

Economic trajectories of palm oil development in Buvuma and Kalangala districts



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Summary

This research on economic trajectories of oil palm described and quantified direct and indirect benefits, and assessed trade-offs between oil palm and current livelihoods in Buvuma and Kalangala districts. It was designed as a descriptive evaluation study, considering both ex-post factors of progress made with oil palm production, and ex-ante factors of future prospects for livelihoods along with other socio-economic and environmental factors. The projection analysis supporting ex-ante analysis covered the period 2018-2030. The principal primary data collected was through questionnaires and focus group discussions. Secondary data was drawn from reports by district governments, IFAD, the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) and the Ecological Trends Alliance/Tropenbos International partnership. Analysis was based on descriptive analysis of primary data using STATA software and a synthesis of field notes. Food security analysis was based on two criteria prescribed by FAO/WFP's 2013 Guidelines for Comprehensive Food Security and Vulnerability Analysis. Gross margin analysis assessed enterprise performance for oil palm and other crop and livestock enterprises. Projection and trade-off analyses were conducted for oil palm, other farm incomes, and forest-

based ecosystem services. Results should feed into proposed implementation of further land acquisitions in the new ten-year National Oil Palm Project (NOPP).

Projections of direct impacts of oil palm incomes and agricultural production, and the indirect impacts on food security and forestry-based ecosystem services for Kalangala and Buvuma districts showed medium to long term decline in economic welfare under the current system of oil palm production. In Kalangala, the net economic contribution of oil palm was projected to decline from UGX 23.0-63.6 billion/year (US\$ 6.3-17.3 million) in 2019, to UGX -4.1 to +7.8 billion/year (US\$ -1.1 to +2.1 million) by 2030. In Buvuma, the net economic contribution of oil palm was projected to decline from UGX 5.6-12.4 billion/year (US\$ 1.5-3.4 million) in 2019, to UGX -4.4 to +10.1 billion/year (US\$ -1.2 to +2.8 million) by 2030. Economic forecasts for Kalangala were based on a projected increase of 1326 hectares in farmland and 337 hectares more oil palm plantations, and a decline of 1983 hectares of dense tropical high forests. The economic results in Buvuma are based on a projected reduction of 6397 hectares in subsistence farmland and 1081 hectares less woodlands, as a result of planting of 7478 hectares of oil palm.

Buvuma has a much higher population density (305 persons/km²) than Kalangala (120 persons/km²), and a larger area under subsistence farmland. Conversely, Kalangala still has a large area of fully stocked tropical high forests compared to the woodlands in Buvuma district. As a result, loss of agricultural production and livelihoods, followed by food security, were identified as the main factors expected to limit the economic benefits associated with oil palm in Buvuma, while loss of forest ecosystem services, followed by loss of agricultural livelihoods, were likely to be most limiting in Kalangala. Even though Kalangala showed a higher skills-based education attainment (21%) compared to Buvuma (3%), both districts generally have few trained people to optimally benefit from new employment opportunities, with the exception of casual labour associated with oil palm production.

Introduction

Background

The Government of Uganda is implementing the Vegetable Oil Development Project (VODP) with support from the International Fund for Agricultural Development (IFAD). Under this, oil palm purchase and trade are promoted through a partnership with a private sector partner and smallholder farmers. Starting in 2019, the government with support from IFAD, the private sector and oil palm growing communities intends to replace VODP2 with the National Oil Palm Project (NOPP). As distinct from VODP and VODP2, NOPP will focus on strengthening the value chain through an innovative public-private-producer partnership (4P) arrangements, developing oil palm in Buvuma and three other districts in the country, as well as consolidating production, supply and the value chain in Kalangala district.

Oil palm development was initially focused on Bugala island. The predominant economic activity is fishing, but there are also many smallholder farm households scattered across the island. Kalangala district was least populous in Central Uganda with a population of 54,293 people in 2014, mean household size of 2.5, and a population density of 120 people per square kilometre (national population density is 173) (UBOS 2016). The main economic activities in Buvuma are agriculture and fishing. Agricultural and livestock production is mostly of a subsistence nature, but with some commercial focus. Many communities undertake primary processing in nearby towns, especially Jinja. Transportation of produce to markets is by boat and the ferry, while bicycles and motorcycles are used for movements within the island.

Evolution of oil palm production

The rationale for VODP was to provide import substitution, diversify Uganda's export commodities, improve rural incomes, and improve the health of the population (MAAIF 2009). Specific objectives were: (i) to reduce poverty and increase farmer incomes by involving smallholders in oil crop production; (ii) create an enabling environment to attract private sector investment in oil palm development with a view to reducing imports of vegetable oil and thus create savings on foreign exchange; (iii) promote private sector agro-industrial investment with the introduction of industrial oil processing mills that are environmentally friendly; (iv) improve the delivery mechanisms and availability of credit and improved seeds; (v) develop the potential for sunflower and other arable oil seeds; (vi) provide interested smallholders, particularly women, with appropriate technologies to extract oil from arable oil seeds; (vii) stimulate and support the raw materials base and know-how for the subsequent development of commercial

essential oils; and (viii) create an industry-financed consultative body to advise the government on its priorities. The project covers several oil crops in different parts of the country, but the oil palm component was the largest (MAAIF, 2009).

