that both certified and non-certified farms used artificial fertilisers in addition to other non-chemical soil conservation technologies. The RFC programme does not prohibit the use of chemical fertilisers, but seeks to moderate their impacts by imposing a ban on the ones perceived as harmful to the environment. Perhaps the challenge is how to ensure that the banned chemicals are not used on the certified farms and that those that are permitted are used safely and without causing significant damage to the environment.

The certified farm management teams seemed to place emphasis on minimal accountability in order to achieve certification status. After achieving certification status, it is possible that most organisations can easily settle on maintaining the status quo, while others even deteriorate. In addition, some of the certifying bodies do not require organisations to meet 100% of the certification conditions/standards. For example, the RFC has set specific critical conditions that the farms must meet before being certified. In order to obtain and maintain certification, the farms must comply with at least 50% of each principle's criteria, and with 80% of all criteria (Sustainable Agriculture Network, 2008). Therefore, certification status does not necessarily mean compliance with all of the standard requirements. This explains the

non-achievements reported by the certified farm managers, i.e., a garage in farm C that needed to be relocated, ineffective wastewater management systems and inadequate housing for the employees.

The government's support for efforts aimed at achieving sustainability standards is a key (Font & Harris, 2004; Raynolds et al., 2006). The government officials' lack of awareness about the existence of certified tea farms indicated non-commitment by the government in supporting voluntary sustainability standards. Therefore, there is a need for the government to address public-good issues using one or more mechanisms, including regulatory approaches, market-based mechanisms, self regulation, and the provision of information and education (Seymour & Ridley, 2005). Further, success of an EMS requires not only support from the government but also from a variety of stakeholders such as environmental non-government organisations, industry associations and large corporations (Tee et al., 2007). The second largest tourism sustainability initiative programme, the Certificate for Sustainable Tourism (CST), was developed in 1997 as a not-for-profit, government-funded Costa Rican programme to raise the image of the country as a tourism destination by certifying sustainable accommodation (Font & Harris, 2004). Some of the roles to be played by the government include provision of an enabling environment that encourages industries and businesses to adopt EMS and other similar arrangements where appropriate.

In the following sections, the ability of the RFC to foster sustainable agriculture in the Kenyan tea farms is further explored by discussing some of its standards and possible implications.

6.5 The RFC programme and sustainability

In this research, sustainability has been examined against the RFC criteria and sustainable livelihoods approach. In an attempt to understand sustainability and sustainable development, a number of interpretations have arisen. One such interpretation is given by Robinson (2004), in which sustainability focuses on questions related to values and fundamental changes in individual attitudes towards nature. It means transformational change of products, processes, work and living places, consumption mode and how our activities impact on the world around us (Pratt & Pratt, 2010). Sustainability goes beyond protecting the environment and also encompasses social, economic and cultural change and hence examines our world as a whole system (Hitchcock & Willard, 2006). There is no standard definition for sustainability, therefore various authors have attempted to describe what sustainability is all about. For

example, Robèrt, Daly, Hawken, & Holmberg (1997, pp. 85-86) identify four system conditions to help define a sustainable society as follows:

1. Substances from the lithosphere must not systematically increase in the ecosphere. The condition means that in a sustainable society, fossil fuels, metals and other minerals must not be extracted and dispersed at a faster pace than their slow redeposit and reintegration into the Earth's crust.

2. Substances produced by society must not systematically increase in the ecosphere. This requires that substances must not be produced and dispersed at a faster pace than they can be broken down and integrated into the cycles of nature or be deposited into the Earth's crust.

3. The physical basis for the productivity and diversity of Nature must not be systematically deteriorated. In other words, we cannot harvest or manipulate the ecosystem in such a way that productive capacity and diversity systematically deteriorate.

4. Fair and efficient use of resources with respect to meeting human needs. This condition requires that the basic human needs must be met with the most resource-efficient methods possible, and their satisfaction must take precedence over luxury consumption.

Sustainability is like a goal which is about protecting our options, i.e., adjusting our economic and community development practices to levels necessary to ensure that the stocks and flows of nature can naturally regenerate themselves over time (Doppelt, 2010). Since sustainability can be seen as a goal, the term "sustainable development" has been used to describe means for protecting our options (Doppelt, 2010). The term "sustainable development" was first coined by the Brundtland Commission (WCED, 1987 as cited in Atkinson, 2000, p. 236) as:

> "Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs."

The definition, according to Robinson (2004), takes a more pragmatic and collective approach, which is aimed at achieving efficiency gains and improvements in technology. The Brundtland Commission described some key objectives for sustainable development as:

> "…reviving economic growth, but in a new form (less material – and energy-intensive); meeting essential needs for jobs, food, water, energy, and sanitation while

conserving and enhancing the natural resource base; and merging ecological and economic considerations in decision-making" (Doppelt, 2010, p. 59).

The focus of this research is not to delve into what constitutes sustainability, but to evaluate whether there are sustainability aspects, or if the certified tea farms conduct their activities towards a sustainability shift. In order to better understand this, it is worth pointing at sustainability issues in agriculture. Schaller (1993) and Aldy et al. (1998) report some of the problems associated with agriculture as: contamination of ground and surface water from agricultural chemicals and sediments; hazards to human and animal health from pesticides and feed additives; adverse effects of agricultural chemicals on food safety and quality; loss of genetic diversity in plants and animals; destruction of wildlife including bees and beneficial insects by pesticides; growing pest resistance to pesticides; reduced soil productivity due to soil erosion; over-reliance on non-renewable resources, and health and safety risks incurred by farm workers. The listed sustainability issues can be conveniently categorised into three components: environmental, social and economic (i.e., the TBL classification, also used in this research).

The three sustainability components have been described by Tischner et al. (2010, p. 16) as stated:

> "***Environmental***: Land use, emissions, pesticides and artificial fertilisers, hormones and antibiotics, energy use and CO2 and methane emissions, diversity and genetically modified organism (GMO) issues, animal welfare.
>
> ***Social***: Food security, health and food production and consumption, quality of life, skills and knowledge of citizens, protection of local culture and wisdom, fair trade and fair wages and labour conditions.
>
> ***Economic***: feasibility of agricultural and production systems, subsidies and production quotas, profit and power distribution in the food chain, efficiency and quality, value for money."

Consequently, the popular definition of sustainable agriculture understood as environmentally sound, productive, economically viable, and socially desirable is adopted. The definition implies that a sustainable agriculture system should not contribute to environmental deterioration but promote resource conservation, cultural diversity and satisfaction of basic needs (Schaller, 1993). Concerns for environmental resource conservation, meeting basic human needs and enabling continuity are common in all the three

related terms, i.e., sustainability, sustainable development and sustainable agriculture. This implies that in order to have sustainable tea production, the natural resources in the tea farms should be conserved, basic needs of the employees must be met and the financial gains should be sufficient to support the farms' operations. In other words, sustainable agriculture is a way of producing or raising food that is healthy for consumers, does not harm the environment, is humane to workers, respects animal welfare, provides fair wages to farmers and supports and enhances neighbouring communities (Tischner et al., 2010). It is against this background that the ability of the RFC programme to address sustainability issues in the tea farms is evaluated under the three sustainability components (environmental, social and economic). Further, the extent to which the certified farms addressed sustainability issues is evaluated against the research findings. The evaluation does not claim to exhaust all the facets of sustainable agriculture but points to the specific areas, which were investigated. Some of the provisions of the RFC standards are outlined and the tea farms' performance against the standards discussed. For more details of the RFC standards see Appendix A.

6.5.1 Environment and ecological systems

The Sustainable Agriculture Standard of the RFC programme, version February 2008, outlines 14 critical criteria to be met by the certified farms. Three relevant criteria are next considered. First, criterion 2.1 states:

> "All existing natural ecosystems, both aquatic and terrestrial, must be identified, protected, conserved and restored through a conservation program. The programme must include the restoration of natural ecosystems or the reforestation of areas within the farm that are unsuitable for agriculture. The programme must include the establishment and maintenance of shade trees for those crops traditionally grown with shade, in areas where the agricultural, climatic and ecological conditions permit" (Sustainable Network, 2008, p. 8).

