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The Actors, Rules and Regulations Linked to Export Horticulture Production and Access to Land and Water as Common Pool Resources in Laikipia County, Northwest Mount Kenya

Mariah Ngutu [1,*], Salome Bukachi [1], Charles Owuor Olungah [1], Boniface Kiteme [2], Fabian Kaeser [3] and Tobias Haller [3]

1 Institute of Anthropology, Gender and African Studies (IAGAS), University of Nairobi, P.O. Box 30197, GPO, Nairobi, Kenya; sallybukachi@yahoo.com (S.B.); owuorolungah@gmail.com (C.O.O.)
2 Centre for Training and Integrated Research in ASAL Development (CETRAD), P.O. Box 764, Nanyuki, Kenya; boniface.kiteme@cde.unibe.ch
3 Institute of Social Anthropology, University of Bern, 3012 Bern, Switzerland; fabian.kaeser@anthro.unibe.ch (F.K.); haller@anthro.unibe.ch (T.H.)
* Correspondence: mngutu@students.uonbi.ac.ke; Tel.: +254-723-839-619

Received: 26 July 2018; Accepted: 14 September 2018; Published: 17 September 2018

Abstract: Agriculture is the backbone of Kenya's economy, supporting up to 80% of rural livelihoods. Kenya's export horticulture is currently the leading agriculture subsector in Kenya and is regarded as an agro-industrial food system based on the economies of scale, producing for mass markets outside of the production area. Much of the food consumed from Kenya's export horticulture sector has undergone multiple transformations and been subject to a host of formal and informal institutions (rules, regulations, standards, norms and values). Kenya's export horticulture production, driven by rising global demands, has expanded beyond the 'traditional' mountainous high yielding areas into arid and semi-arid (ASALs) zones such as Laikipia County, Northwest of Mount Kenya. An anthropological study of export horticulture viewed as an agro-industrial food system in Laikipia County was carried out utilizing the new institutionalism theory in anthropology to explore the actors, rules and regulations linked to export horticulture production and access to common pool resources. The study employed qualitative data collection methods to collect data over an extended field work period of eight months. The data from 40 in-depth interviews complemented by unstructured observations, four focus group discussions and five key informant interviews was transcribed, coded and analyzed thematically based on the grounded theory approach. This paper, therefore, presents findings from the qualitative case study on the actors as well as the rules and regulations (the institutional settings) of export horticulture production and access to common pool resources from an emic perspective of the involved actors. The formal and informal rules and regulations which form the institutional setting in this food system are viewed as changing and defining the operations of the food system's access and management of common pool resources, namely water and land. With the agro-industrial food system competing with local food systems such as agro-pastoralism and small holder agriculture for these scarce resources in a semi-arid zone, there is potential for conflict and reduced production, as well as overall benefits to the different actors in the study area.

Keywords: qualitative; agro-industrial food system; actors; formal and informal rules and regulations; export horticulture; common pool resources; land; water; Laikipia County

1. Introduction

Kenya's export horticulture is regarded as an agro-industrial food system based on the economies of scale, producing for mass markets outside of the production area [1,2]. Much of the food consumed from this food system has undergone multiple transformations, travelled substantial distances, passed through different hands and been subject to formal and informal rules and regulations [1,3]. Currently, the horticulture industry in Kenya is the fastest growing agricultural subsector and is ranked third in terms of foreign exchange earnings from exports, after tourism and tea [2]. Kenya's value of horticulture has quadrupled in the last three decades and is now the largest exporter of horticultural produce in Sub Saharan Africa, with a 16 percent share in the European market. Kenya's export horticulture sector also subscribes to international food safety and quality standards as the European union is its main destination market [2]. The steady growth, as seen in export horticulture is, however, not felt across other agriculture and foreign income earning subsectors [2,4].

While Kenya's export horticulture began with a small number of Asian-owned family enterprises in the 1960s, several well-financed exporters had joined the sector by the 1980s [5–7]. International investments (foreign direct investments) in Kenya grew rapidly after independence and these included investments into the horticulture sector [7,8]. The multinational exporters viewed direct sales of export horticulture produce to retailers in Europe as a way to exploit their advantages in investment, scale and market linkages [6,8]. As competition has intensified, many small and medium-sized exporters have shifted to growing crops for the large exporters rather than shouldering the risk of exporting [8,9]. However, despite the increase in large-scale, export-oriented farms, exporters still source at least some of their produce from their own farms because; control over one's own production guarantees continuity of supply and reduces the risk of losing suppliers to competitors and also provides them with hands-on problem solving capabilities [5,10,11]. In an industry increasingly characterized by innovation and the need for rapid problem-solving, these are important. Some exporters (and their associated importers) also believe that vertical integration provides greater control and greater scope for reducing costs [8,9,11]. Notably, the power in the supply chain lies in possessing resources and capabilities that are not easily substitutable. Established exporters have some protection from the competence and relationships that they have built up over time, including knowledge of production and post-harvest processes; investments in specialized facilities; and relationships based on trust and reciprocity with overseas customers in the short-term [11]. These capabilities decrease their vulnerability to substitution within the supply chain, either from within Europe or from another external supply source [8].

The growth in horticultural production of fruits and vegetables, for export, in developing countries has also been coupled with dramatic changes in governance patterns of trade in the sector. This is driven by two key factors related to the European market. The first factor is the increasingly multifaceted strict environment for control of food safety, particularly pesticide residues and conditions for post-harvest processing, as well as environmental and labor standards [10,12,13]. Many large food companies, supermarket chains (the main buyers of the horticultural produce) and NGOs (Non–Governmental Organization) have engaged in establishing private food standards—that are often stricter than public requirements—and have implemented food quality and safety standards in certification protocols, including GLOBAL G.A.P.; Ethical Trading Initiative (ETI); Tesco's Nature's Choice and Save Quality Food (SQV) Programme [3,12,14]. Although private standards are legally not mandatory, many of them have become indirectly mandatory due to export pressure by a large share of buyers in international agri-food markets requiring compliance with such private standards [3,8]. The second set of factors is the increasing involvement of retailers (supermarkets) in export horticulture trade of mainly fresh fruits and vegetables (FFV) which is credited to the strategic importance of the products. Fresh fruits and vegetables are one of the few items for which consumers will change their choice of stores and because they are income-elastic products [10,14].

The horticulture sector in Kenya that started with its production dependent heavily on small holder farming is now dominated by large-scale export, farming owned multinational companies

as large-scale investments [1,2,15]. Large-scale land investments, such as export horticulture, often emphasize the rapid increase in yield they can produce and the additional employment they can provide [16–18]. However, these additional opportunities of agricultural production are not felt locally or only on a short-term basis [16–19]. There also are small holder farmers producing as outgrowers for the export companies and others for the domestic markets [19,20]. Export horticulture has become one of the highlights of African development because it has raised production standards in agriculture; provided good opportunities for increasing rural area incomes; improved nutrition of the people; resulted in diversification of exports; provided raw materials for agro-based industries and created employment, especially for the youth and women [9,19,20]. On the other hand, when export horticulture is seen as part of an export food system, the economic implications are viewed differently. Studies on horticulture in Kenya and other African countries, including Senegal, reported both positive and detrimental effects of this sector to development and livelihoods [4,8,19,20].

Horticulture export, when regarded as an agro-industrial food system producing for commercial markets outside of the production area, thus, needs to be interrogated further in relation to sustainable food systems, ecological considerations and resource use. New institutionalism and political ecology analysis views on the issue of food systems use and access of common pool resources, such as land and water, regard the subsequent resource contestation as the outcome of problems related to access, governance and distribution of resources [21–23]. Too much land and common pool resources, such as water, pasture, forests and fisheries, have seen a change from common, to state and private property, and are therefore not accessible for marginal people who also do not have the means to get adequate wage earnings from employment in order to substitute that loss [19,21,22]. There are formal and informal rules and regulations in export horticulture that define the institutional setting for production and the access and use of land and water [1,21,22]. As export horticulture rises in financial importance and becomes more valuable, it impacts on the local institutional setting of working conditions, property rights and access to common pool resources, such as water and pasture, vital for local livelihoods, and need to be interrogated further [11,16,21].