The first phase (VODP1) was approved in 1997 and implemented between 1998 and 2010, focused on growth, poverty reduction and agricultural modernization, with an increased role for the private sector (IFAD, 2010). The goal was to increase household cash income of smallholders by revitalizing and increasing domestic vegetable oil production. The specific objectives were, among others, to develop a well-integrated palm oil for the benefit of smallholders and private sector processors. The project design included a total planted area of 4500 ha with a nucleus estate of 1000 ha on Bugala island, Kalangala district, and 3500 ha for smallholder oil palm development. After failed negotiations with the original private-sector investor, this was redesigned between 2000 and 2003 as part of negotiations with a new private-sector investor, BIDCO Oil Refineries Limited. As a result, the nucleus estate was increased to 6500 ha, while the 3500 ha for smallholder development was maintained, bringing the total area planted to 10,000 ha (IFAD, 2010).

The second phase (VODP2) started in October 2010, approved by IFAD's Executive Board in April 2010 and by the Government of Uganda on 29 September 2010 (IFAD, 2012). The goal was to contribute to sustainable poverty reduction in the project area, with the development objective "to increase the domestic production of vegetable oil and its by-products, thus raising rural incomes for smallholder producers and ensuring the supply of affordable vegetable oil products to Ugandan consumers and neighbouring regional markets." The outcome indicators for VODP2 were for 11,200 ha of oil palm in Kalangala, and 2500 ha in Buvuma initiated, and provision of extension and value chain services to smallholder farmers. The project also works with the Uganda National Bureau of Standards (UNBS), National Agricultural Research Organization (NARO), National Seed Certification Service (NSCS), and financial institutions. By the beginning of 2018, the total oil palm areas planted in Kalangala was 10,924 hectares, comprising 6500 hectares by the private sector partner on the nucleus estate and 4424 hectares by smallholder farmers. Annual oil palm fresh fruit bunches harvested were estimated at 26,889 t, valued at UGX 15.7 billion (US\$4.2 million).

In April 2018, IFAD and the Government of Uganda proposed the National Oil Palm Project (NOPP) to replace VODP2 (IFAD, 2018). The rationale for NOPP lies in the transformative socioeconomic impact achieved under the VODP I and II. The overall goal is for inclusive rural transformation through oil palm development – the NOPP theory of change. NOPP will expand a vertically integrated value chain with strong linkages between smallholder oil palm growers and primary processors, based on the innovative public-private-producer partnership (4P) arrangement developed under VODP. This will reduce market risks faced by smallholders and ensure their access to quality inputs, technical know-how and investment credit. The government will provide the necessary public infrastructure and offer growers financial, technical and organizational support. IFAD's main role will be to broker this 4P relationship and build trust among the partners. The project will work in three identified geographical hubs (Buvuma, Mayuge and Masaka), defined as agroclimatically suitable areas within a radius of 30 km around a crude palm oil mill, in which at least 3000 ha of smallholder oil palm production can be assured. A fourth new hub is yet to be definitively identified. In Kalangala, the hub established during VODP, the project will consolidate the investments to date, but will not expand the area under oil palm production.

Methodology

The overall objective of this research was to undertake an assessment of the economic trajectories of palm oil development for different stakeholders in the landscape. Expected outputs were the following. (i) Collect information on livelihoods at household level in Kalangala related to the oil palm project and use this for trajectories of socio-economic effects of oil palm development on Buvuma. (ii) Describe economics, food security and food prices, dependency on the environment and on third parties at household level and how these will change due to the oil palm project. (iii) Quantify direct benefits vs. indirect benefits of oil palm and the hidden costs of oil palm growing.

The study was undertaken in Buvuma and Kalangala districts, assessing the impacts of oil palm on other economic activities, livelihoods, society, and the environment and natural resources in the islands. The study was to calculate economic trajectories on the short, medium and long-term impacts of oil palm in the two districts. The study will support future planning of safeguards, and optimization of emerging economic opportunities linked to the oil palm

value chain, and will contribute to planning for and implementing optimal land use for sustainable livelihoods in the medium and long-term within the districts and beyond.

The study was designed as a descriptive evaluation study, considering both ex-post factors of progress made with oil palm production and livelihoods in Kalangala. The study also considered ex-ante factors of future prospects of livelihoods, and other socioeconomic and environmental factors with oil palm production in both Kalangala and Buvuma. The projection analysis supporting the ex-ante analysis covered the period between 2018 and 2030. The descriptive evaluation considered at household level, types of livelihoods and wealth, current and future economic activities, observed outcomes of oil palm production, and future likely outcomes of oil palm production. The results included gross margins, food security, household wealth, socioeconomic status, and status of drivers for future economic, social and environmental transitions, changes and impacts. The scenarios project likely outcomes associated with oil palm production and the local economy in the two districts.

A total of 213 interviews were conducted, 104 in Kalangala and 109 in Buvuma including six focus group discussions in each, with principal primary data collected through administered questionnaires. The type of data collected was based on the three study objectives. Data included: (i) description of communities, livelihoods, wealth and social economic factors; (ii) economic activities including oil palm production, other dominant economic activities, and food security considerations; (iii) perspectives of communities, local governments, and oil palm stakeholders among others, on direct and indirect benefits and hidden costs associated with oil palm production. Secondary data comprised census data collected by the district local government, and reports compiled by IFAD on the VODP project. Literature reviews also considered previous work on oil palm impacts and activities under the Ecological Trends Alliance/Tropenbos International partnerships; and work of actors such as Care International in Uganda.