Based on this criterion, the certified farms had maintained riparian strips to protect forests and natural water sources. However, the extent to which water was conserved was not clear and required further investigation. The WRMA's officer reported that the tea farms, including certified ones, abstracted excessive water and also planted blue gum which draws more water compared to the native species. Photos 6 and 7 show a main water source (stream) and diverted water. However, the claim that the blue gum draws more water requires further investigation.

Photo 6 **A stream from which water is diverted**

Photo 7 **Diverted water from a stream**

Second, criterion 3.3 of the RFC standards states:

> "Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm…" (Sustainable Network, 2008, p. 8).

All the certified farms prohibited hunting and had signs erected around the forests to communicate the prohibition. This research did not establish how effective the prohibition and the sign posts were but identified a concern with the wild animals. Both the Kenya Wildlife Service official and a certified farm manager reported occasional conflict between the wild animals and tea farm residents. Wild animals such as monkeys, elephants and wild dogs caused disturbance and anxiety among the tea farm residents. In the process of chasing away wild animals from the residential areas, some of them are killed. This begs for a new approach to enable coexistence between tea farm residents and wild animals.

Third, and finally, criterion 4.5 states:

> "The farm must not discharge or deposit industrial or domestic wastewater into natural water bodies without demonstrating that the discharged water complies with the relative respective legal requirements, and that wastewater's physical and biochemical characteristics do not degrade the receiving water body…" (Sustainable Network, 2008, p. 9)

The certified tea farms reported treating their effluent and also monitoring river and stream water quality on a monthly basis. Although the credibility of such water quality tests was

contested by the District Environment Officer, the existence of a monitoring system can help identify threats of water pollution and attract a remediation action.

Among other provisions, the Sustainable Agriculture Standard (Sustainable Network, 2008, p. 37) states that:

> "To minimise the excessive application and waste of agrochemicals, certified farms have the procedures and equipment for mixing these products and for maintaining and calibrating application equipment. Certified farms do not use products that are not registered for use in their country, nor do they use transgenic organisms or other products prohibited by different entities or national and international agreements."

The certified farms used both non-chemical and chemical inputs to manage soil fertility and insectivorous pests in their farms. Although the RFC standard requires a controlled use of the chemical inputs, they still pose a challenge. One of the farm managers reported that they use aerial spray methods so as not to involve more of their employees in the handling of the chemical inputs. Aerial spray as opposed to targeted application of fertilisers and other pesticides can lead to non-intended pollution and contamination.

The RFC standards, as observed by Raynolds et al., (2006), cover a broader base of the natural resource conservation strategies but are less effective. This is because most of the standards are less precisely defined. For example, section 9.3 of the Sustainable Agriculture Standard states:

> "The farm must use and expand its use of vegetative ground cover to reduce erosion and improve soil fertility, structure and organic material content, as well as minimise the use of herbicides…" (Sustainable Network, 2008, p. 39).

Merely minimising the use of herbicides does not set a clear target for farmers, hence reducing chances that a certified farm will stop polluting water sources through contaminated run-off.

6.5.2 Social conditions

The social conditions of the tea farms were evaluated based on the relevant components of the Sustainable Livelihoods Framework (SLF). Many authors have recognised the complexity in the definition of sustainable livelihoods, e.g., Scoones (1998, p. 7) who stated that:

> "The concept of sustainable livelihoods is a composite of many ideas and interests, the coming together of a number of different strands in the development debate."

Therefore, sustainable livelihoods are considered a subtle and complex issue, and arguably one that cannot be meaningful if quantified beyond fairly basic statistics of employment and income, or surveys of people's perceptions (Font & Harris, 2004). In this research, the understanding of sustainable livelihoods conforms to the definition provided by Singh & Gilman (1999, p. 540):

> "An approach to maintain or enhance resource productivity, secure ownership of and access to assets, resources and income-earning activities as well as to ensure adequate stocks and flows of food and cash to meet basic needs."

The SLF identifies five groups of assets upon which livelihoods are built. These groups of assets are commonly referred to as capital and consist of the following: human capital, social capital, physical capital, financial capital and natural capital. DFID (1999) explains that although the term "capital" is common in the literature, not all assets qualify as capital stocks in the strict economic sense where capital is the product of investment which yields a flow of benefits over time. Perhaps the best analogy for the five capitals is to view them as livelihood building blocks. Under the five capitals, specific attributes are identified, for example, human capital consists of access to education, health care services and skills. In this evaluation, the natural and financial capitals are excluded because they are discussed under environmental and economic performance. Table 6.1 shows an evaluation of the RFC standards and certified farms against the selected three capitals identified in the sustainable livelihoods framework.

Table 6.1 Evaluation of the RFC standards and overall certified farm performance against the capitals identified in the sustainable livelihoods framework

Capital	Capital attributes	RFC standards	Certified farms (Indicator code)
Human	Access to education	✓✓	✓✓ (SO 14 & 15)
	Access to health care services	✓✓✓	✓✓ (SO 7)
	Employees training (skills)	✓✓✓	✓✓✓ (SO 1)
Social	Membership of a workers' union	✓✓✓	✓✓ (SO 23)
	Informal safety nets	✓✓✓	✓✓ (SO 16)
Physical	Affordable transport	**NP**	✓ (SO 21 & 22)
	Secure shelter and buildings	✓✓✓	✓ (SO 3, 4 & 5)
	Adequate water supply and sanitation	✓✓✓	✓✓ (SO 9, 10 & 11)
	Clean and affordable energy	**NP**	✓ (SO 12 & 13)
	Access to information	**NP**	✓✓ (SO 18, 19 & 20)

Key: **NP = No provision/access** **✓ = Low provision/access**

✓✓ = Moderate provision/access **✓✓✓ = High provision/access**

The RFC standards require that tea farms provide opportunities for the employees' children to go to school, provision of health care services and workers' safety. For example, section 6.2 states:

> "The farm must have a permanent and continuous training programme to educate workers on how to carry out their work safely, especially regarding the handling of machinery and agricultural equipment. Workers must be familiar with the training requirements for their job, and must be trained before starting work on the farm…" (Sustainable Network, 2008, p. 30).

All the certified tea farms provided support for schools and had written policies against child labour to enable children go to school. However, the tea farm employees' children were assured of primary school education but not secondary. Only one certified tea farm offered scholarships to the capable students. All the certified tea farm employees were trained on

work safety and natural resource conservation. In addition, a majority of the employees were provided with personal protective equipment.

Physical capital consists of the basic infrastructure and producer goods needed to support livelihoods. The DFID (1999, p. 2.3.4) identify components of infrastructure essential for livelihoods as: "affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean and affordable energy, and access to information (communications)." The RFC standards require that the employees be provided with adequate housing, safe water and sanitary facility. Affordable transport, clean and affordable energy, and access to information are not among the standards' requirements. The tea farm employees had access to safe water but the housing conditions were poor. They also relied on firewood as the main source of cooking energy, which is unclean given the low technology (open fire). A majority of the employees owned a radio and a mobile phone and hence had access to information.

6.5.3 Economic performance

There was inadequate data to help effectively analyse the economic performance of the certified tea farms. However, all certified tea farm managers reported that the RFC enhanced the marketability of their tea. The farms' productivity did not indicate any improvement since certification was undertaken. However, only three years had elapsed from the certification period and productivity may require a long period, i.e., at least five years to change. The farms' financial records were not accessed to help determine returns on investment levels. The RFC standards require that the employees be paid at least a minimum salary established by the government according to the type of activity carried out. Most of the respondents from the certified farms reported earning more than the minimum wage but 29% reported otherwise.

Although the evaluation indicates some important benefits from the RFC certification programme, the identified gaps e.g., 29% of the employees earning less than the minimum wage, suggest that sustainability is yet to be achieved. Since some of the gaps are due to non-conformance by the tea farms, the following section further investigates whether the RFC standards are promoting strong or weak sustainability.

6.6 The RFC standards: Do they promote strong or weak sustainability?

From the previous sections, sustainability has been described as encompassing maintenance of natural capital and processes, provision of human basic needs and sustenance of the necessary economic gains to support farm operations. Sustainable development is that which

does not decrease the capacity to provide non-declining per capita utility (human wellbeing) for infinity (Neumayer, 2003). In the following sections, weak and strong sustainability are introduced followed by an evaluation of the RFC standards against their principles.