2. Export Horticulture and Institutional Settings in Laikipia County

The export horticulture sector in Kenya has evolved over the years since the pre-colonial period when the shaping of its structure, policies, production and marketing began [7]. The sector's production of vegetables, fruits, and high care products is market driven, with increasing stringent food safety standards resulting from increased consumer awareness and a series of food safety failures in the 1990s [24,25]. Notably, Kenya's export horticulture production, driven by rising global demands, has expanded beyond the 'traditional' mountainous high yielding areas into arid and semi-arid (ASALs) zones [19]. As a result of this expansion to regions with varying climatic and agronomic conditions, most horticulture companies rely on both rain-fed as well as economically modified conditions for crop production and utilize land to maximize production [26,27]. The ASALs, such as the Laikipia County region, are often prone to common pool resources (CPR) contestation among the different food systems, given the poor rainfall and frequent dry spells [19,26,28].

Despite arid climatic conditions in Laikipia County, the horticulture sector is booming with over 30 horticulture companies in 35 farms competing against other food systems, such as small holder farming and pastoralism in the region, for the already scarce resources [26,28,29]. Agro-industrial horticulture displays a specific form of interaction with neighboring communities and with the administration on different levels. In addition, the sector's culture and institutional settings define its operations, as well as utilization of common pool resources for the production of food and influences its linkages with other food systems. Understanding these institutions (rules and regulations), actors, and linkages provides insights into this sector which is also regarded as part of an agro-industrial food system.

Developments in agro-industrial horticulture in Kenya can be related to the issue of changes in relative prices, as in the institutional analysis model of Ensminger [30]. The rise of market prices

for horticulture products triggers investments, and changes actors' access to labor, bargaining power and institutional settings, as land and other common pool resources are much more devoted to this sector [30]. Despite arid climatic conditions in the north west of Mount Kenya, the horticulture sector is still growing and, thus, utilizing more resources over time. The region's different food systems, namely; agro-industrial horticulture, pastoralism and small holder agriculture, compete for land, capital, and water, with access to water being particularly hotly contested [18,28]. There is also a lot of food being produced through this labor intensive agro-industrial horticulture, but there still remains limited holistic literature that can provide a deeper understanding of the actor involvement, power relations, the major institutional setting transformations, linkages to the local food systems and the 'rules of the game' of this sector [31].

Previous studies have focused on the impact of the development of the large-scale, export-oriented horticulture sector on river water resources on the upper Ewaso Ng'iro basin [26,32]. Studies have also looked into the implications of large-scale, export-oriented horticulture on rural livelihoods in the North West of the Mount Kenya region [28,29]. Based on the literature reviewed, this study assumes that power relations of actors with different bargaining powers, perceptions and ideologies, influence the formal and informal rules and regulations (institutional setting) 'rules of the game' of common pool resource use and access in export horticulture production.

3. History of Land and Water Use and Access in the Study Area

In pre-colonial Kenya, land in Laikipia County extending into the Rift valley region was mainly owned by pastoral communities, as community lands where water, land and pasture were utilized communally. When Kenya became a British colony, land in this region, alongside the Nyandarua ranges, was taken up by the white settlers, and regarded as the White Highlands [33]. At this time, the pastoral communities were pushed away into the Mugogodo forest area. The White settlers had casual workers in their farms and establishments who were mainly from the Agikuyu and Ameru communities [33]. As the colonial era came to an end in the late 1950s into early 1960s, the settlers began to leave the colony, back to Britain, and hence disposed of their properties and lands. Following Kenya's independence in 1963, the land previously occupied by the white settlers was designated to be given back to the Africans [33]. Prior to independence, the government initiated programmes to register customary land as private property (Swynnerton Plan) and to reallocate land that had been isolated during colonization [33]. According to Kohler (1987), the government bought land between 1961 and 1978, from European settlers who were keen to sell their land. This land acquired by the government was either divided into individually owned plots that were assessed to provide for full subsistence and a surplus cash production, or handed over as extensive ranches to wealthy and powerful Kenyans. However, in spite of their large coverage, the government settlement schemes did not meet the demand for land by the massive landless population [33].

Consequently, people organized themselves into groups/co-operatives to mobilize resources with which they would then buy land in large tracts from settlers on their own. Notably, for the private initiatives, public funds were crucial as the government provided credit facilities through the Agricultural Finance Cooperation (AFC) to over one thousand groups for purchases of land [33]. It is, however, important to note that not all land acquired post-colonial era was for immediate use; and also, not all the colonial land was re-sold to government or private settlement groups. Some chunks of land were still left in the ownership of large-scale landholders [33,34]. The largest settlement schemes were dominated by beneficiaries of the KANU dominated district governments and in particular the Kikuyu squatters, while the Luo and Maasai were nearly allocated no land. According to Hornsby, (2012): p. 120, "the complex bureaucratic processes of land re-allocations used favored those with money, education and contacts" [35]. This resulted in ethnic and violent tensions around the issue of land which are ongoing to date [36]. Therefore, the government and private initiatives for the redistribution of land can be viewed as not having achieved an equal allocation of land repossessed from the colonial

regime. Moreover, it is not described in the literature, how post-colonial land acquisitions influenced the access and use of land for large-scale horticulture, a focal aspect in this study.

Land settlement in Laikipia had long-term effects [33,34]. The settlements resulted in significant immigration and population growth in the region. Notably, a majority of the immigrants came from ecologically high-potential areas where land had become scarce [34]. In 1994, the majority of small-scale farmers in Laikipia were Kikuyu (89%) from the current Nyeri, Muranga and Kiambu counties. The Ameru (8%) of the current Meru County were reported to occupy almost exclusively the eastern part of Laikipia. Small-scale farmers who were previously farm laborers or squatters in the region were found to be of an insignificant proportion [34]. Given the semi-arid conditions of Laikipia County, the new immigrants had limited expertise in agriculture other than the rain-fed practices horned in their ecologically high-potential zones of origin. As such, the new land owners converted the expanses of land previously dedicated to rain-fed beef ranching and wheat cultivation into irrigated small-scale mixed farming portions to allow for their practice of the traditional agro-pastoralist production [34]. Accordingly, the management of land and related resources, such as water, was transferred from a few, large-scale land users to include a larger sub-set of individual small holders [33,34].

Numerous studies have documented that river water is the main source for irrigation farming practices in the semi-arid area [37–39]. Over time, this has resulted in the over use and depletion of water, an already scarce resource in the region, as well as conflicts over the access by the numerous food systems including the small holder agro-pastoralists and large-scale users such as wildlife conservancies, private ranches and horticulture investments in the region [19,26,28,29]. This paper, therefore, focuses on the actors, rules and regulations in relation to the access of land and water as common pool resources, linked to export horticulture in Laikipia County. It seeks to outline the rules and regulations (institutional settings), and changes linked by the different actors to export horticulture in its access and use of land, as well as the potential for common pool resource contestation. Furthermore, it relates to research on large-scale land acquisitions, or land grabbing debates, anchored on the new institutionalism theory that highlights the institutions as rules of the game, and the food system perspective that regards export horticulture as an agro-industrial food system [21,31].

4. Materials and Methods

4.1. Description of Study Area

The qualitative case study took place in the Laikipia County region. The research site was an export horticulture investment (farm and pack-house) located in the Naibor area of Laikipia North Sub-county (Figures 1 and 2). This research was carried out in the study site located in the Laikipia County region for several reasons: First, the region is an arid and semi-arid (ASAL) zone on the lee-ward side of Mount Kenya. It is characterized by dry spells and erratic rainfall patterns averaging 400 mm per annum [19,28]. Arable land constitutes 1984 km^2, non-arable land constitutes approximately 7456 km^2, and urban areas constitute 243.3 km^2 out of the 9642 km^2 total land mass. Different food systems including pastoralism, mixed farming, and export horticulture, compete for the already scarce common pool resources especially water and arable land [26,32,40]. Secondly, in the last two decades, despite the ASAL characteristics, with the export horticulture sector spreading from the high yielding mountainous regions with favorable climate into the ASALs, the study area has been booming in export horticulture [26]. In Laikipia County, there has been notable growth of horticulture companies from one farm in the 1990s, to 30 horticulture companies that operated at 35 farms and covered an area of 1385 hectares in 2013 [26,32]. The area has, over the years, attracted migrants from all over Kenya to work in the horticulture companies, with the native inhabitants of the region mainly practicing pastoralism and small holder farming in their portions of land owned individually or communally [26,32,33,40].