Statistics were developed on the frequencies and means of occurrences observed in the primary data using STATA software. The descriptive analysis characterized the status of community livelihoods, wealth and economic activity, and also showed how average income; weekly, monthly and annual compared across the two districts. Food security analysis was conducted based on two criteria for strong food security prescribed in the FAO/WFP (2013) Guidelines for Comprehensive Food Security and Vulnerability Analysis (CFSVA), being the Dietary Diversity Score (DDS) and the Food Security Score (FSC). The DDS nutritional security based on benchmarks of food groups (meat/fish, pulses, carbohydrates, fruits, vegetable, milk, sugar/honey), the higher the score the more diversified the diet. The FSC shows commutative food security over a specified period (1-7 food days), based on benchmarks of poor, borderline and acceptable food and nutritional opportunities. Table 2 shows the food groups and categorization used for weighting, to determine dietary diversity and aggregation to determine the food security score for a given community (WFP, 2008).

Table 1: Default scores used for calculation of dietary diversity and food consumption score

No.	Food items (examples)	Food group (definitive)	Weighting (definitive)
1	Maize, rice, sorghum, millet, bread, other cereals	Cereals, tubers and plantain (carbohydrates)	2
	Cassava, sweet potato, potato, plantain, cooking banana		
2	Beans, peas, groundnuts etc.	Pulses	3
3	Vegetables and leaves		1
4	Mangoes, passion fruit, jack fruit	Fruit	1
5	Beef, goats, poultry, pork, eggs, fish	Meat and fish	4
6	Milk, yoghurt and other dairy products	Milk	4
7	Oils, fats and butter	Oil	0.5
8	Sugar and sugar products	Sugar	0.5
9	Spices, coffee, tea, salt, fish powder	Condiment	0

Source: WFP, 2008

Performance of the crop and livestock enterprises was assessed based on gross margin analysis. Gross revenues were estimated by multiplying animal output by average prices, while total variable costs were estimated by aggregating product input quantities by input prices. Gross margin was calculated as the difference between gross revenues and total variable costs, and was used to rank performances of different crop and livestock enterprises. Three

basic scenarios were developed with a high and low trajectory for aggregate gross margins of farm enterprises for farm households in Buvuma and Kalangala districts. In Buvuma, business as usual' (BAU) and oil palm investment (OPI) scenarios were developed, while in Kalangala, the oil palm investment (OPI) scenario was developed. Two scenarios for Buvuma project included before and after oil palm production, but effective graphical comparison was made for two OPI scenarios. The BAU scenario for Buvuma was developed based on calculations and estimates and included in a table, while the trajectories for the OPI scenarios for Buvuma and Kalangala districts were shown graphically.

Scenarios are based on projections of discounted gross margins for oil palm on the one hand, and a second of projections based on discounted gross margins from oil palm netted out with expected impacts on subsistence crop enterprises, farm income, losses in ecosystem service flows, and impacts on food security. Ecosystem service losses and food security impacts are shown separately, reflecting on indirect impacts associated with oil palm production. Oil palm revenue trajectories and crop enterprise losses reflect the more direct impacts of oil palm. Indirect and direct benefits were assessed based on a synthesis of discussions described in focus group discussion notes. Benefits and hidden costs were described based on a synthesis of results from the quantitative analysis and collaborated with community and stakeholder perceptions, as well as the synthesis of scenarios analysis.

Household description

Modal family size in Buvuma is 4-5 persons per household, 5-6 in Kalangala (Table 2), while families above 10 members were about 12% of the entire group of respondents. The average household size for Buvuma and Kalangala districts, respectively were 6.1 and 6.5, higher than the national average of 4.7 persons per household and the national rural average of 4.9 (Figure 1).

Table 2: Family size

Family size (members per household)	Buvuma district		Kalangala district	
	n	%	n	%
1 to 3	25	23	28	27
4 to 6	43	39	31	30
7 to 10	31	28	27	26
11 to 18	10	9	18	17

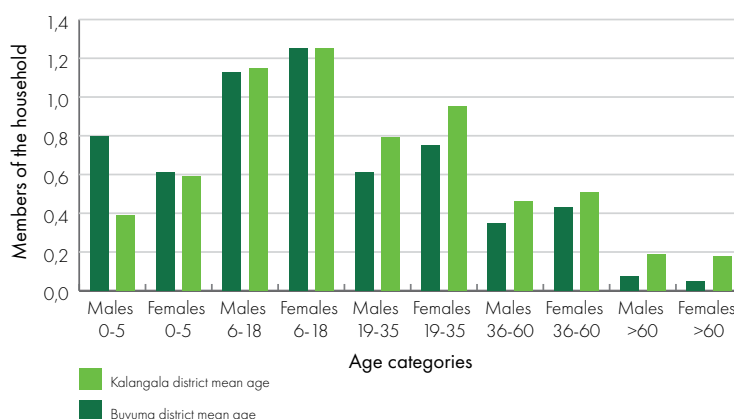


Figure 1: Distribution of members of household by age

Higher average household size may indicate a higher pressure on local resources to support livelihoods. Higher population size may also indicate remoteness and limited access to family planning services, and therefore whether or not economic opportunities are available, families are not well educated on how to manage the number of children and dependents in their homes.

Long-term settled people who described themselves as indigenous, included those born on the island, those who returned because of their ancestry, and those settled in the islands for more than 20 years. Community interviews showed that 70% of people in Buvuma district are recently settled, 30% 'local', while in Kalangala the number

of recent settlers 40% with 60% 'local', with many indicated they had migrated from nearby districts of Masaka, Rakai, Isingiro, Busia, Mayuge, Jinja and Mukono, among others. New settlers in Buvuma were largely attracted to the area because of fishing prospects, while those in Kalangala were attracted by new economic opportunities of trade, timber and charcoal production and the likelihood of employment in hotels, farms and fishing when the timber and charcoal trade reduced. Production of new crops such as rice, millet, maize is also attractive to newly settled people.