6.6.1 Weak sustainability

Depending on how one views the concept of maintenance or non-declining capital, sustainability can be grouped into two classes: weak and strong (Hueting & Reijnders, 1998). The weak sustainability concept was developed from the neoclassical theory of economic growth when the theory was upgraded to account for non-renewable natural resources as a factor of production (Dietz & Neumayer, 2006; Hediger, 1999). Proponents of weak sustainability advance the argument that natural capital is either abundant or substitutable, both as an input into the production of consumption goods and as a provider of direct utility (Neumayer, 2003). This feature makes the weak sustainability concept limited in the context of market exchange at a particular point in time (Gowdy & O'Hara, 1997); hence it is an "econocentric" concept.

6.6.2 Strong sustainability

The strong sustainability concept is based on an assumption that natural capital provides functions that cannot be substituted by man-made capital (Gutés, 1996). Consequently, strong sustainability requires preservation of the value of natural capital. That is, the extraction of non-renewable resources must be compensated for by an investment in substitute renewable resources of equivalent value (Dietz & Neumayer, 2006). For example, fossil fuel can be replaced with wind farms to generate electricity. Strong sustainability requires preservation of a subset of total natural capital (critical natural capital) in physical terms in order to maintain its functions. This subset of total natural capital is meant to suit future generations and should not be less than the stock enjoyed by the present generation (Gutés, 1996).

Strong sustainability identifies four functions of natural capital, three of which can be substituted and one that cannot. Dietz & Neumayer (2006) outline the four functions of natural capital as:

1. Provision of raw materials for production and direct consumption, i.e., food and timber.
2. Assimilation of wastes.
3. Provision of amenity services e.g., visual amenity of landscape.

4. Provision of the basic life-support functions on which human life, including the first three functions above depend on.

Therefore, the fourth function is a direct determinant of human welfare and cannot be substituted.

6.6.3 Qualitative evaluation of the RFC standards against weak and strong sustainability principles

A detailed study based on scientific measurements is required to effectively determine the extent to which the RFC standards can help in achieving sustainability. In this research, a qualitative evaluation of the RFC standards based on the main principles of weak and strong sustainability is undertaken. In order to evaluate the RFC standards against the weak sustainability model, the focus is on whether the standards allow for substitutability of natural resources, and if so, the value of the substitutes compared to the substituted resource. Establishing values of the extracted natural resources and those of the replacements requires quantitative investigations as opposed to a mere qualitative description. On the other hand, strong sustainability advocates for the protection of the physical integrity of the critical natural capital. Therefore, the key question is whether the RFC standards provide for the protection of the critical natural capital in order to maintain functions of the ecosystems. The challenge here is how to determine the size of the critical natural capital.

The RFC programme is broad in scope in the sense that it covers all three pillars of sustainability, i.e., environmental, social and economic. It seeks to improve the living conditions of farmers as well as to uphold the ecosystem's integrity. In this evaluation, only the environment and ecological system component is included as both weak and strong sustainability concepts consider basic human needs (social conditions) as a minimum sustainability requirement (Hediger, 1999). As earlier stated, the RFC standards outline 14 critical criteria which require farms to comply with before certification. These critical criteria are used in this qualitative evaluation as they can be translated as the minimum basic requirements for certification. The Sustainable Agriculture Network (2008, p. 8) states in criterion 2.1:

> "All existing natural ecosystems, both aquatic and terrestrial, must be identified, protected, conserved and restored through a conservation programme. The programme must include the restoration of natural ecosystems or the reforestation of areas within the farm that are unsustainable for agriculture…"

The criterion advocates for identification, protection and conservation of all natural ecosystems within the farm. In this regard, the RFC standards are consistent with the principle of strong sustainability which requires that the critical natural capital be protected to maintain its function. This condition is not only limited within the farm boundaries but also extended outside the farm boundaries as some environmental problems are trans-boundary in nature. The Sustainable Agriculture Network (2008, p. 8) states in criterion 2.2:

> "The farm must maintain the integrity of aquatic or terrestrial ecosystem inside and outside of the farm, and must not permit their destruction or alteration as a result of management or production activities on the farm."

Therefore, criterion 2.2 defines the scale on which farm management teams must ensure natural resource protection and conservation. If strictly adhered to, the two criteria (2.1 and 2.2) are very important in maintaining ecological functioning of the natural ecosystems. However, the criteria, especially 2.2 are stated broadly and hence can make the implementation work difficult. For example, "The farm must maintain the integrity of aquatic or terrestrial ecosystem…" does not describe what maintaining integrity means. This can be interpreted differently by different farmers (and for that matter scientists), which can lessen its effectiveness.

In order to protect wild animals, Sustainable Agriculture Network (2008, p. 8) states in criterion 3.3:

> "Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm. Cultural or ethnic groups can hunt or collect fauna in a controlled manner and in areas designated for those purposes under the following conditions:
>
> a. The activities do not involve species in danger of or threatened with extinction.
>
> b. There are established laws that recognise the rights of these groups to hunt or collect wildlife.
>
> c. Hunting and collection activities do not have negative impacts on the ecological processes or functions important for agricultural and local ecosystem sustainability.
>
> d. The long-term viability of the species' populations is not affected.
>
> e. These activities are not for commercial purposes."

Again, the criterion (3.3) sets an ideal platform for ensuring natural regeneration of the wild animals' populations. In particular, conditions (a), (c), (d) and (e) are important to protect

wild animals from being over-hunted on farms. The strong sustainability concept does not prohibit use of natural resources entirely but seeks their rational use so as not to diminish their ecological benefits. Therefore, criterion 3.3 conforms to this principle by allowing hunting of animals and collection of fauna in a controlled manner under the four specified conditions.

For the protection of water bodies, the Sustainable Agriculture Network (2008, p. 9) states in criterion 4.5:

> "The farm must not discharge or deposit industrial or domestic wastewater into natural water bodies without demonstrating that the discharged water complies with the respective legal requirements, and that the wastewater's physical and biochemical characteristics do not degrade the receiving water body. If legal requirements do not exist, the discharged wastewater must comply with the following minimum parameters:

Water quality parameter	**Value**
Biochemical Oxygen Demand ($DBO_{5, 20}$)	Less than 50mg/L
Total suspended solids	Less than 50mg/L
pH	Between 6.0 – 9.0
Grease and oils	Less than 30mg/L
Faecal coliforms	Absent

> The mixing of wastewater with uncontaminated water for discharge into the environment is prohibited."

Criterion 4.5 is an example of a precisely worded standard and hence can be uniformly implemented across many farms. It is also consistent with the strong sustainability concept because it addresses the assimilative capacity of the water ecosystem. Water bodies are intended for further protection by criterion 4.7 (Sustainable Agriculture Network, 2008, p. 9):

> "The farm must not deposit into natural water bodies any organic or inorganic solids, such as domestic or industrial waste, rejected products, construction debris or rubble, soil and stones from excavations, rubbish from cleaning land, or other similar materials."

One area which poses a challenge to the RFC standards is use of chemicals. Although the standards attempt to address it by prohibiting some groups of products, it still remains an

unresolved issue. Perhaps, its effective redress will require zero or reduced usage of pesticides, adoption of integrated pest management (IPM), improved technologies, i.e., improved fertiliser efficiency; timing, placement and adoption of a global positioning system, and incorporation of legumes and catch crops to maintain soil stability and fertility (Wagner, 1998). The organic production system prohibits the use of artificial fertilisers because of their potentially adverse impacts. However, the RFC standards seek to moderate use of chemicals as stated by criterion 8.4 (Sustainable Agriculture Network, 2008, p. 9):

> "The following chemical or biological substances cannot be used on certified farms:
>
> a. Biological or organic substances that are not legally registered in the country for use on that particular crop.
>
> b. Agrochemicals that are not registered officially in the country for the specific crop.
>
> c. Agrochemicals that are prohibited by the United States Environmental Protection Agency (EPA) or by the European Union.
>
> d. Substances that have been identified in the Stockholm Convention on Persistent Organic Pollutants (POPs).
>
> e. Agrochemicals included in Annex III of the Rotterdam agreement that are prohibited or severely restricted by the United Nation Environmental Programme's Prior Informed Consent (PIC) programme.
>
> f. All pesticide Action Network Dirty Dozen products."

Although these are apparently elaborate and specific criteria to identify chemicals that cannot be used in certified farms, the vast nature of chemicals makes the approach inadequate. In addition, the critical criterion does not address procedures for applying chemicals so as to foster benign environmental conditions.