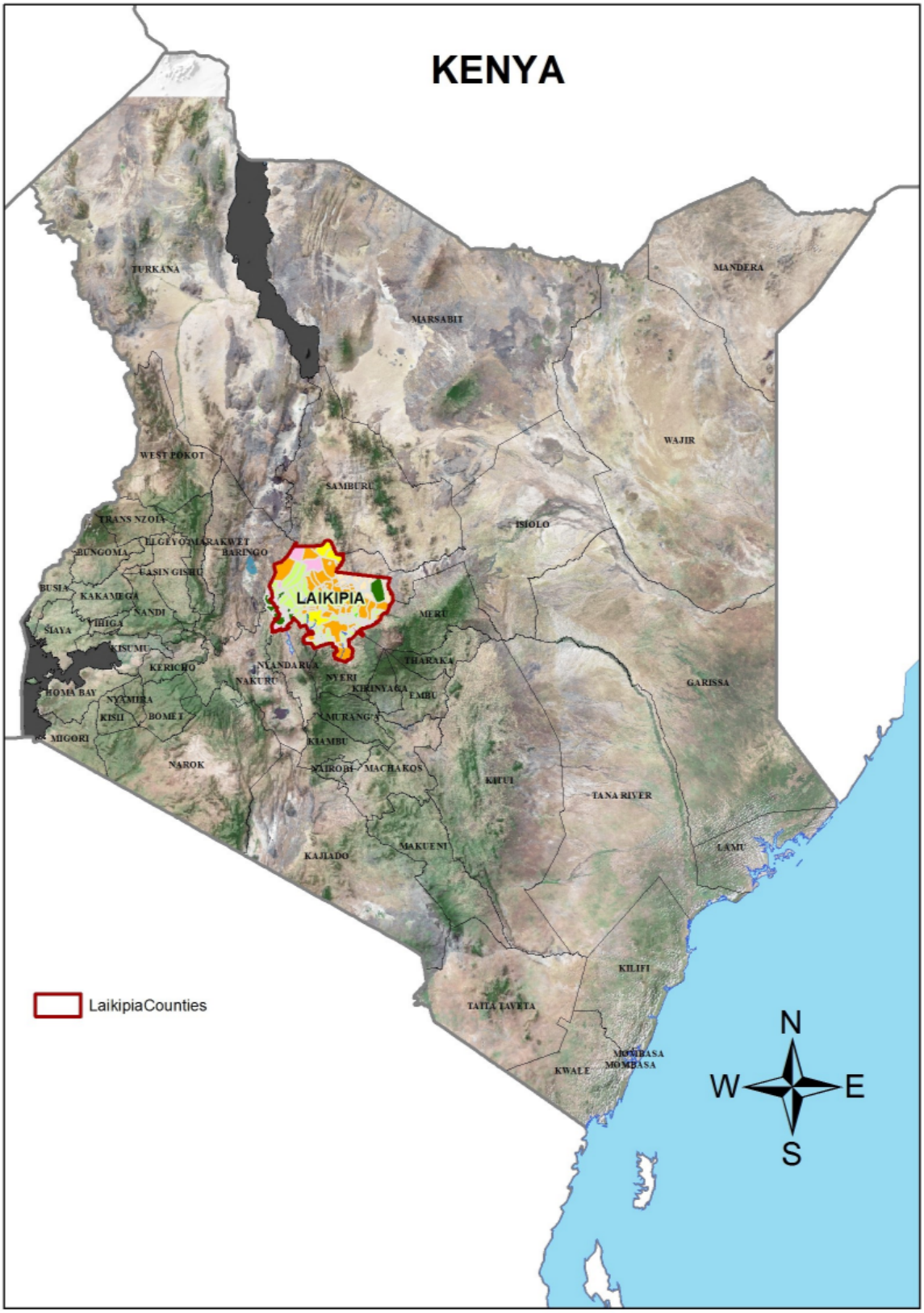

Figure 1. Map of Kenya highlighting Laikipia County, the research area (Source: CETRAD, 2018 [41]).

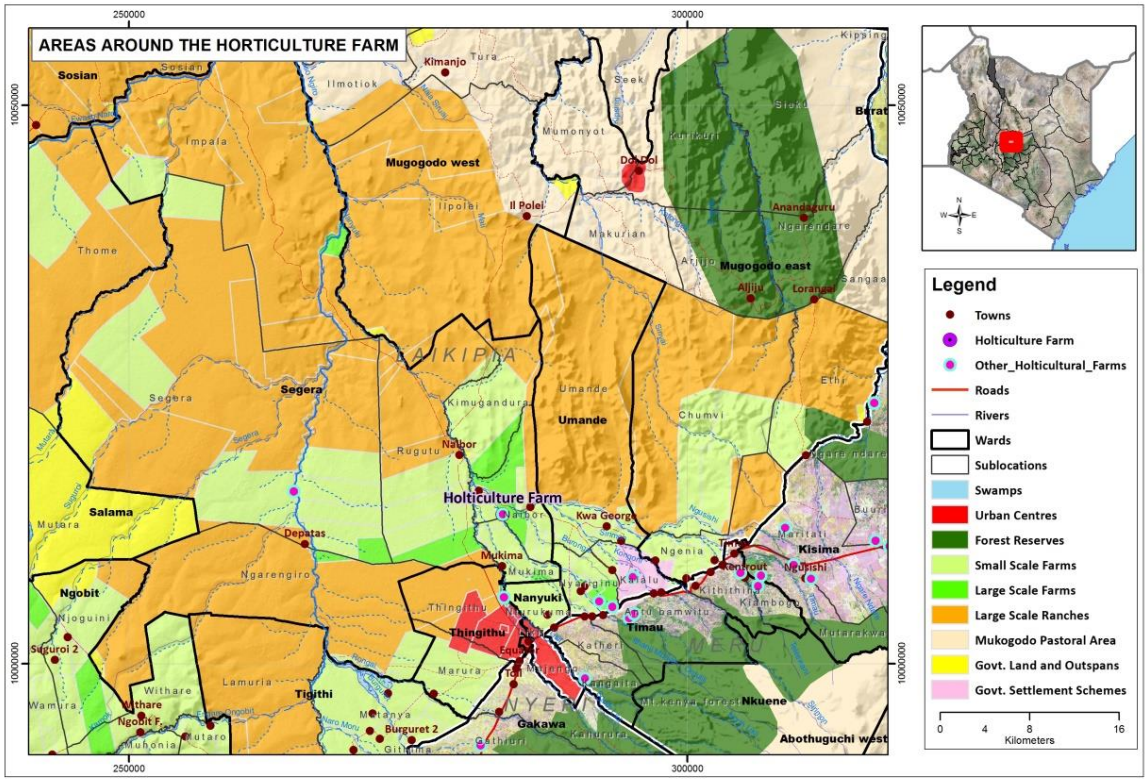

Figure 2. Map of the research area (Source: CETRAD, 2018 [42]).

4.2. Study Design and Selection of Study Participants

This study adopted an inductive case study design based on in-depth, qualitative exploration to establish the institutional setting of export horticulture in the Laikipia County region in relation to common pool resources. The study adopted a qualitative approach to allow for emic perspectives of the food system actors. The study employed the purposive, non-probability technique to sample the export horticulture farm and pack-house [hereafter regarded as investment], and study participants respectively. Once the permission to carry out research was granted, the researcher relocated to the neighboring area where she lived with a host family for the entire period of research. These arrangements enabled interactions with different workers and with members of the communities neighboring the horticulture investment.

Data was collected in two research phases that were carried out simultaneously. The preliminary research stage involved direct and indirect observations complemented by informal, in-depth interviews recorded on a daily basis as field notes. With the preliminary data from the informal interviews, discussions and observations, different actors linked to the horticulture investment were identified. The in-depth research stage, during which the bulk of the data was collected, followed the preliminary stage without a break in between. At the preliminary research stage, the horticulture investment was sampled purposively through existing networks based on its location, products, and willingness of the company to host the research. The participants included: Representatives of management, workers at different cadres in the farm and pack-house, county, and national government representatives. Their participation was subject to their linkage to export horticulture production and willingness to voluntarily participate in the study. Study participants were sampled conveniently and taken through the informed consent process and verbal consent obtained with an emphasis on the

participant's right of voluntarism in deciding whether or not to participate in the study.[1] The unit of analysis in this research was the actors linked to the export horticulture setting.