Generally, households are headed by men and fewer households are headed by women. However, there were more female headed households in Buvuma district compared to Kalangala. Out of every five households in Buvuma about two were headed by a woman (42%), while out of every five households in Kalangala only one was headed by a woman (23%), compared to the national average of 25%. More than three-quarters of the household heads in Buvuma and Kalangala are married, nearly 20% are widows or widowers and about 5% are single. For nearly one-fifth of the households to be headed by widows is an indication of the impact of fatalities on the water and external factors of household health, and particularly HIV/AIDS in fishing communities. HIV prevalence is high (15-40%) among fishing communities, compared to 37% among sex workers and 18% in partners of sex workers (GOU, 2016).

The average age of the household head is about 40 years in Buvuma and 46 years in Kalangala. The indication is that the communities in Buvuma are on average six or more years younger than their counterparts in Kalangala. The age groupings for household heads also show clear differences between the two communities. The modal household age group for Buvuma are those aged between 20–35 years while for Kalangala it is the older group of those 50 years and over.

Educational attainment in Kalangala was clearly higher than in Buvuma. The number of years of primary education averaged six years in Buvuma compared to six and a half years in Kalangala. The main difference is at for the secondary school. For secondary school on average for persons living in Kalangala District at least 50% of them attained four years of secondary school education, while for Buvuma less than 30% attained at least three years of secondary school education (Table 5). The gap in education attainment was wider at tertiary level. Only three of the 109 respondents in Buvuma has a tertiary education while in Kalangala at least one-fifth of the respondents had tertiary education. Tertiary education is associated with acquisition of technical skills that are crucial to obtaining skilled employment. Even though local community members generally preferred to operate as outgrowers and/or suppliers of shop or market items to the nucleus estate and BIDCO rather than work, due to the reports of low wages for nucleus estate and the oil palm processing factory workers.

In both Buvuma and Kalangala district, the majority of houses (55% and 67%, respectively) are made of bricks and iron sheet roofs (Table 6). In Buvuma unlike Kalangala, wooden houses make up a large fraction of 42% of all houses. In Kalangala, only 5% of houses are made of wood. Just under one-third of the houses in Kalangala are made from mud and wattle, while 3% in Buvuma are mud and wattle. Wooden houses represent new or temporary settlement for the owner of the houses. The wooden houses were common in concentrated settlements with in fishing villages. Many of the wooden houses were built on rented land with no occupancy rights for the owners of the houses. Permanent brick walled iron roofed houses represent permanent settlement. The level of permanence of settlements is higher in Kalangala compared to Buvuma. In Buvuma 72% of houses are owned by current occupants while 83% of houses in Kalangala are owned by current occupants. Only 28% and 17% of houses in Buvuma and Kalangala, respectively, are rented. There is a strong level of house ownership which reflects, the absence of houses for rent on one-hand, and the community preference to build their own structures for housing. The lack of clear standards for construction and/or poorly developed real estate markets may account for observed housing ownership.

Economic performance of crop enterprises

Farm crop enterprise profitability in Kalangala is dominated by oil palm, with a profitability range of UGX of 3.85 to 10.63 million/ha/yr (Table 3). Passion fruit, however, have the potential to raise between UGX 5.8 to 12.7 million/ha/yr, but the number of farmers engaged in the enterprise is less than 5% of households interviewed. Tomatoes are another high value crop grown by a few farmers but has a profit range that peaks at UGX 4.6 million/ha/yr. Coffee performs much better in Kalangala with gross margin of UGX 2.4 million compared to UGX 0.84 million in Buvuma.

Table 3: Annual gross revenue from crop enterprises in Kalangala district

Crops	Area (ha)		Yield (units*/ha)	Total variable costs (UGX/ha)		Gross margins (UGX/ha)	
	High	Low		High	Low	High	Low
Bananas (bunches)	0.5	0.25	100	1,118,695	1,118,695	3,715,305	1,298,305
Beans (tonnes)	1.5	1	4.5	625,423	0	1,549,877	128,907
Cassava (sacks)	2	0.25	10	891,638	891,638	921,112	268,522
Sweet potatoes (sacks)	2	0.5	15	379,488	0	1,614,537	193,360
Coffee (60 kg sacks)	2	0.25	12.5	2,129,067	0	2,402,808	386,720
Maize (tonnes)	2	0.5	0.5	0	0	422,975	145,020
Oil palm (tonnes)	15	1	144	2,129,067	2,129,067	10,632,693	3,853,008
Passion fruit (sacks)	1	1	35	2,998,459	2,998,459	9,690,791	2,802,341
Rice (tonnes)	2	2	1.05	2,998,459	891,638	3,092,381	1,464,937
Tomatoes (boxes)	2	0.5	42	2,998,459	891,638	4,615,091	268,522

* units indicated on left hand side with crop

In Buvuma district, the most profitable enterprise is bean cultivation, with per hectare gross margins of UGX 4.3 to 5.5 million (Table 4). Despite the high profitability, however, the average area of bean crops is 0.07-0.25 ha per household. Therefore, the most farmers generally make in bean production is a gross revenue of about UGX 2.5 million/year. Bean profitability is followed by cassava (gross margin UGX 0.76-1.5 million/ha/yr), sweet potato (UGX 0.84-0.95 million/ha/yr) and coffee (UGX 0.72-0.91 million/ha/yr). Other notable enterprises are rice (gross margins UGX 0.67-0.93 million/ha/yr), followed by groundnuts and maize (UGX 0.2-0.5 million/ha/yr).