In order to maintain the critical natural capital, a key feature of strong sustainability, there is a need to minimise the rate at which man depletes natural resources. Economic progression should allow for a faster resource regeneration rate than the depletion rate. This is partly what has been identified as a change of lifestyle in pursuit of sustainability. The aim is to allow for normal functioning of natural systems. This concern is addressed by criterion 9.5 (Sustainable Agriculture Network, 2008, p. 11):

> "New production areas must only be located on land with the climatic, soil and topographic conditions suitable for intensity level of the agricultural production

planned. The establishment of new production areas must be based on land use capacity studies that demonstrate long-term production capacity. The cutting of natural forest cover or burning to prepare new production areas is not permitted."

The above evaluation of the RFC critical criteria indicates that the RFC standards generally promote strong sustainability. However, there can be challenges with the implementation process given less precision in the definition of some terms and also difficulty in monitoring e.g., use of chemicals. The difficulty of evaluating weak sustainability qualitatively is also apparent as it requires specific transactions, for example, the amount of resource harvested in a given time and the amount of replacement.

6.7 Chapter summary

From the research findings, the certified tea farms have more benefits for employees and also have a higher chance of conserving natural resources than the non-certified tea farms. This is consistent with the conclusions arrived at by Dowell et al. (2000). However, the RFC has yet to achieve sustainable agriculture at the farm level and sustainable livelihoods for the employees. The certified farm employees had better working conditions ranging from employment terms to income level. Also, there were similar conditions experienced in both certified and non-certified farms. Two such conditions, unfortunately undesirable, were poor housing and dependence on firewood, but with unclean technology as the main source of cooking energy. This poses health risks to the tea farm employees and hence jeopardises chances of achieving sustainable livelihoods.

The environmental resource conservation measures which were unique to the certified tea farms included bans on illegal hunting, maintenance of riparian strips and monitoring of water quality on a monthly basis. In addition, there were resource management strategies also practised on the non-certified farms but even more conspicuously on the certified farms. These included non-chemical soil conservation measures, for example, ploughing across the contours and use of oat grass. In both certified and non-certified farms, artificial fertilisers were used to maintain soil fertility, and wood fuel (which necessitated plantations of blue gum – a non-biodiversity species) depended on to process tea. These, among other factors limited the chances to achieve sustainable agriculture.

Qualitative evaluation of the RFC standards against weak and strong sustainability principles further indicates that the RFC standards promote strong sustainability. However, there is a need to define certain terms in order to allow ease of implementation.

Drawing from the results and discussion chapters, the following chapter draws conclusions from this research and also recommends possible ways of improving performance of the RFC programme.

Chapter 7
Conclusions and recommendations

7.1 Introduction

This chapter highlights the key findings of the research. It also proposes some possible ways of improving the performance of the RFC on the Kenyan tea farms. Based on the research methods and their identified limitations, and the existing dearth of knowledge with regard to the RFC, future studies are also recommended.

7.2 Conclusions

This research has assessed the performance of the RFC in Kenyan tea farms by comparing sustainability indicators between certified and non-certified farms. While it recognises the complex nature of sustainability, particularly in agriculture, the research concludes that there are important benefits from the certification programme. The benefits of the RFC established by this research were also identified by Gómez Tovar, Martin, Gómez Cruz, & Mutersbaugh (2005) as social and economic advantages especially among large producers. Raynolds, Murray & Heller (2006) observed that the RFC helps to attain acceptable social conditions in production, which is confirmed by the findings of this research. However, sustainability is yet to be achieved by the certified farms as they need to make changes in the way their business is conducted. For example, adopting advanced technologies to make use of wood fuel sustainable and also ensuring efficient application of fertilisers. The RFC enabled implementation of the natural resource management strategies such as establishment of the riparian strips, water quality monitoring, treatment of the effluents before discharge and bans on illegal logging and hunting. There were still challenges to be addressed including managing conflicts between wild animals and tea farm residents, and increasing the area of and maintenance of native tree species.

The needed changes were not only limited to the inadequate actions by the certified farm managers but also with the RFC governance structure. Practice of the RFC programme had the potential to limit its outcomes in some instances, for example, the non-requirement of disclosure to the public, auditing teams not being fully a responsibility of a third party, and difficulty in monitoring implementation. Similarly to ISO 14001, and as reported by Seymour & Ridley (2005), the RFC does not set requirements for environmental performance beyond

commitment, compliance, and continual improvement. Therefore, there is no guarantee that acceptable environmental performance is actually occurring.

In addition, achieving sustainability or not in the certified tea farms depended on their performance against the RFC standards, including the methods and competence of the certification programme. These in turn could only be achieved by incurring financial costs in making the necessary changes for compliance. Therefore, the high cost of implementing all the RFC requirements limited its performance. The qualitative evaluation of the critical criteria of the RFC indicates that the standards have the potential to promote strong sustainability. However, there is a need to re-define some of the criteria in order to make them operational.

The fact that this research was conducted only a short period (three years) after certification was undertaken could also mean that some of the certification benefits had not become obvious. In addition, the short period for data collection, i.e., three months, and the study methods adopted only allowed for indicative results. This is because the research questions were mainly based on the means of indicators and relied on self-reporting (interviews with the farm managers) and farm internal reports. Despite the stated weaknesses, this research is the first of its type and has made a key contribution to understanding the role of EMS in developing countries and some issues associated with their further development and implementation. To this end, the research has led to a number of recommendations.

7.3 Recommendations

Detailed studies on performance indicators such as water quality and quantity, soil fertility and vegetation cover are necessary to further catalogue the outcomes of the RFC. The Water Resource Management Authority (WRMA) officer reported that the certified tea farms were among the main abstractors of water. Therefore, it will be important to investigate further whether this water abstraction practice is sustainable or not. In addition, an investigation to substantiate the claims that the blue gum may be leading to excessive loss of water is needed.

Certification may not always be undertaken with the objective of improving natural resource management outcomes, but rather to sustain operations as preparations for anticipated changes in market access, government requirements or community demands and/or branding opportunities (Tee et al., 2007). Certification can only result in positive resource management outcomes if the managers perceive that the EMS will address pressures on the natural resources. Therefore, it is imperative for the tea farm management teams to undertake

certification with a vision beyond enhanced market access and toward achieving sustainability.

Raynolds et al. (2006) identify some of the factors influencing performance of sustainability initiatives. These include governance arrangements, which include the actors involved in creating and enforcing standards, and the specific standards which determine whether the sustainability initiative works to achieve minimal acceptable levels or allows for continual improvements. The RFC proponents may consider initiating means of promoting continual improvement and also make use of trained and qualified independent auditors. At present, individual member organisations are responsible for annual monitoring and certification using local auditors (Raynolds et al., 2006).

Using a combination of policy instruments to further promote RFC (or similar EMS) adoption may be more effective than a single instrument and most incentive approaches are backed by regulations that prevent or limit a particular activity (Seymour & Ridley, 2005). The government therefore, needs to improve on enforcing its regulations. Low standards and/or laxity in enforcing national legislation and regulations can offer less incentive to the certified farm managers to aim high, as their non-certified counterparts perform even more poorly.

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Appendix A
Summary of the Rainforest Alliance Certification programme standards

Since the establishment of the Sustainable Agriculture (SAN) organization, policy documents were developed to offer guidelines on sustainable farming practices. The latest one replacing all the previous ones is Sustainable Agriculture Standard Version February 2008. It supports implementation of the SAN's mission which is to promote efficient agriculture, biodiversity conservation and sustainable community development by creating social and environmental standards. The objective of the standard is to provide a measure of each farm's social and environmental performance and best management practices. The standard consists of ten principles as outlined in the previous section, and each principle is composed of various criteria. SAN's Sustainable Agriculture Standard version February 2008 contains 94 criteria.

The standard's scope covers the management of farms of all different sizes and includes aspects relating to agricultural, social, legal, labour and environmental issues, in addition to sections on community relations and occupational health and safety. The farm's compliance with the standard is evaluated by observation of agricultural and labour practices, existing infrastructure, plus interviews with farm workers and their representatives, the management or administration team; neighbours, local representatives and community members, as well as document review.

Sustainable Agriculture Standard Version February 2008 contains 14 critical criteria. A farm must completely comply with a critical criterion in order for the farm to be certified or maintain certification. Any farm not complying with a critical criterion cannot be certified, or certification is cancelled, even if all other certification requirements have been met.