4.3. Fieldwork and Data Analysis

The qualitative data was collected through 40, in-depth interviews, complemented by unstructured observations, four focus groups discussions and five key informant interviews as summarized in Table 1. This data was collected from August 2016 to March 2017 to enable long-term exploration and interaction with the actors in export horticulture settings in Laikipia County. The study findings were analyzed thematically, based on the grounded theory approach, to inform the study objectives. Data obtained through the qualitative interviews was transcribed and translated into English transcripts for coding and analysis, as most of the interviews were conducted in Swahili. The field notes were also transcribed for analysis. Names of informants and places that were identifiers were replaced with pseudonyms on the transcripts for anonymity and confidentiality of the study participants. Once transcribed, the interview transcripts were reviewed for accuracy. Coding was done manually. The researcher read through the transcripts repeatedly to identify and list inductive codes. The codes were used to develop a codebook which was flexible to include new codes, delete or merge other codes as the analysis went on. After coder agreement and transcript review, themes were identified in line with the study objectives. Research findings have been integrated and presented as thick descriptions complemented with verbatim quotations in this paper. Ethical considerations were applied to data collection and subsequent analysis.[1]

Table 1. Summary of data collection tools and study participants.

Data Collection Tool	Respondent (s)
In-Depth Interviews (n = 40)	Targeted at export horticulture workers, neighbors that lived in the study area and practiced small holder farming for subsistence; outgrowers and pastoralists sampled purposively in the study area.
Focus Group Discussions n = 4 groups comprised of 6 to 8 members each	Workers and members of neighboring communities (small holder farmers and pastoralists) who had knowledge regarding the access and use of common pool resources in the study area.
Key Informant Interviews n = 5	Key informant interviews targeted individuals identified as knowledgeable on the institutional changes regarding common pool resources use and access in the study area, as well as those with deeper understanding of the export horticulture institutional settings. These key informants were namely; two senior managers with over 5 years work experience in the horticulture investment; the Naibor area assistant chief; a village elder from Muramati and a representative of a local outgrower farmer group in Jua Kali area linked to the research site.
Unstructured Observation	Carried out daily and recorded as field notes for the entire duration of the study.

5. Findings

Actors with Common Pool Resource Use, Access and Sharing Linked to Export Horticulture in the Study Area

Actors were identified in this study to include the members of communities neighboring the export horticulture investment, including the local authorities. Investors, outgrower farmers and workers in the horticulture setting were also identified as actors. Members of the communities neighboring the export horticulture setting included the people residing around Jua Kali and Muramati town centers

[1] **Ethical considerations.** The approval and permit for this study was issued by the National Council of Science, Technology and Innovation (NACOSTI), Kenya. Collaboration and approval was further sought from the Export horticulture investment, county government education and agriculture offices. The participants were given full details of the study including any foreseen or anticipated risks and how to tackle them in case they occurred, and any benefits/compensations or lack of beforehand. Informed consent and permission to record interviews was obtained.

about 5 km each from the horticulture farm and pack-house. These community actors were engaged in different livelihood activities including outgrowers/contract farmers for the horticulture farm located within the study area; people who have moved into the locality to work in horticulture farming. Besides working as wage laborers in the horticulture farm, people also obtain casual employment for construction, clearing fields and even farming in these other establishments. There are pastoralists who have come from Naibor and Doldol and bought land and settled around the horticulture farm's surrounding. These pastoralists still have their herds in the group ranches back in Naibor and Doldol. They have herders and members of their larger families to look after them and from time to time visit to tend after them. The small towns of Jua Kali and Muramati neighboring the farm also provide opportunities for small traders to bring merchandise from Nanyuki town and sell to the people living here. In addition, besides looking for work at the horticulture farm, people can find casual work in the development estates.

As observed in this study, in the neighboring areas close to the horticulture farm most of the housing is permanent (stone-built) or semi-permanent (wooden-built) for rentals. There are also individuals who have built their own homes and reside there. The road is tarmacked, there is electricity and, in some cases, tapped water is provided by the Nanyuki Water and Sewerage Company. As you move from the town towards the horticulture farm, a distance of about 3 km, there are people's homesteads, though these are sparsely placed. Most of these homesteads (built mainly of stone and wood with corrugated iron roofing) either have water tanks for water storage (which are used to store rain water) or just have to depend on the river water. These communities comprised people of different ethnicities originating from the study area, with others who migrated into the region in search of work, pasture and livelihood opportunities. There were other investments that offered work for the population, such as development companies constructing property, as well as smaller farms doing horticulture and permaculture in the study area, as in Figure 3.

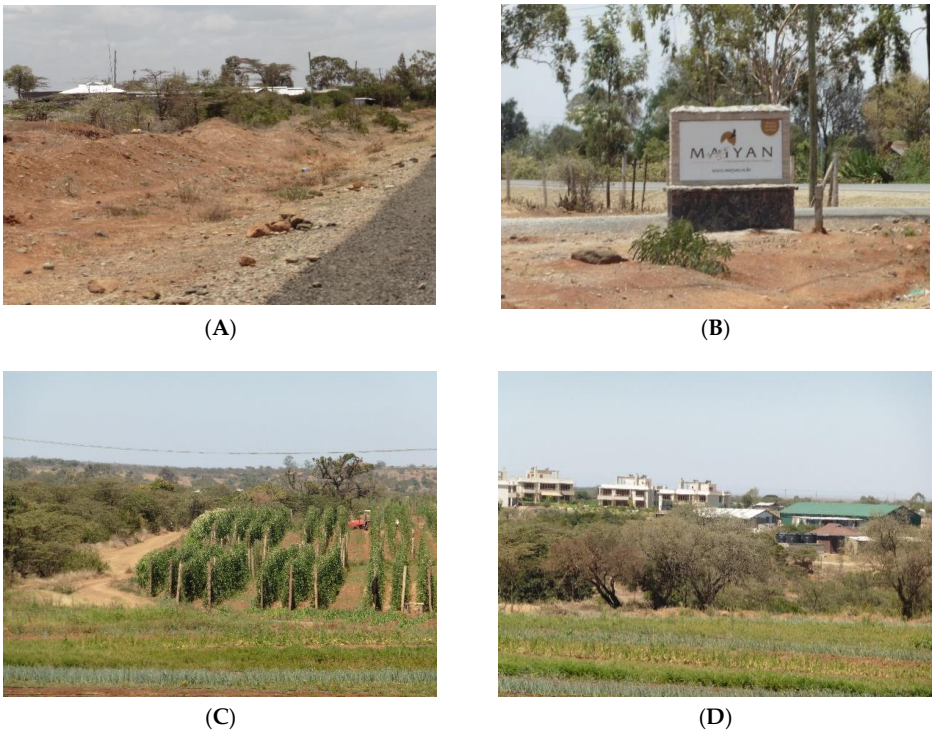

Figure 3. Summary of land use and economic activities in the study area (Source: Author, 2017). (**A**) Picture of permanent corrugated iron roofed houses in the study area; (**B**) Picture of a signpost of one of the real estate developments in the study area; (**C**) Picture of the export horticulture open field production in the study area; (**D**) Picture capturing a packhouse for export horticulture (green building) and real estate homes being developed for sale in the study area (cream buildings).

The investors and owners were identified as value chain actors playing the role of producer and processor in export horticulture in the study area. The owners established the horticulture exporting company and subsequently production units such as the horticulture investment in Laikipia County where the study took place. As reported in this study, investors set up the production unit and facilities for post-harvest management to enable the production, processing and distribution of export horticulture produce. Owners and investors provided the capital to access the land, water, technology, material inputs. They engaged outgrowers and employ workforce for the labor intensive horticulture production. As of 2017, the investors had three big farms and pack-houses including the investment in Laikipia County. In addition to acquiring the land, the investors had capital investments for setting up the infrastructure for the operations and running of the export horticulture investment. Notably, the large-scale export horticulture investors had integrated technology into the processes and activities for production and post-harvest handling to guarantee safety, efficiency, freshness and quality of the high value, yet perishable, products.