Table 4: Gross revenue from crop enterprises in Buvuma district

Crops	Area (ha)		Yield (units*/ha)	Total variable costs (UGX/ha)		Gross margins (UGX/ha)	
	High	Low		High	Low	High	Low
Bananas (bunches)	4.14	0.62	120	250,320	250,320	909,840	716,480
Beans (tonnes)	0.41	0.21	6.1	520,881	520,881	8,542,869	4,313,119
Cassava (sacks)	2.07	0.21	19.3	207,846	207,846	1,145,674	758,954
Sweet potato (sacks)	1.65	0.10	9.1	207,846	207,846	154,704	952,314
Coffee (60kg sacks)	0.41	0.21	61	614,631	614,631	835,569	545,529
Groundnuts	0.21	0.10	7.1	520,881	0	204,219	145,020
Maize	1.65	0.83	0.6	614,631	0	442,807	120,850
Rice	0.62	0.41	24.2	614,631	614,631	932,249	674,436

Nutrition and food security

The number of different foods or food groups eaten over a reference period is a proxy indicator for improved outcomes in areas related to human health (e.g. birth weight, improved haemoglobin concentrations, etc.). A more diversified diet is highly correlated with such factors as caloric and protein adequacy, percentage of protein from animal sources (high-quality protein), and household income. Even in very poor households, increased food expenditure resulting from additional income is associated with increased quantity and quality of the diet.

Average dietary diversity was captured by measuring the food groups that a household consumes during one week, based on memory recall of respondents. The results showed a higher dietary diversity in Kalangala compared to Buvuma. The range of the dietary diversity score was 43-50% for the eight food groups in Buvuma, and 58-62% for Kalangala (Tables 5 and 6). Differences were in the consumption of meat and fish, milk, fruits, sugar, oil and fats, and carbohydrates, where Kalangala had a higher consumption than Buvuma. Conversely, Buvuma had a higher consumption only for vegetables, and it seems likely that the income differences between the two communities

in Buvuma and Kalangala are already observable in terms of their consumption patterns. Food groups such as meat and fish, milk and fruits are associated with more affluent people with higher disposable incomes, whereas vegetables, pulses and carbohydrates are more associated with subsistence livelihoods.

Table 5: Dietary diversity in Buvuma district

Days	Meat & fish	Milk	Fruit	Vege- tables	Sugar	Oil	Fish	Carbo- hydrates	Pulses	Dietary index	Dietary diversity
	Average daily weights over daily for one week										
1	0.48	0.16	0.05	0.35	0.23	0.09	0.46	1.62	0.50	3.43	43%
2	0.43	0.15	0.04	0.34	0.26	0.13	0.42	1.61	0.53	3.44	43%
3	0.42	0.16	0.06	0.37	0.27	0.15	0.41	1.67	0.61	3.64	46%
4	0.38	0.16	0.01	0.33	0.28	0.16	0.35	1.75	0.71	3.76	47%
5	0.41	0.15	0.04	0.33	0.25	0.13	0.38	1.78	0.67	3.72	46%
6	0.40	0.16	0.04	0.40	0.28	0.17	0.39	1.86	0.67	3.94	49%
7	0.50	0.17	0.04	0.44	0.22	0.15	0.37	1.88	0.68	4.04	50%

Table 6: Dietary diversity in Kalangala district

Days	Meat & fish	Milk	Fruit	Vege- tables	Sugar	Oil	Fish	Carbo- hydrates	Pulses	Dietary index	Dietary diversity
	Average daily weights over daily for one week										
1	0.71	0.25	0.23	0.24	0.49	0.34	2.06	0.60	4.92	62%	43%
2	0.62	0.25	0.2	0.20	0.49	0.33	2.03	0.63	4.75	59%	43%
3	0.58	0.24	0.17	0.18	0.46	0.36	2.00	0.68	4.67	58%	46%
4	0.51	0.29	0.17	0.20	0.50	0.36	2.05	0.80	4.88	61%	47%
5	0.53	0.22	0.09	0.17	0.48	0.37	2.01	0.79	4.66	58%	46%
6	0.51	0.27	0.16	0.20	0.49	0.34	2.15	0.80	4.92	62%	49%
7	0.69	0.21	0.13	0.17	0.51	0.34	2.22	0.66	4.93	62%	50%

Food security scores are a composite based on dietary diversity, food frequency, and relative nutritional importance of different food groups. The thresholds of the food consumption score were determined based on the frequency and knowledge of consumption behaviour in that country/region. Results (Figure 2 and 3) show the cumulative performance of the food security score profile for Buvuma and Kalangala, respectively. Over the course of the seven days, an acceptable level of food security for Buvuma was achieved between the fourth and fifth day of cumulative consumption, whereas for Kalangala, the acceptable food security threshold was achieved between the third and fourth day. Thus, cumulative food security is achieved a day earlier in Kalangala than in Buvuma, indicating that communities in Kalangala are significantly more food secure than those in Buvuma.