Table 1 The 14 critical criteria of SAN's Sustainable Agriculture Standard version February 2008

Criterion	Contents
1.10	The farm must have a system for avoiding the mixing of certified products with non-certified products in its facilities and during harvesting, packaging and transportation. All transactions involving certified products must be recorded.

Criterion	Contents
	Products leaving the farm must be duly identified and accompanied with the relevant documentation indicating a certified farm as origin.
2.1	All existing natural ecosystems, both aquatic and terrestrial, must be identified, protected, conserved and restored through a conservation program. The program must include the restoration of natural ecosystems or the reforestation of areas within the farm that are unsuitable for agriculture. The program must include the establishment and maintenance of shade trees for those crops traditionally grown with shade, in areas where the agricultural, climatic and ecological conditions permit.
2.2	The farm must maintain the integrity of aquatic or terrestrial ecosystems inside and outside of the farm, and must not permit their destruction or alteration as a result of management or production activities on the farm.
3.3	Hunting, capturing, extracting and trafficking wild animals must be prohibited on the farm. Cultural or ethnic groups can hunt or collect fauna in a controlled manner and in areas designated for those purposes under the following conditions: a. The activities do not involve species in danger of or threatened with extinction. b. There are established laws that recognize the rights of these groups to hunt or collect wildlife. c. Hunting and collection activities do not have negative impacts on the ecological processes or functions important for agricultural and local ecosystem sustainability. d. The long-term viability of the species' populations is not affected. e. These activities are not for commercial purposes.
4.5	The farm must not discharge or deposit industrial or domestic wastewater into natural water bodies without demonstrating that the discharged water complies with the respective legal requirements, and that the wastewater's physical and biochemical characteristics do not degrade the receiving water body. If legal requirements do not exist, the discharged wastewater must comply with the

Criterion	Contents
	following minimum parameters: Biochemical Oxygen Demand (DBO5,20) _ Less than 50 mg/L Total suspended solides _ Less than 50 mg/L pH _ Between 6.0 – 9.0 Grease and oils _ Less than 30 mg/L Fecal coliforms _ Absent The mixing of wastewater with uncontaminated water for discharge into the environment is prohibited.
4.7	The farm must not deposit into natural water bodies any organic or inorganic solids, such as domestic or industrial waste, rejected products, construction debris or rubble, soil and stones from excavations, rubbish from cleaning land, or other similar materials.
5.2	The farm must not discriminate in its labor and hiring policies and procedures along the lines of race, color, gender, age, religion, social class, political tendencies, nationality, syndicate membership, sexual orientation, marital status or any other motive as indicated by applicable laws, ILO Conventions 100 and 111, and this standard. The farm must offer equal pay, training and promotion opportunities and benefits to all workers for the same type of work. The farm must not influence the political, religious, social or cultural convictions of workers.
5.5	Workers must receive pay in legal tender greater than or equal to the regional average or the legally established minimum wage, whichever is greater, according to their specific job. In cases where the salary is negotiated through collective bargaining or other pact, the worker must have access to a copy of this document during the hiring process. For production, quota or piecework, the established pay rate must allow workers to earn a minimum wage based on an eight-hour workday under average working conditions, or in cases where these conditions

Criterion	Contents
	cannot be met.
5.8	It is prohibited to directly or indirectly employ full- or part-time workers under the age of 15. In countries where the ILO Conventions have been ratified, the farm must adhere to that established in Convention 138, Recommendation 146 (minimum age). Farms contracting minors between the ages of 15 and 17 must keep a record of the following information for each minor: a. First and last name. b. Date of birth (day, month and year). c. First and last name of parents or legal guardian. d. Place of origin and permanent residence. e. Type of work carried out on the farm. f. Number of hours assigned and worked. g. Salary received. h. Written authorization for employment signed by parents or legal guardian. Workers between 15 and 17 years old must not work more than eight hours per day or more than 48 hours per week. Their work schedule must not interfere with educational opportunities. These workers must not be assigned activities that could put their health at risk, such as the handling and application of agrochemicals or activities that require strong physical exertion.
5.10	Any type of forced labour is prohibited, including working under the regimen of involuntary imprisonment, in agreement with ILO Conventions 29 and 105 and national laws. The farm does not withhold any part or all of workers' salaries, benefits or any rights acquired or stipulated by law, or any of the workers' documents, in order to force them to work or stay on the farm, or as a disciplinary action. The farm does not use extortion, debt, threats or sexual abuse or harassment, or any other physical or psychological measure to force workers to work or stay on the farm, or as a disciplinary measure.

Criterion	Contents
6.13	All workers that come into contact with agrochemicals, including those who clean or wash clothes or equipment that has been exposed to agrochemicals, must use personal protection equipment. The farm must provide this equipment in good condition, and must provide incentives to workers to use the equipment. The equipment must reduce contact with the agrochemicals and the possibility of acute or chronic poisoning, and must comply with the strictest of the following requirements: a) the requirements indicated on the products' Material Safety Data Sheet, b) any applicable laws; or c) the equipment indicated in Annex 2 of this standard.
8.4	The following chemical or biological substances cannot be used on certified farms: a. Biological or organic substances that are not legally registered in the country for use on that particular crop. b. Agrochemicals that are not registered officially in the country for the specific crop. c. Agrochemicals that are prohibited by the United States Environmental Protection Agency (EPA) or by the European Union. d. Substances that have been identified in the Stockholm Convention on Persistent Organic Pollutants (POPs). e. Agrochemicals included in Annex III of the Rotterdam agreement that are prohibited or severely restricted by the United Nation Environmental Program's Prior Informed Consent (PIC) program. f. All Pesticide Action Network Dirty Dozen products.
8.6	The farm must take steps to avoid introducing, cultivating or processing transgenic crops. When nearby transgenic materials are accidentally introduced into a certified farm's crop, the farm must develop and execute a plan to isolate the crops and provide follow-up in order to comply with the requirements of this criterion.
9.5	New production areas must only be located on land with the climatic, soil and

Criterion	Contents
	topographic conditions suitable for the intensity level of the agricultural production planned. The establishment of new production areas must be based on land use capacity studies that demonstrate long-term production capacity. The cutting of natural forest cover or burning to prepare new production areas is not permitted.

This is a set of policies and procedures managed by the farm administrators for planning and executing operations in a manner that fosters the implementation of the best management practices indicated in the standard. As a requirement, the objectives and a summary of the social and environmental management system and its programs must be available and divulged to workers. The farm must have the necessary processes for the follow up, measurement and analysis, including those of claims by workers or other persons or groups, to evaluate the functioning of the social and environmental management system and farm compliance with applicable laws and the standard.

The continual improvement program must contain necessary corrective actions to rectify non-compliance situations, as well as the mechanisms needed to determine if the actions are implemented and if they result in improvements or need to be adjusted to produce the desired results. The farm must not use the services of suppliers or contractors that do not comply with the social, labour and environmental requirements of this standard. It is also a requirement that the farm implements a training and education program in order to guarantee the effective execution of the social and environmental management system and its programs.

A.1 Ecosystem conservation

Carbon capture, crop pollination, pest control, biodiversity and soil and water conservation are just some of the services provided by natural ecosystems on farms. Certified farms protect these natural ecosystems and conduct activities to restore degraded ecosystems. Under ecosystem conservation cutting, extracting or harvesting trees, plants and other non-timber forest products is only allowed in instances when the farm implements a sustainable management plan that has been approved by the relevant authorities, and has all the permits required by law.

There must be a minimum separation of production areas from natural ecosystems where chemical products are not used. A vegetated protection zone must be established by planting

or by natural regeneration between different permanent or semi-permanent crop production areas or systems. Natural water channels must be protected by establishing protected zones on the banks of rivers, streams, creeks, lakes, wetlands and around the edges of other natural water bodies. Farms must not alter natural water channels to create new drainage or irrigation canals. Previously converted water channels must maintain their natural vegetative cover or, in its absence, this cover must be restored.

As part of the conservation program, the farm must establish and maintain vegetation zones between the crop and areas of human activity, as well as between production areas and on the edges of public or frequently travelled roads passing through or around the farm. These zones must consist of permanent native vegetation with trees, bushes or other types of plants, in order to promote biodiversity, minimize any negative visual impacts and reduce the drift of agrochemicals, dust and other substances coming from agricultural or processing activities. Farms in areas where the original natural vegetation is not forest must dedicate at least 30% of the farm area for conservation or recovery of the area's typical ecosystems.