Workers in the horticulture investment also identified as value chain actors in this study comprised of both skilled and unskilled labor that was engaged on permanent and short-term wage-based contracts, respectively. The workers played the roles of producers and processors as reported in this study. Many workers, especially women, found short term sources of income through the wage employment opportunities in large-scale horticulture as is further highlighted in the following excerpts:

> *In the morning in Nanyuki town, you will find about 20 buses or more that ferry workers both from the management level and the farm hands moving across to the various farms. The locus of their operation is Nanyuki town*. (KII_09, County Agriculture officer, Male, 47 years)

> *Currently there are about 1073 employees with the farm having about 600 and the rest being in the pack-house. Of the workers, the majority are women because most of the work here is done better by women than men*. (IDI_31, Crop manager, Female, 41 years)

The bulk of employees (over 80%) comprised of unskilled seasonal workers hired on a short-term wage basis. These workers lived in the surrounding areas with most of them being immigrants into the Laikipia County region in search of work. The majority of these workers did not own land in the region as illustrated in the excerpt:

> *For the seasonal staff we give them contracts are varying from between 1 to 3 months renewable based on work availability and performance. Most of these workers do not have land to farm on here and the few who have, say about one percent of our workers only do subsistence or outgrower farming. The pastoralists who are the majority original inhabitants of this region rarely come to work in horticulture farms*. (IDI_06, Administrative officer, Male, 38 years)

There were also a few small holder farmers in the study area as well, who teamed up into farmers groups and provided outgrower/contract farming services to the horticulture investment, as well as other horticulture farms in Laikipia County. The outgrowers often produced for the horticulture investment crops that required less monitoring, like the fine beans and baby corn. The outgrowers provided diversity by contributing to about 20 per cent of the export product for the company. The involvement of the outgrower contract farmers is further detailed in the following excerpts:

> *We have contracted farmers around who supply different products like the fine beans coming in from the Timau group*. (IDI_03, Team leader, Male, 29 years)

> *We work with outgrowers to grow different horticulture produce from what was available at our own farm like fine or french beans (green and yellow) and baby corn and in this way, we increase the variety of produce for the consumers*. (IDI_06, Administrative officer, Male, 38 years)

> *Small growers have also come up because we are getting produce from the outgrowers who are around the farm so that some were working here; they went out and started doing their work*. (KII_01, Manager, Horticulture investment, Laikipia County)

However, over the years the involvement of outgrowers had been greatly affected by the increasing market standards, whose compliance costs are to be met by the individuals. Consequently, outgrowers not meeting the market standards were often dropped off the value chain as explained in the following excerpt:

> *We gave them the new regulations, for those who managed we continued with them and for those who did not manage by the new standards we had to let them go because it was very difficult to have everybody on board*. (IDI_06, Administrative officer, Male, 38 years)

These different actors namely; the investors, the workers, the members of the neighboring communities, including the outgrowers around the study setting, have many narratives to project their ideologies based on their perceptions and bargaining power positions to explain common pool resource (water and land) use and access overtime.

6. Perceptions of Actors on the Access and Use of Land as a Common Pool Resource Linked to Export Horticulture in Laikipia County

In 2004/2005, when the export horticulture investment in Laikipia County was set up, the investors ventured into establishing the farm in that locality as the first of its production units for three key reasons namely; the cheap land rates, availability of large tracts of underutilized land and the proximity to water sources. These aspects are as detailed in the following excerpt, as detailed from an interview with one of the managers of the horticulture investment:

> *Why we started with a farm Nanyuki was mainly because of the availability of the land. We not only found the land here but there were rivers that were flowing that time and this land at that time was cheaper as compared to the other areas*. (KII_02, Manager, Horticulture investment, Laikipia County)

At that time, land in the region was available as large underutilized and unexploited tracts of land that mostly were left fallow. In 2004/2005, one acre cost the exporting company Kshs 50,000 (500 USD) and they bought 700 acres within one locality from one owner under the freehold land tenure, as explained in the following excerpts from key informant interviews:

> *If you wanted an acre or two depending on your ability to buy, they sell it to you an acre for about 50 to 60 thousand Kenya shillings back in 2008, 2007. Like this horticulture farm where I used to work bought land from one man who owns a lot of land in this area*. (Village elder, Laikipia County, KII_03)

> *We acquired an acre for about 50,000 Kenya shillings. Today the price is almost increase by 100 per cent*. (KII_02, Manager, Horticulture investment, Laikipia County)

The land, on which the export horticulture investment was located, was initially owned by one individual who had amassed large tracts of land and invested heavily in real estate in the region as detailed in key informant interview excerpt:

> *[And all that land was bought from Mugambi?] Yes. It all belonged to Mugambi. It was very big. Half of Muramati belongs to him. He bought very many shares from the white man. No, they were a group. [Okay, a group? Then they left the land to the Africans who had shares?] You know, some Africans refused to contribute for the shares. It was not compulsory. If you wanted to get the shares, that was okay. Then when the Europeans were leaving, they would leave the farm to the Africans who had shares in the land. Even if the land was 2000 acres, 1000 acres, they just left the land to them*. (Village elder, Laikipia County, KII_03)

Notably, in the Laikipia County region, land at one point in pre-colonial era was communally owned and belonged to the pastoral communities. As reported in the study and corroborated in literature, in independent Kenya, land was mainly secured by the different actors on freehold titles obtained through purchase of the property from private owners. The new land owners utilized

land and related resources for economic activities, such as small holder agriculture; large-scale export-oriented horticulture as in the case of the farm; real estate development; private ranching and wildlife conservancies. These actors' perceptions on land ownership in the study area are further elaborated in the excerpts:

> *Like for us when we started the church, where I am a pastor in 2004 there were no homesteads in this Kariunga area. Then there were very few people. That was when the farm was beginning. There are now more people living in this area especially after the farm was established. Now this is a big village.* (Community FGD_02, Laikipia County)

> *Other foreigners besides the owners of the horticulture farm also started to buy land here for ranching and other farms and life has gone on. We get construction jobs in those farms.* (Community FGD_02, Laikipia County)

The pastoral communities lived more towards the Northern part of the region where they were settled by the government in community trust lands and land and pasture use and access was communal. There were some pastoralists who had come from Naibor and Doldol and bought land and settled around the horticulture farm's surrounding as illustrated in the excerpts:

> *These pastoralists still had their herds in the group ranches back in Naibor and Doldol. They engaged herders and members of their larger families to look after them and from time to time visit to tend after them.* (Community FGD_01, Laikipia County)

> *You can't build in a land that is not yours. So, they have bought the land and they have their own title deeds. Only that family can build on that land.* (Community FGD_01, Laikipia County)

In desperate times, when there was scarcity of grass for their herds, the pastoral communities would overlook the institutional settings of land and private property, and, especially in the dry seasons, would trespass into the horticulture farm's land to graze their animals as illustrated in the excerpt:

> *We must search for the animals. Sometimes we even go to the farm to search for grass there. The horticulture farm doesn't allow, but as pastoralists, we don't fear them. We just let the animals wander to that farm. When asked we say they had wandered to that farm but in the real sense it was us that drove the animals there for food.* (Community FGD_04, Laikipia County)

While this was not a common practice, the pastoral community had the potential to break the existing institutional settings and affect the agro-industrial food system. Given that the private property land tenure was familiar to the communities linked to the horticulture investment, and that, over time, they had co-existed peacefully, the semi-arid environmental characteristics could work against the actors and create situations of conflict as illustrated in the excerpt:

> *Some time ago there was a court case that lasted for some six to seven years about grazing goats in large-scale farm by one individual, and it was a case taken to court for some time. They even had hired lawyers and it went on for so long. But since then we have not had any more issues. And it almost caused enmity in the community because the head of security that had forwarded the case became the people's enemy. There was even a case of mistaken identity, where a villager was accidentally pierced with a spear after being mistaken for the security man. This was caused by that quarrel. That led to that man moving from this area and settled in a different area. We learnt that it is good for the community to live in harmony with its neighbors . . . .* (Community FGD_02, Laikipia County)