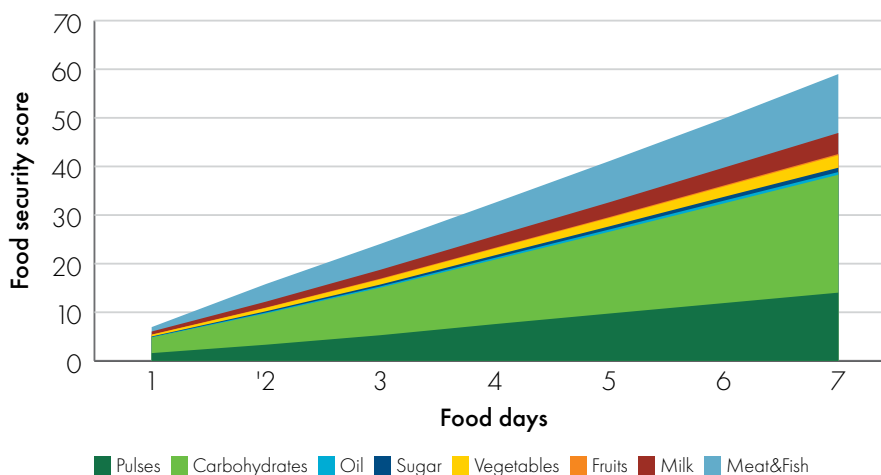


Figure 2: Cumulative increase in Food Security Score over one week in Buvuma district

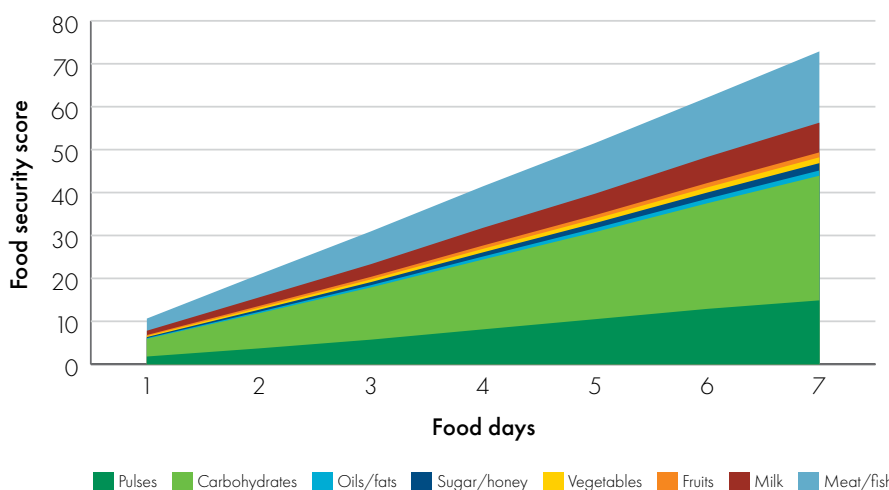


Figure 3: Cumulative increase in Food Security Score over one week for Kalangala District

Scenario analysis: direct, indirect and hidden impacts of oil palm production

Deriving benefits and hidden costs

Direct benefits represent gains achieved in the project area, directly associated with oil palm production. The leading direct benefit is the income associated with oil palm production. Some is obtained by outgrowers while some is by workers in the nucleus estate. Direct benefits are calculated from the gross margins of oil palm from outgrower plantations, estimated to be at least 25% of the income generated from the nucleus estate. Conversely to income gains, oil palm production also leads to land conversion that results in a loss of income as farmers have to cede current subsistence production in exchange for income from oil palm.

Indirect benefits and losses on the other hand are derived, and occur as secondary impacts, such as the loss of ecosystem services, carbon storage, pollinator services and future wood fuel supply, among others. The oil palm industry has brought along with it a strict need for financial literacy among farmers, such as bookkeeping which is important to monitor cash flows so that farmers can realize profits from oil palm. This financial literacy is now being extended to other crop enterprises, with skills passed to other family members and particularly children who help their parents manage their farms.

Hidden costs are those that appear underneath the primary and secondary impacts. For example, the level of impacts on food security may affect the more vulnerable groups in a community where income from oil palm is either too low or their direct participation in the oil palm industry is limited. Costs such as carbon sequestration and loss of biodiversity affect the country's capacity to implement international commitments to the Nationally Determined Contributions (NDCs). There are also hidden costs associated with the opportunity cost of long-term impacts on ecosystem services related to wetlands, forestry and fresh water systems. There are also potential impacts on livelihood resilience and the failure to cope to with lifestyle changes for some community members.

Scenarios for gross margin of farm incomes with oil palm

Scenarios were conducted by developing projections on discounted gross margins with oil palm production in Buvuma and Kalangala districts. These scenarios focused on the range of gross margins between low and high, based on prices and yields obtained by farmers and the gross margin assessment. Therefore, for each projection, a low and high range were added to the scenario analysis. The scenarios also assessed the direct impacts from oil palm production, i.e. the additional income from oil palm production and lost income from crop production replaced by oil palm, with an assumption that the impact of oil palm on livestock production is indeterminate. And whereas farmers indicated that livestock can be produced along with oil palm, there were reports that nucleus estate managers had stopped farmers from grazing livestock within their plantations because of the damage caused and the likelihood of livestock feeding on the fresh fruit bunches.

The indirect impacts assessed were impacts on food security and ecosystem services. The ecosystem services considered were for forestry resources because of the clear observed impacts on land cover and land use changes. The impacts are likely to extend to wetlands, fresh water systems such as streams, springs, shore line vegetation,

fisheries resources, and potential for pollution into the lake. However, these were synthesized as hidden costs that are unclear, based on the limited information currently available.

Land cover and land use change

Kalangala district, unlike Buvuma, had a small baseline area of subsistence farmland which was projected to reduce by 370 ha over the 11-year projection. This decline in subsistence farmland was relatively small, and was assumed to be largely due to a small expansion of the oil palm area, based on definitive plans in the NOPP report (IFAD, 2018) that stated that with no additional funding and/or programming for expansion of oil palm in Kalangala district, the focus will be on consolidating current oil palm areas. Nonetheless, well stock tropical high forest, depleted tropical high forest and woodlands are expected to decline considerably between 2018 and 2030 (Figure 4).