A.2 Wildlife protection

Certified farms protect natural areas that contain food for wild animals or habitats for reproduction and raising offspring. It is a requirement that an inventory of wildlife and wildlife habitats found on the farm must be created and maintained. The farm takes special measures to protect threatened or endangered species.

A.3 Water conservation

Certified farms must conduct activities to conserve water and avoid wasting this resource. Farms must prevent contamination of surface and underground water by treating and monitoring wastewater. The farm must have a water conservation program that ensures the rational use of water resources. The program activities make use of the best available technology and resources. It must consider water re-circulation and reuse, maintenance of the water distribution network and the minimizing of water use. The farm must keep an inventory and indicate on a map the surface and underground water sources found on the property. The farm must record the annual water volume provided by these sources and the amount of water consumed by the farm.

A.4 Fair treatment and good working conditions for workers

All employees working on certified farms, and the families that live on these farms, benefit from the rights and conditions established in the United Nations' Universal Declaration of

Human Rights and Children Rights Convention, and in the International Labour Organization's (ILO) conventions and recommendations.

Farms pay salaries and benefits equal to or more than the legal minimum, and the workweek and working hours must not exceed the legal maximums or those established by the ILO. Workers may organize and associate freely, especially for negotiating working conditions. Certified farms do not discriminate and do not use forced labour or child labour; on the contrary, these farms work hard to offer employment opportunities and education to people in neighbouring communities. Housing provided by certified farms is in good condition, and has potable water, sanitary facilities and domestic waste collection. Families living on certified farms have access to medical services and the children have access to education.

A.5 Occupational Health and Safety

All certified farms must have an occupational health and safety program to reduce or prevent the risk of accidents in the workplace. All workers receive training on how to do their work safely, especially regarding the application of agrochemicals. Certified farms provide the necessary equipment to protect workers and guarantee that the tools, infrastructure, machinery and all equipment used on farms are in good condition and do not pose a danger to human health or the environment. Measures are taken on these farms to avoid the effects of agrochemicals on workers, neighbours and visitors. Certified farms identify potential emergencies and are prepared with plans and equipment to respond to any event or incident, as well as to minimize the possible impacts on workers and the environment.

A.6 Community relations

Certified farms are good neighbours. They relate in positive ways with neighbours, surrounding communities and local interest groups. The farms periodically inform the surrounding communities, neighbours and interest groups about their activities and plans, and they consult with interested parties about changes on farms that could have potential impacts on the social and environmental well-being of surrounding communities. Certified farms contribute to local economic development through training and employment and try to prevent negative impacts on the areas, activities or services that are important for local populations.

A.7 Integrated crop management

The SAN encourages the elimination of chemical products known internationally, regionally and nationally for their negative impacts on human health and natural resources. Certified

farms contribute to the elimination of these products through integrated crop management to reduce the risk of pest infestations. They also record the use of agrochemicals to register the amounts consumed, and work to reduce or eliminate these products, especially the most toxic ones. To minimize the excessive application and waste of agrochemicals, certified farms have the procedures and equipment for mixing these products and for maintaining and calibrating application equipment. Certified farms do not use transgenic organisms or other products prohibited by different entities or national and international agreements.

A.8 Soil management and conservation

One of the objectives of SAN is the long term improvement of the soils that support agricultural production. Certified farms carry out activities that prevent or control erosion, and thus reduce the loss of nutrients and the negative impacts on water bodies. The farms have fertilization programs based on the crop requirements and soil characteristics. The use of vegetative ground cover and crop rotation reduces dependency on agrochemicals for the control of pests and weeds. Certified farms only establish new production areas on land that is suitable for agriculture and the new crops, and never by cutting forests.

A.9 Integrated waste management

The farm must have an integrated waste management program for the waste products it generates. This must be based on the concepts of refusing or reducing the use of products that have actual or potential negative impacts on the environment or human health as well as reusing and recycling. As part of this program, the sources and types of waste must be identified and the quantity (weight or volume) must be estimated. The activities of the integrated waste management program must be in accordance with the types and quantities of waste generated. The use of open waste dumps and open-air burning of waste is not permitted.

Appendix B

Laws governing the tea production process in Kenya

B.1 Introduction

For a long period of time, Kenya's natural resources have been managed by various Acts of Parliament, resulting in a sectoral approach to natural resource management. This sectoral approach has been blamed for conflicts and inaction among the various sectors. For example, while a water source may be found in forest land, the two resources are managed using two different statutory Acts (Water Act Cap. 372, Water Act 2002 and Forests Act Cap. 385) of Parliament, which may have conflicting stands on the management of either of the two resources. In 2000, the Environmental Management and Coordination Act (1999) was assented to. The new Act (EMCA, 1999) was drafted in order to harmonise the sixty six pieces of Acts that governed the natural resources in Kenya. The Act was not meant to repeal the existing Acts but where there is a conflict, the EMCA 1999 prevails.

B.2 Environmental Management and Coordination Act, 1999

Part ii section 1 of the Environmental Management and Coordination Act (EMCA) 1999 entitles every person in Kenya to a clean and healthy environment. It further states that such persons have the duty to safeguard and enhance the environment. This implies that the tea farms have a duty to protect and preserve where appropriate the natural resources within their jurisdictions.

B.2.1 National Environmental Management Authority

Under part iii section 7(1) of the EMCA 1999, an authority known as the National Environmental Management Authority (NEMA) is established. Section 9(1) provides the object and purpose for which the Authority was established as: to exercise general supervision and coordination over all matters relating to the environment and to the principal instrument of Government in the implementation of all policies relating to the environment. Further, sections 9(2a, b, c, d and e) state that the Authority (NEMA) shall coordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya.

In particular, the authority shall take stock of the natural resources in Kenya and their utilisation and conservation, establish and review in consultation with the relevant lead agencies, land use guidelines, examine land use patterns to determine their impact on the quality and quantity of natural resources and carry out surveys which will assist in the proper management and conservation of the environment among others.

In order to execute the NEMA's objectives, Sections 29 and 30 of the EMCA 1999 establish and provide functions of the Provincial and District Environment Committees. Section 30 (a) states that the Provincial and District Environment Committees shall be responsible for the proper management of the environment within the province or district in respect of which they are appointed.

B.2.2 Conservation of the natural resources

Under part five section 42 of the EMCA 1999, protection and conservation of the environment are emphasised. Section 42(1) states that no persons shall, without prior written approval of the Director-General given after an environmental impact assessment, in relation to a river, lake or wetland in Kenya, carry out any of the activities outlined:

a) Erect, reconstruct, place, alter, extend, remove or demolish any structure or part of any structure in, or under a river, lake or wetland;

b) Excavate, drill, tunnel, or disturb the river, lake or wetland;

c) Introduce any animal whether alien or indigenous in a lake, river or wetland;

d) Introduce or plant any part of a plant specimen, whether alien or indigenous, dead or alive, in any river, lake or wetland;

e) Deposit any substance in a lake, river or wetland or in, on, or under its bed, if that substance would or is likely to have adverse environmental effects on the river, lake or wetland;

f) Direct or block any river, lake or wetland from its natural and normal course; or

g) Drain any lake, river or wetland.

B.2.3 Environmental Impact Assessment

Section 58 of the EMCA 1999 requires any person, being a proponent of a project, before financing, commencing, proceeding with, carrying out, executing or conducting or causing to be financed, commenced, proceeded with, carry out, executed or conducted by another person

any undertaking specified in the Second Schedule to the Act, submit a project report to the Authority, in the prescribed form, giving the prescribed information and which shall be accompanied by the prescribed fee. Further, section 58(2) states that the proponent of the project shall undertake or cause to be undertaken at his own expense an Environmental Impact Assessment (EIA) study and prepare a report thereof where the authority, being satisfied after studying the project report submitted under subsection (1) that the intended project may or is likely to have a significant impact on the environment, so directs.

B.2.4 Environmental Audit and Monitoring

Section 68 (1) of the EMCA 1999 holds the Authority (NEMA) responsible for carrying out an environmental audit (EA) of all activities that are likely to have significant effect on the environment. The owner of the premise or operator of a project for which an environmental impact assessment study report has been made is required to keep accurate records and make annual reports to the Authority describing how far the project conforms in operation with the statements made in the environmental impact assessment study report submitted under section 58(2).