Given the dynamics of seeking a livelihood for the local actors, particularly the pastoralists, and the need for production even in the dry seasons for the horticulture investment, these set of actors instituted unwritten/informal arrangements and rules to complement the formal institutions of land tenure as illustrated in the following excerpts:

> *We have even donated some part our farm which still has its natural vegetation and is not arable at the moment to the community to graze their cattle. And in return they are taking care of this place.* (KII_02, Manager, Horticulture investment, Laikipia County)

> *The only areas we do not allow them to graze in the farm is where we have planted. But outside the farm towards Muramati we have quite a big chunk of unfarmed land and we let the pastoralist graze. The farm is now part of the community. They have taken ownership and even before others come from far wanting to invade our farm they are the first ones to stop them.* (KII_01, Manager, Horticulture investment, Laikipia County)

The investor had also instituted informal arrangements especially for the pastoral communities to access pasture in the uncultivated section of the farm, alongside other community development activities through the company's corporate social responsibility. According to the investors, the good relationship with the neighboring community was important for the export horticulture investment as it secured its territory, produce and investments, as further detailed in the excerpt:

> *To be very honest the community has been very supportive. You can see even when we have these cattle rustlers we just hear it from very far but don't come around.* (KII_01, Manager, Horticulture investment, Laikipia County)

These institutional settings and changes around land in the study area are founded on historic entitlements and laws on land ownership. While individual owners buy and own land in the formal arrangements, pastoral communities have a historic claim on land. They perceive access rights to be passed down, as these were their ancestral lands wrongfully taken from them. With the erratic rainfall in the semi-arid lands, there is periodic drought where pastures are scarce. In those seasons, given the unequal distribution of gains from the land, there is potential for conflict especially between large-scale land investors, such as the export horticulture investment, and communities linked to it by virtue of location.

For instance, pastoralists in search of pasture and water could trespass into privately owned properties, including large-scale horticulture farms, creating potential for resource related conflicts. In the study area, these resource related conflicts were witnessed in 2017, with herders invading private large-scale ranches to access water and pasture for their livestock. The horticulture farm was not directly affected by these conflicts as the herders targeted ranches rearing livestock and conserving wildlife. However, data collection this study was concluded as this pastoralist—private ranches conflict was developing. Detailed studies that explore the contentious issues around water and land as shared resources in Laikipia County are recommended. This discourse on potential conflicts is further advanced in the following section that presents the institutional settings of access and use of water.

7. Resource Contestation Linked to Water Scarcity

The export horticulture investment settled on their first farm in the Laikipia County location because of the proximity to two rivers, namely, River Timau and River Ontilili which pass by the hedges in two sides of the land. This was a guarantee to water availability. Due to the year-round production in order to meet market demands, the horticulture investment practiced irrigation agriculture. Water was an important factor to consider in export horticulture production, given the water-intensity of the crops grown in this sector. When the farm was established, proximity of the land to a reliable source of water was considered a key factor when choosing its location. This, to them, was seen a guarantee to water availability as espoused in the excerpts:

> *The fact that there were two rivers namely; Timau and Ontilili which pass by its hedges of this land was another factor that was important in selecting the location of this farm. These rivers were to them viewed as a guarantee to water availability because these horticulture crops have high water demands.* (KII_01, Manager, horticulture investment, Laikipia County)

We get our water from River Timau. In fact, when we started we were getting water from Ontilili river but somewhere around 2005 to 2007 the river started drying up. It is then that we went to Timau River from around 2010. (IDI_31, Crop manager, female, 41 years)

At the point of acquiring the farm, the investors were strategic in being able to have the river water sources accessible for use through abstraction and harvesting. However, this element has changed, over the years since the farm was acquired, with the rivers drying up and becoming seasonal as in the excerpts:

The main source of water is River Timau which is abstracted to dams within the farm. The Ontilili river has now become seasonal and is not as dependable. (IDI_24, Farm worker, Male, 45 years)

This farm generally faces water shortage challenges because Timau which is much closer to the forest where the river waters flow from has many horticulture farms and by the time this water flows downstream to this farm only very little is left. (IDI_32, Farm worker, Male, 27 years)

The water that is tapped into the rivers in the rainy season, often dries up in the dry season, as had been the case between December 2016 and March 2017. The horticulture farm now invests in alternative water sources, such as rainwater harvesting and underground water from boreholes to manage its water demands as espoused in the excerpt:

There are three dams and one manmade lake. A fourth dam is under construction. Water for cleaning buildings as well as for use in the sanitary units is also sourced from the dam. However, water for irrigating crops in the green houses (NPDs) as well as for use in the canteen for cooking as well as drinking is strictly sourced from the boreholes or tanks containing rain harvested water. Water from the dams is not fit for human consumption as it is not purified before use. It is mainly filtered to remove particles of dirt that may cause blockages on the drip pipes. If you actually walk around the hydrant posts you find signages indicating 'do not drink hydrant water'. (IDI_19, Farm supervisor, Male, 45 years)

The use and regulation of water in the region was managed by the national government through Water Resources Authority (WRA) which worked through community led Water Resource Users Associations (WRUAs) to regulate river water users. WRA had structures in place, including water meters in farms, to record the cubic meters of water utilized for monthly payments. The horticulture investment was in two WRUAs, given its location, namely Ontilili and Timau, as summarized in the excerpts:

But there are people from the water authority who monitor that water even as you pump it. Because like now, the water is not enough, pumping river water is regulated because some people may not get water. Sometimes those people can even carry your generator. (Community FGD_01, Laikipia County)

If your farm goes up to the river, 10 ft towards the river belongs to the government. So even if your farm goes all the way to the river, you are not allowed to farm very close to the river. So, what you do is put pipes and pump water from the river using a generator right to your farm. (Community FGD_01, Laikipia County)

As the horticulture investment accessed water, it shared this resource with other users including small holder farmers, other horticulture establishments and pastoralists, as it was located downstream of the Ewaso Ng'iro River basin. The neighbors of the horticulture farm share common pool resources, especially water and land, for farming and pasture with the establishment as elaborated in the excerpts:

But sometimes the river dries up, like now it is dry and we cannot plant anything, our crops are drying in the farms. Even the fine beans we have been harvesting to take to the horticulture farm will now just wither unless by good luck it rains. (Community FGD_02, Laikipia County)

We get water from the river but now the river is dry. We are now buying water from this borehole [in a nearby private farm close to the location of the discussion] or we go to Jua Kali. If you don't have enough money you go to the other river at Jua Kali. (Community FGD_04, Laikipia County)

The horticulture farm regarded its downstream location, coupled with both the erratic rainfall patterns in this leeward side of Mount Kenya and with the semi-arid climate, as the main challenge in accessing water for irrigation. There was also increased river water use upstream of the two main rivers, now turning seasonal. In spite of the erratic rainfalls, downstream users argued that river water would still be available, and enough, if it was properly regulated and coordinated as elaborated in the excerpt:

So many people, local farmers are getting water up stream and other big growers like Finlays and also other flower growers are getting water are also getting water from the same river. There is no proper control that is why it is drying up. Which we have Timau River user associations where we also belong and there is very little they can do to control these local people because they steal at night. (IDI_06, Administrative officer, Male, 38 years)

Not all river water users were registered and there was, therefore, the possibility of many users beyond the river's capacity. Users upstream, including the horticulture farms, were also blamed for excess abstraction of water, limiting the access by the downstream users, as espoused in the excerpts:

Because the horticulture farms tamper with the meter and that is not something that is hidden. They use huge meters that abstract most of the water, then they release water that has been contaminated with chemicals. (IDI_33, Small holder farmer, Female, 38 years)

Even when it is dry, the river has water. Another horticulture farm [H] has closed this water. They are the ones who have closed it. You know they grow flowers, and the demand for flowers is big because of weddings and all that. . . . . H is a very big company. When we complain, we are just locals, those are big people. If they give a bribe of say three million, we can't compete with that? Sometimes even when we complain, we are told it will be opened, when we come back home, there's no water, or they open it for some time then close it again. (Community FGD_03, Laikipia County)

The water authorities, especially the water resource user associations (WRUAs) that comprised leadership from the local communities around the water catchment areas, were faulted for not fully regulating the use of the river water as detailed in the excerpt:

But you see now these local WRA officials are not being honest. So, when someone goes to the head office asking for the additional water points, you get one and you can see from their system there aren't many users authorized to access the water. However, in practical there are so many other users and we don't know whether they are allowed or not. (KII_02, Manager, horticulture investment, Laikipia County)

Large investments dealt with the water scarcity in the Laikipia County region by investing in alternative water sources, such as boreholes and manmade dams within their settings, to supplement the diminishing river water as in the case of the horticulture farm, as elaborated in the excerpt:

When it is raining we harvest a lot of water, we have five dams and we are still digging more of the dams. We want to excavate a lot of dams so that we can have a lot of water as much as possible so that it can take us at least for a year even if we don't get rain. If we can store about two million cubic meters last us throughout the year if it doesn't rain. But we have less than a million right now and that is why at some point we will have to depend on the rains which are not very predictable. (KII_01, Manager, Horticulture investment, Laikipia County)

Additionally, at the County, the Nanyuki Water and Sewerage Company (NAWASCO) offered tapped water services, payable monthly, to supplement water for domestic use, mainly from the

boreholes and rainwater harvested in the horticulture farms and large-scale ranches in the region. The alternative sources were not yet sufficient to sustain the horticulture investments' water needs. As such, the investment lost many crops that could not be watered and had to depend on other sources to supplement their market supplies for the season between December 2016 and late March 2017 when the rain started as espoused in the excerpts:

> *In some instances, like what we are now experiencing we have to leave already planted crop dry in the farm because we cannot harvest without water. This will cause massive losses for the us as well as our outgrower farmers who are also affected by this dry season*. (IDI_07, Crop manager, male, 32 years)

> *There's plenty of work but there is no water to do the work. You see the river is drying up already*. (Community FGD_02, Laikipia County)

Through informal institutional arrangements, the horticulture investment shared water as a common pool resource as illuminated in the excerpts:

> *We have Kariunga police station and another police base at Muramati we supply them with water on a weekly basis*. (IDI_06, Administrative officer, Male, 38 years)

Workers were able to access clean drinking water while in the horticulture investment. As observed in the study, at times in the dry season, senior management could even carry water for use at home. However, given that the water was barely enough for the production activities, the majority of the workers had to source alternative sources of water outside of the horticulture investment, however, as detailed in the excerpt;

> *A 20 liter can of water was sold at 20 Kenya shillings from local water suppliers including NAWASCO and individuals with tapped ground water. In most desperate instances water then was fetched from the already drying up river bed*. (Community FGD_01, Laikipia County)

The water scarcity also affected outgrower farmers in the region who mostly depended on river water for irrigation and did not have the capacity to set up alternative water sources as alluded in the excerpt:

> *Water scarcity affects us as we solely depend on the river water. We do not have the resources to put up reservoirs and boreholes to sustain us a bit more in dry seasons. So, in the dry seasons our crops just dry in the sun and we lose our incomes*. (KII_04, Outgrower farmer group secretary, Laikipia County)

Additionally, the communities around the river, especially those downstream, faced the threat of using contaminated water redirected from the large-scale horticulture farms as illustrated in the excerpt:

> *There was a time the local communities were drinking dirty water. The water in the river was contaminated by water from the pack-house. There was a problem and I think they had not realized it. And you know one can't tell dirty water when it's flowing in the river because the soil purifies that water. When the horticulture farm realized the mistake, it seems their pipes were faulty, they constructed that dam you are seeing there*. (Community FGD_03, Laikipia County)

The farms used large amounts of chemicals for pest management and often, when not monitored, would dispose of the waste inappropriately. The chemical waste would end up mixing with the flowing river water which other food producers accessed for domestic and subsistence use. Water, likely contaminated with pesticides and fertilizer residue from horticulture farming was, therefore, a threat to human and animal health, and the environment, in the study area as illustrated in the excerpt:

> *In addition to water abstraction, the communities along the river, and downstream take this water contaminated by chemicals from the big horticulture farms...I remember at some point in there was a huge demonstration by the all the people from Isiolo and Laikipia, the pastoral communities that are there because this Ewaso Ng'iro River is their lifeline as there is no other river so*. (IDI_27, Small holder farmer, 35 years)

8. Discussion of Findings

8.1. Actors with Common Pool Resource Use, Access and Sharing Linked to Export Horticulture in the Study Area

As reported in this study, the different actors had different roles in the export horticulture value chain with some actors, such as the investors and workers, having multiple roles. When analyzed, the agro-industrial horticulture sector is regarded as having many stakeholders along the value chain. In addition, especially after the market liberalization of the 1990s, the sector became multi-stakeholder with the private sector playing key roles. These included input provision, credit, extension services, post-harvest handling, value addition, agro-processing and market access [4,5,43]. The study findings corroborated the literature and identified the owners/investors, the workforce, and the neighboring community as the main actors in large scale, export-oriented horticulture use of land and water as a common pool resource. The owners and investors provide the capital to access the land, water, technology, and material inputs, as well as workforce required in the horticulture production. Workers provide labor for production and share water as a common pool resource in the region with the horticulture investment. Export oriented, large-scale horticulture production of vegetables and flowers targeting the European market, started in the study area in the early 1990s [32]. The region has over 1085 hectares of land dedicated to horticulture and employs about 4700–7400 persons [39]. The outgrowers are producers for the horticulture investment and, in their position as small holder farmers, also share land and water as common pool resources. As illustrated by this study and reported in other literature, there are multi-level stakeholders in the horticulture sector forming formal and informal rules and regulations for production, as well as access to water and land [21,43,44].

Actors in export horticulture have varying perceptions and bargaining power positions that drive the formal and informal rules and regulations (institutional settings) and changes in the food system as illustrated by the study findings. The actors' bargaining power positions are founded on their perceptions about the food system and their ability to benefit from it for food security and food sustainability. The actors' positions were differentiated by their resource base in export horticulture, as this defined their bargaining power and, ultimately, their ability to formulate and shape formal and informal institutions in the food system. This consequently impacted on the actors' capability to benefit from the food system through income as profits from sales or wages; skills and welfare for development in relation to food production, security and sustainability. The investors' perceptions of large-scale, export horticulture were based on their power position as the owners of the horticulture investment. They had a higher bargaining power position, given that they had direct linkages to the markets and also capital to invest in the business, compared to their wage workers, outgrowers, and local communities. In their opinion as investors, they viewed the horticulture investment in terms of its usefulness to the local communities and for the generation of income opportunities [9,25,44].

8.2. Resource Contestation Linked to Water Scarcity

Developments in horticultural export in Laikipia County can be related to the issue of changes in relative prices, as in the institutional analysis model [30]. The rise of market prices for horticulture products triggers investments and changes actors' access to labor, bargaining power and institutional settings (rules and regulations) as land and other common pool resources are much more devoted to this sector [21,30]. Further, from existing literature, export horticulture is seen as one of the bright spots of African development as it has raised production standards in agriculture; created supporting industries, and provided considerable employment in rural areas [20,25,44]. However, critics argue that increased globalization in export horticulture does not benefit the poor [18,45,46].

The study findings illustrated that agro-industrial horticulture is dependent on the market demand, and access to water to determine the production. The study site, while able to adhere to the production standards and align to the trade regimes to a large extent, the production capacity is often affected by the water shortages resulting from the erratic weather in the region. Production, in turn, defines the magnitude of labor to be engaged. For the study site, the market has remained stable

over the years as they have established a consumer base for their produce. The challenge, however, is on the water availability throughout the year to meet the production demands. The fresh fruits and vegetables grown in the farm are water intensive and require irrigation. The farm where the research took place is located within the North West Mount Kenya region which experiences erratic rainfall because of the semi-arid climate it is located within. Additionally, given the downstream location of the study site, access to river water is limited since other users abstract a lot of water upstream, with only a little remaining for downstream users, including the horticulture farm. Similar findings are reported elsewhere [19,28,37,39].

As illustrated by the study findings, the drying up of the two rivers that provided water for irrigation farming, and had domestic uses for local actors, as well as the horticulture investment, are prevailing challenges facing the use and access of water by the different food system actors. Additionally, due to the limited alternative water options for most local users, the possible contamination of water, overuse of water for export horticulture activities, and the unresolved river water managements issues fueled by the ideologies of different actors on their ownership and access rights, pose as a platform for conflicts and tension over water as a common pool resource in the Laikipia County dominated by export horticulture despite its semi-arid climate characteristics that limit access to water for the production of food.