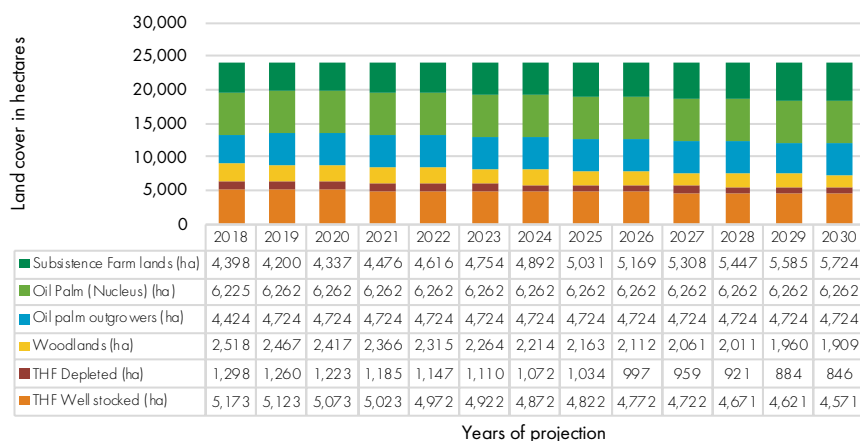


Figure 4: Trends of land use projected for 2018 to 2030 in Kalangala district

The land cover and land use change projected in Buvuma district involves a rapid decline in the area of subsistence agricultural land. The area of oil palm is projected to increase for both the nucleus estate and outgrowers, while woodlands and depleted tropical high forest are projected to decline (Figure 5). The projections are based on proposals in NOPP (IFAD, 2018), and were used as a basis to predict expected changes in land cover and land use.

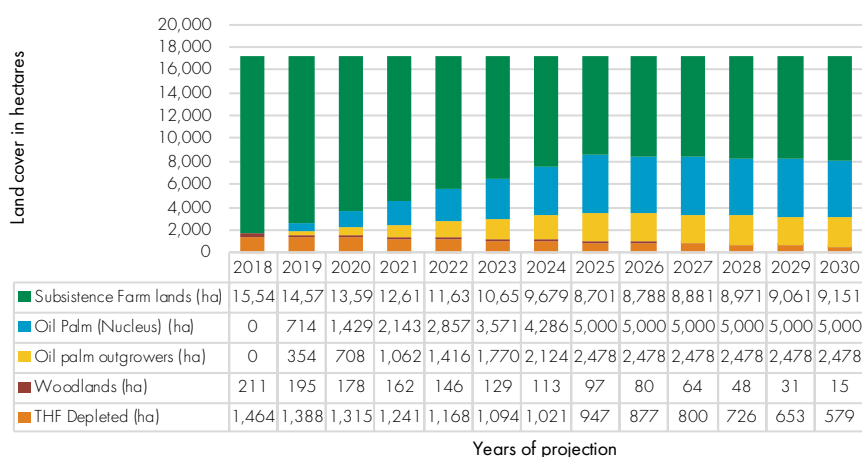


Figure 5: Trends of land use projected for 2018 to 2030 in Buvuma district

Ecosystem service values and expenditure for food security

The indicator adopted for the indirect benefits and/or losses from oil palm production was ecosystem services. Using a benefit transfer approach, the values of woodlands, well stocked and deleted tropical high forest were adopted from the financial and economic assessment of forest landscape restoration opportunities in Uganda (MWE and IUCN, 2018). The highest values are in for well stocked tropical high forest, due to the higher biomass and higher timber values, followed by depleted tropical high forest, and woodlands (Table 7). Biomass data was generated by the National Forestry Authority under standard methodology using forest landscape restoration assessments and that can be applied across the country. Therefore, assumptions for benefit transfer are plausible within the Ugandan context, i.e. with similar figures for both Kalangala and Buvuma.

Table 7: Value of ecosystem services

Ecosystem services	Values in UGX/ha		
	Well stocked tropical high forest	Depleted tropical high forest	Woodlands
Timber	18,008,563	6,288,130	1,226,560
Poles	358,848	150,400	51,200
Wood fuel	168,210	141,000	96,000
Carbon sequestration	8,226,900	3,447,840	3,209,550
Pollinator services	8,150	8,150	8,150
Soil loss reduction	464,000	464,000	1,393,200
Totals UGX/ha	27,234,671	10,499,520	5,984,660

Source: MWE and IUCN (2018)

Expenditure on food was based on a number of estimates including food security score calculations, and the default thresholds of expenditure on food as a percentage of income (The Economist Intelligence Unit, 2018). These estimates were based on default household expenditures on food security, the average size of the household, and average subsistence income (Table 8). Whereas subsistence income was higher in Kalangala, both the population density and size of the households were higher in Buvuma district.

Table 8: Expenditure on food estimates

Description for food expenditure calculation	Kalangala	Buvuma
Population (2018)	62,328	112,542
Number of households	24,931	33,101
Households/ha	1.09	1.54
Average household size	2.5	3.4
Default value of expenditure on food (as percentage of income)	28.5	28.5
Average expenditure on food per household/ha/year	760,867	1,651,147

Indirect losses and direct gains from oil palm production

In Kalangala district, indirect gains from oil palm production are characterized by losses of ecosystem services associated with the reduction in well stocked and deleted tropical high forest, and woodlands, as well as food security losses from a reduction in land under agricultural use (Figure 6). Over the projection period, total losses in ecosystem services and food security increased from UGX 3.37 billion/year in 2018 to UGX 32.7 billion/year in 2030. The highest losses were associated with ecosystem services of well stocked tropical high forest, from UGX 4.1 to 13.1 billion/year over the projection period, followed by depleted tropical high forest from UGX 2.8 to 8.9 billion/year. Losses from food security due to land conversion for oil palm were higher than the losses from the woodland areas.