The tea farms were established long before the commencement of the EMCA, 1999. Therefore, an EIA was not conducted at the time of their establishment but they presently comply with the requirement of an annual environmental audit (EA).

B.3 The Tea Act (Cap. 343)

This is an Act of Parliament to make provision for regulating and controlling the production, manufacture and export of tea, and for connected purposes. The Tea Act allows for the establishment of a board known as the Tea Board of Kenya under section 3(1). Section four of the Act bestows upon the Tea Board of Kenya the responsibility of promoting the tea industry in Kenya. The Board's responsibilities shall include the carrying on of such activities and the doing of such things as are necessary, advantageous, proper or for the benefit of tea growers and the tea industry. The Tea Board has specific responsibilities of licensing of tea factories, regulating, controlling and improving the cultivation and processing of tea, controlling pests and diseases, monitoring trade in tea through registration of any person dealing in tea under the Act, conducting investigations, research, and coordination of training in all matters relating to the tea industry.

B.4 The Forest Act, 2005

This Act of Parliament provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development of the country. According to section 2 of the Act, it applies to all forests and woodlands on state, local authority and private land. Section 4 allows for the establishment of the Kenya Forest Service. Some of the functions of the Kenya Forest Service as stipulated under section 5 of the Act include: to manage all state forests, manage all provisional forests in consultation with the forest owners, promote forestry education and training, provide forest extension services by assisting forest owners, farmers and Associations in the sustainable management of forests and to collaborate with other organisations and communities in the management and conservation of forests and for the utilisation of the biodiversity therein.

B.5 The Agriculture Act (Cap. 318)

This Act of Parliament promotes and maintains a stable agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry.

B.5.1 The preservation of the soil and its fertility

The Agriculture Act (Cap. 318) under section 48 makes it possible for the Minister when necessary or expedient so to do for the purpose of the conservation of the soil of, or the prevention of the adverse effects of soil erosion on any land,, with the concurrence of the Central Agricultural Board, to make rules for any or all of the matters listed: (a) prohibiting, regulating or controlling the breaking or clearing of land for the purposes of cultivation, grazing or watering of livestock, firing, clearing or destruction of vegetation including stubble; (b) requiring, regulating or controlling the afforestation or re-afforestation of land, the protection of slopes, catchment areas, the drainage of land, including the construction, maintenance or repair of artificial or natural drains, gullies, contour banks, terraces and diversion ditches; (c) requiring the uprooting or destruction, without payment of any compensation thereof, of any vegetation which has been planted in contravention of a land preservation order; (d) requiring the supervision of unoccupied land; (e) prohibiting, restricting or controlling the use of land for any agricultural purpose including the depasturing of stock.

B.5.2 The preservation, utilization and development of agricultural land

Section 184 of the Agriculture Act confers powers upon the Minister to make general rules i.e., for the preservation, utilization and development of agricultural land, either in Kenya generally or in any particular part thereof. Section 184(2) states that without prejudice to the generality of subsection (1), rules made thereunder may: (a) provide for requiring owners (whether or not also occupiers) to manage their land in accordance with rules of good estate management, (b) provide for requiring occupiers to farm their land in accordance with the rules of good husbandry, (c) provide for regulating, controlling or prohibiting the cultivation of land or the keeping of stock or any particular kind of stock thereon, (d) provide for regulating the kinds of crops which may be grown on land and (e) provide for controlling the erection of buildings and other works on agricultural land among others.

B.6 Water Act, 2002

This is an Act of Parliament meant to provide for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water; to provide for the regulation and management of water supply and sewerage services; to repeal the Water Act (Cap. 372) and certain provisions of the Local Government Act; and for related purposes.

The Act states in section 3 that every water resource is vested in the State, subject to any rights of user granted by or under the Act or any other written law.

B.6.1 Water Resources Management

Under section 7 of the Water Act, an authority known as "Water Resources Management Authority" is established. Some of the Authority's functions as given under section 8 of the Water Act include: to develop principles, guidelines and procedures for the allocation of water resources; monitor, and from time to time reassess, the national water resources management strategy; receive and determine applications for permits for water use; monitor and enforce conditions attached to permits for water use; manage and protect water catchments; regulate and protect water resources quality from adverse impacts and, in accordance with guidelines in the national water resources management strategy, to determine charges to be imposed for the use of water from any water resource among other responsibilities.

Section 25 of the Act allows for certain uses of the water resources but with a permit. Such uses include: drainage of any swamp or other land and discharge of a pollutant into any water

resource. Exceptions are provided under section 26 and they include: abstraction or use of water without the employment of works, from or in any water resource for domestic purposes by any person having lawful access thereto; for any development of ground water, where none of the works necessary for the development is situated; within one hundred metres of any body of surface (other than inclosed[1] spring water) or within a ground water conservation area. In section 31, charges for water use are introduced. It states that the conditions of a permit may require that, on issue of the permit and at prescribed intervals thereafter, the permit holder shall pay charges to the Authority for use of water in accordance with the permit.

B.7 Labour Institutions Act, 2007

This is an Act of Parliament to establish labour institutions, to provide for their functions, powers and duties and to provide for other matters connected thereto. Therefore, under section 5 of the Act, it provides for the establishment of the National Labour Board. The functions of the National Labour Board are given under section 7 as: all matters concerning employment and labour, legislation affecting employment and labour, any matter relating to labour relations and trade unionism, any issue arising from the international Labour Organisation and the international Labour Organisation Conventions, codes of good practice, any issue raised by an international or regional association of states of which Kenya is a member, appointment of wages councils, and many other functions.

B.7.1 Wages Councils

Sections 43 of the Labour Institutions Act allows for the establishment of the Wages Councils and section 44 consequently outlines the functions of a wages council. Such functions include: to investigate the remuneration and conditions of employment in any sector, invite and consider written and oral representations in the prescribed manner from interested parties and to make recommendations to the Minister on minimum wage remuneration and conditions of employment.

B.8 The Wildlife (Conservation and Management) Act (Cap. 376)

This Act of Parliament consolidates and amends the law relating to the protection, conservation and management of wildlife in Kenya; and for purposes connected therewith and incidental thereto. The prime objective of this Act is to ensure that wildlife is managed and

[1] Inclosed spring water means water in a spring which is situated wholly within the boundaries of the land owned by any one landholder and does not naturally discharge water into a watercourse abutting on, or extending beyond, the boundaries of that land.

conserved so as to yield to the nation in general and to individual areas in particular, optimum returns in terms of cultural, aesthetic and scientific gains as well as such economic gains as are incidental to proper wildlife management and conservation and which may be secured without prejudice to such proper management and conservation.

B.8.1 Kenya Wildlife Service

Section 3(1) of the Wildlife (Conservation and Management) Act allows for the establishment of a uniformed and disciplined service known as the Kenya Wildlife Service (KWS). Some of the functions of the KWS as given under section 3A of the Act are: to formulate policies regarding the conservation, management and utilisation of all types of fauna and flora; manage national parks and national reserves and others; provide wildlife conservation education and extension services to create public awareness and support for wildlife policies; sustain wildlife to meet conservation and management goals; provide advice to the government and local authorities and landowners on the best methods of wildlife conservation and management and be the principal instrument of the government in pursuit of such ecological appraisals or controls outside urban areas as are necessary for human survival and render services to the farming and ranching communities in Kenya necessary for the protection of agriculture and animal husbandry against destruction by wildlife.

Appendix C

Farm managers' questionnaire

Assessment of the Rainforest Alliance Certification Performance of Kenyan tea farms

Interview with a Farm Manager/Environmental Manager/Senior Manager etc.

Date of the interview: _____

Section 1 Background information

1. Name of the farm _____

2. Year of establishment _____

3. Number of employees _____ Males_____ Females _____

4. Size of the farm in acres _____

5. Brief outline of activities in the farm:

_____

6. What motivated adoption of the Rainforest Alliance Certification in your tea farm (if certified)?

7. Are you considering adopting any Environmental Management System? (If not certified), explain why?

_____

8. Have you considered adopting other forms of EMS? (For certified farms), explain

_____

Section 2 Environmental management

9. Are there any water sources in and around your farm?

1). Yes 2). No

10. If yes to the above, which water sources and how are they managed?

_____

11. What is the quality (physical and chemical) of water from the sources discussed in question 10?

_____

12. How do you manage waste water from the farm and estates?

_____

13. Do you have a system for monitoring water quality? If yes, describe

_____

14. Are there any environmentally sensitive areas within the farm e.g forests, animal parks, wetlands, etc? (If yes, which ones?)