Most new institutionalism analyses have looked into institutional settings that structure access to land and associated natural resources—often Common Pool Resources (CPR) (e.g., Elinor Ostrom (1990) provides a detailed account on common property rights in general. Jean Ensminger (1992), Carolyn Lesorogol (2008) and Tobias Haller (2013) elaborately describe institutional settings that structure access to CPR, such as pastures or fisheries) [21,47,48]. However, institutional settings also structure other aspects of food systems, such as property rights (e.g., inheritance of goods or social status), labor arrangements (e.g., wage-labor or labor arrangements based on kinship) or access to infrastructure and knowledge (e.g., secret knowledge or patents) [21,43]. Even though the content of these different institutions varies, their nature remains similar as illustrated by the study findings.

The ASALs, such as the Laikipia County region, are often prone to common pool resource (CPR) contestation among the different food systems, given the poor rainfall and frequent dry spells [28,38]. The region's different food systems compete for land, capital, and water, with access to water being particularly hotly contested [19,26,29]. Despite arid climatic conditions in Laikipia County, the horticulture sector is booming, with over 30 horticulture companies in 35 farms competing against other food systems in the region for the already scarce resources [28,29,32]. Notably, the demand for fresh horticultural products in Europe is at its peak during the winter season which coincides with the dry season in Kenya, as well as in the study area.

Most of the commercial medium- and large-scale horticulture farms are located between 1700 and 2500 m a.s.l. (Above Sea Level) on the upper and lower mountain slopes, as well as in the highlands of Laikipia County. Therefore, they are part of important ecological interactions within the Upper Ewaso Ng'iro North Basin where depleted river water resources in the upper reaches of the system have great consequences on downstream users [26,27].

In addition to the already erratic rainfall patterns in Laikipia County, the rain water does not provide adequate water at the most crucial time for horticulture production, even when harvested and stored [19,28]. At this point, the production is based on irrigation farming which was, initially, largely dependent on river water abstraction. Since the irrigation farming was also practiced by smallholder farmers and pastoralists also used this for their herds, there was significant reduction in discharge rates of local rivers [26,39]. Horticultural investments in the region were held responsible for aggravating irrigation water shortages in the dry season [26,32]. These water shortages affected, and continue to have an impact on, the production levels in the large-scale export horticultural companies, often resulting in massive losses. In a bid to resolve the perennial water scarcity and contain the water-related conflicts, the investments increasingly established water reservoirs, to retain river water in the wet seasons, and ground water pumps (boreholes), as well as supported the formation

and operation of local water user associations [26,32,39]. These measures reduced the impacts on the river water discharge rates during the dry seasons and to some level mitigated the water-related conflicts [39].

There is also an on-going debate on the local to national impact of large-scale land acquisitions (LSLAs) for export-oriented horticulture. While agricultural commercialization is the new phenomenon in Africa, the ongoing, large-scale land acquisitions have led to an explosion of literature about their drivers and effects [16–18]. These international investments, especially by powerful economic actors in the global north on 'empty' land in the global south, can serve as sites for large-scale production, for instance, for large-scale export-oriented horticulture [18,49]. Agro-industrial horticulture companies are regarded as large-scale land investments by multinationals, and there is on-going debate on the local to national impact of these investments in the target regions and countries [1,49]. The debate of the large-scale land acquisitions (LSLAs) is going on amidst the increasing global demands on agricultural land resulting from increased population, the on-going global food crisis, increased dietary needs and the use of bio fuels [17]. The potential benefits of large-scale, export-oriented horticulture as an LSLA, including insurance against food price shocks and increased global food supply, cannot be over emphasized. However, these land deal transactions often take place at the expense of, and without the informed consent from, prior land users, a fact often ignored by the governments and the investors [16–18,49]. The growing demand for food, such as export fruits and vegetables and non-food crops, fuel, and other raw materials, are seen as the main drivers of these large-scale land investments, such as the export horticulture investments [17,18]. As such, the utilization of common pool resources, such as land and water by the agro-industrial food system, and management of common pool resources such as water and land, pose a threat for conflicts with other food systems competing for the same resource as in the study findings. Similar findings are reported elsewhere [21,28,39]. The competition for land and water as common pool resources for food production in export horticulture against local food systems, such as agro-pastoralism and small holder agriculture in the arid and semi-arid region where export horticulture is growing, was illustrated in this study. The resource linked conflict arising from contestation over the scarce water and land in the study area needs further examination to outline sustainable and equitable distribution of the common pool resources.

9. Conclusions and Recommendations

In analyzing the actors, rules and regulations linked to export horticulture production, and the use and access to land and water as common pool resources, the concept of institutions as fit, turning to misfit and then to fit again is experienced, as the formal and informal rules of the game are changed to meet the different actors bargaining power in taking part in the food system [21]. All of these interactions are manifested in the distributional effect and socio-economic behavior of export-oriented horticulture linked actors, and in a cyclic effect, manifest in the environment, population and technological aspects that influence the relative prices in this global value chain.

The inequalities in common pool resources, mainly water and land, in relation to export horticulture production in arid and semi-arid areas, are highlighted in this and other studies. These include the land ownership disparities experienced between the rich and poor, unresolved colonial land legacies and post-colonial disintegration of big-man, big-land notions that have continuously marginalized local populations who have lesser resources and, thus, lesser bargaining power over their right to access and use land for the production of food.

The emerging issues in institutional settings, and changes in export horticulture, are crucial to the viability of the sector as an agro-industrial food system in the food security and sustainability discourses in the local context. Research studies that include larger samples of agro-industrial horticulture companies and actors are needed to better address issues emerging from the food system analysis. Additionally, given that different food systems including export horticulture, small holder agriculture and pastoralism co-exist in arid and semi-arid zones competing for resources, there is potential for conflict as in the study findings.

This study recommends a re-examination of resource use and sharing among the food producers, the Ministry of Agriculture and Irrigation, and the Agricultural Sector Development Program (ASDSP). In their mandate to ensure sustainable resource use and allocation for the different food systems, to ensure food security, there is a need to look into the institutional settings and changes governing common pool resources, namely land and water. Studies that allow in-depth understanding of the experiences and dynamics of the food system are recommended.

Supplementary Materials: The following are available online at http://www.mdpi.com/2073-445X/7/3/110/s1.

Author Contributions: M.N. a Ph.D. candidate from the University of Nairobi, identified the research site, recruited the informants, collected and analyzed the data. M.N. drafted the original manuscript and has been working closely with the PhD supervisors also co-authors in this paper to review and edit the paper for submission to the journal of Land. S.B. was my first supervisor from the initial conceptualization of the study topic to data collection and editing and reviewing of the manuscript. S.B. is a senior research fellow in Anthropology at the Institute of Anthropology, Gender and African Studies, University of Nairobi. C.O.O. was M.N.'s second supervisor from the proposal writing stage to data collection and editing and reviewing of the manuscript. C.O.O. is a professor of Anthropology at the Institute of Anthropology, Gender and African Studies, University of Nairobi. Moreover, as the director of the Institute of Anthropology, Gender and African studies, he also provided administrative support. B.K. is the Director Centre for Training and Integrated Research in ASAL Development (CETRAD) was instrumental in accessing funding for this study and project administration. He has also been involved in the reviewing of this manuscript and accessing the maps for the study. F.K. is a PhD fellow at the Institute of Anthropology at the University of Bern. He was involved in the data analysis and writing and reviewing of this manuscript. T.H. is a professor of Anthropology at the University of Bern in Switzerland. As my third supervisor he followed up on the conceptualization of the study, data collection editing and reviewing of the manuscript.

Funding: This research was funded by the Swiss Programme for Global Issues on Development (r4d programme), funded by the Swiss Agency for Development and Cooperation and the Swiss National Science Foundation [Grant number 400540_152033].

Acknowledgments: The study informants including the export horticulture investment management and workers, small holder farmers, county and national government representatives in North West Mount Kenya who were part of this study. Your approval to carry out the study, hosting and engaging the researcher, participation and invaluable insights made this study possible. Thank you very much.

Conflicts of Interest: The authors declare no conflict of interest.

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