_____

15. Are there buffers or operating restrictions around any of the areas in Q14, and if so, what are they?

_____

16. Are there any wild animals within or around the farm? 1). Yes 2). No

17. If yes above, (ask for the list), describe how they coexist with the farming activities.

_____

18. What are some of the environmental concerns regarding the wild animals in your farm?

_____

19. Which tree species exist in your farm? (ask for a list of both exotic and indigenous species)

_____

20. Do you have tree plantations in your farm? If yes, what size of land is under plantations?

_____

21. How do you manage/conserve soil in the farm?

_____

22. What area of land is under soil conservation? _____

23. How do you manage solid wastes?

_____

24. How can you describe the farm's relationship with the local communities around it?

_____

25. Do you have any common project with the neighbouring communities?

1). Yes 2). No

26. If yes to the above question 25, provide details of the project

_____

27. What environmental issues were identified by certification?

_____

28. What is being done to address the issues listed in question 27?

_____

29. In your opinion, which factors have made the above environmental problems difficult to address?

_____

30. Does the farm have an Environmental Policy? 1). Yes 2). No

31. Are there environmental programmes that involve farm workers? If yes, describe

_____

Section 3 Economic

32. What has been the farm's productivity trend in the last 10 years (amount of tea in Kg. per ha.)

Year	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
Amount (Kg/ha.)										

33. Where are your main markets and their demand sizes?

Market (company/country)					
Volume/Amount (Kg.)					

34. What has been the percentage of the farm's profit margin in the last 3 years?

2008 _____ 2007 _____ 2006 _____

35. Has Rainforest Alliance Certification helped in maximising profits?

1). Yes 2). No

36. Explain your response to question 35 above

_____

Section 4 Social

37. What are the key safety issues in your farm?

_____

38. How do you address the safety issues mentioned in question 37 above?

_____

39. Do you provide safety clothing to the farm employees? 1). Yes 2). No

40. What is your employment policy in relation to the local communities?

_____

41. Does the farm have a written policy against child labour? 1). Yes 2). No

42. What types of services and facilities do you provide to the employees and families?

_____

43. Why do you offer the services mentioned in question 42 above?

_____

44. How many hours per day and days in a week do your employees work? _____

45. Are there unions or workers' associations in your farm or has anyone tried to form them in the past?

_____

Section 5 Proposed improvements to the management systems

46. In your opinion, is there anything that could be done to improve the environmental management system that you are using?

_____

Thanks for participating.

Appendix D

Farm employees' questionnaire

Assessment of the Rainforest Alliance Certification performance of Kenyan tea farms

Questionnaire for the tea farms' employees

Date of Interview: _____

Section 1 Background information

101. Sex 1). Male 2). Female

102. Age (Years) 1). 15 – 20 2). 21 – 25 3). 26 – 30 4). 31 – 35
5). 36 – 40 6). 41 – 45 7). 46 – 50 8). > 50

Section 2 Social and Economic information

201. Does the farm own and manage a school?

1). Yes 2). No 3). Don't Know

202. How many days do you work in a week? 1). 7 2). 6 3). 5
4). 4 5). 3 6). 2 7). 1

203. How many hours do you work per day? 1). 1-5 2). 6-8
3). 9-12 4). > 12

204. Are you entitled to paid annual leave? 1). Yes 2). No 3). Not sure

205. Do you receive a detailed payslip? 1). Yes 2). No 3). Sometimes

206. Does the farm have a written policy against child labour?

1). Yes 2). No 3). Don't know

207. Are there opportunities for promotion to the employees?

1). Yes 2). No 3). Don't know

208. What is your main source of drinking water? 1). Tap 2). Stream
3). Borehole 4). Shallow well 5).Others (Specify) _____

209. Do you need to treat your water before drinking? 1). Yes 2). No
3). Don't know

210. If yes to question 209 above, how do you treat your drinking water?
1). Chlorination/waterguard 2). Chlorine and Alum/Pur 3). Boiling
4). Filtration 5). NA 6). Others _____

211. How far away from your house is the source of your drinking water?
1). Within the compound 2). 100 – 500M 3). > 500M

212. What is your main source of cooking energy?

1). Charcoal 2). Kerosene 3). Firewood 4). Gas 5). Electricity

213. What do you use for light at night?

1). Hurricane lamp 2). Tin lamp 3). Electric bulb 4). Pressure lamp

214. What is the number of rooms in your house? 1). 1. 2). 2.
3). 3. 4). 4. 5). 5.

215. Do you have a toilet in your house or compound? 1). Yes 2). No

216. If yes to question 215 above, how many households share the same toilet?
1). 2 2). 2 3). 3 4). 4 5). >4

217. Does the company provide health care services?
1). Yes 2). No 3). Don't know

218. What is the distance from your house to the nearest health facility?

1). Less than 100 m. 2). 100-500 m. 3). 600m-1 Km. 4).
2-5 Km. 5). 6-10 Km. 6). > 10 Km.

219. Are you a member of a workers' association/union? 1). Yes 2). No

220. Do you own the following items? (Must be functioning)

No.	Item	Yes	No	Quantity/size
220a	Television			
220b	Radio			
220c	Bicycle			
220d	Car			
220e	Mobile phone			
220f	Land			

Section 3 Occupational Health and Safety

301. Have you received training in the following areas? (Tick appropriate boxes)

No.	Training Areas	Yes	No	NA
301a	How to work safely?			
301b.	First aid?			
301c.	Environment and resource conservation?			
301d.	Handling machines			
301e.	Handling chemicals			
301f.	Management skills			

302. Have you been provided with personal protective equipment relevant to your work?

1). Yes 2). No 3). Some

Section 4 Environmental information

401. Do you have a solid waste collection system? 1). Yes 2). No

402 Have you ever participated in any environmental activities i.e., awareness creation campaigns, tree planting, workshops, information exchange programs etc which are organized by the farm's management team?

1). Yes 2). No

403. Does the farm have a written Environmental Management Policy? 1). Yes 2). No 3). Don't know

Section 5 Details of family members

501. Family members and their education levels

No	**Initials and Age** (Years) 1. 0-5 2. 6-10 3. 11-15 4. 16-20 5. 21-25 6. 26-30 7. > 30	**Sex** 1. Male 2. Female	**Education level** 1. None 2. Primary 3. Secondary 4. Intermediate 5. College	**Present status** 1=Schooling 2=Not schooling	**Reason if not schooling** 1. Fee 2. Failed 3. Employment 4. Pregnant 5. School far away 6. Others (specify)
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
h.					
i.					

502. What is the job designation of the household head? _____

503. Period of service (yrs.) 1). < 2 2). 2-3 3). 4-5
4). 6-7 5). 8-10 6. > 10

504. Employment terms 1). Permanent 2). Casual 3). Contract
4). Others (Specify) _____

505. Averagely, how much do you earn per month? (Ksh.)

1). 3000-5000 2). 6000-8000 3). 9000-11000

4). 12000-15000 5). 16000-18000 6). > 19000

506. What is the job designation of the household head's spouse? _____

507. Period of service (yrs.) 1). < 2 2). 2-3 3). 4-5

4). 6-7 5). 8-10 6. > 10

508. Employment terms 1). Permanent 2). Casual 3). Contract

4). Others (Specify) _____

509. Averagely, how much do you earn per month? (Ksh.)

1). 3000 – 5000 2). 6000 – 8000 3). 9000 – 11000

4). 12000 – 15000 5). 16000 – 18000 6). > 19000

Section 6. Observations

601. The type of the house (to be observed)

1). Permanent 2). Semi-permanent 3). Mud 4). Make shift

602. Status of the roof: 1. Good 2. Leaking 3. Dark

603. Status of the wall: 1. Good 2. Cracked 3. Dirty/smudged

604. Status of the floor: 1. Good 2. Pot holes

605. Wiring system: 1. Good 2. Exposed/naked electric wires

3.Not applicable