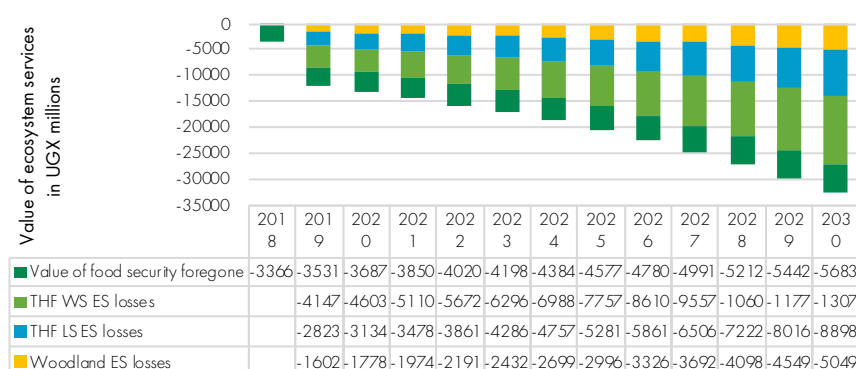


Figure 6: Losses in food security and ecosystem service values associated with oil palm production in Kalangala district (2018-2030)

In Buvuma, unlike Kalangala, well stocked tropical high forest had already been degraded by the time of the base year of projection in 2018 (Figure 7), with woodlands and depleted tropical high forest providing the forest ecosystem services that were considered. The bulk of indirect losses is related to food security losses and ecosystem services from depleted tropical high forest. But Buvuma would still be expected to have a large area of subsistence farm land after the introduction of oil palm over the 2018 to 2030 projection, based on lessons learned from the introduction of oil palm in Kalangala. Nonetheless, given the subsistence nature of production and the relatively higher population density of 305 people/km² compared to the national average of 173 people/km² and the population density in Kalangala of 120 people/km², means that low food productivity is compensated for by having a more land under cultivation.

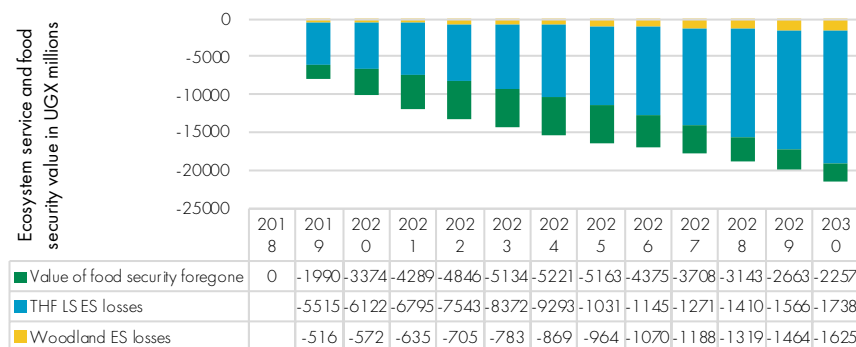


Figure 7: Losses in food security and ecosystem service values associated with oil palm (Buvuma, 2018-2030).

Direct gains and losses from oil palm production

Projections of gross margins from oil palm production and subsistence farm incomes show that based on current prices, oil palm production will continue to be the main source of income and economic returns in Kalangala (Figure 8). However, between 2026 and 2027, agricultural production on farm land may overtake oil palm as the leading source of economic returns and/or income for farm households, as long as the area of oil palm remains as indicated in NOPP. In Kalangala, oil palm creates an opportunity for revenue that can be used to transform agricultural production. Unless prices from oil palm production increase, discounted gross margins show that revenues from oil palm will be overtaken by the future investment in ensuring food security, at least by 2027.

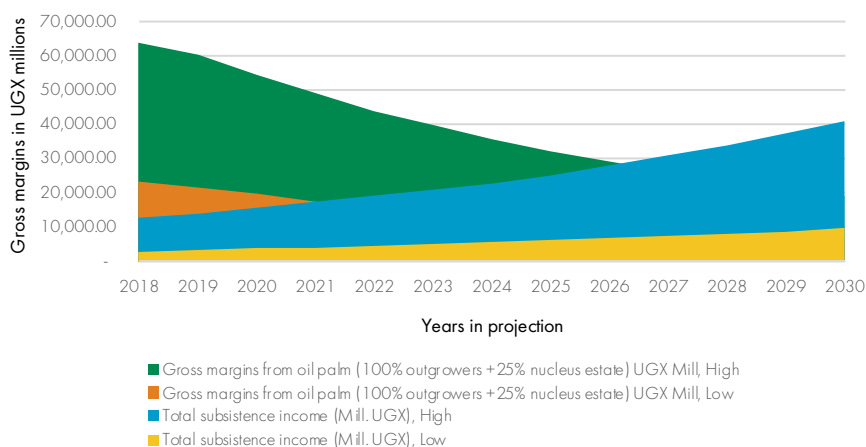


Figure 8: Gross margins oil palm versus total subsistence income in Kalangala district (2018-2030)

In Buvuma, as oil palm production begins, it is expected to quickly become the leading source of income for farm households. However, similar to Kalangala, by 2028, agricultural crop production will overtake oil palm as the leading source of economic returns and/or gross incomes (Figure 9). New income from oil palm will be important in the medium term, however, and should prices increase, may continue to be a major source of revenue. Projections are based on current commodity prices for both oil palm and food crops.

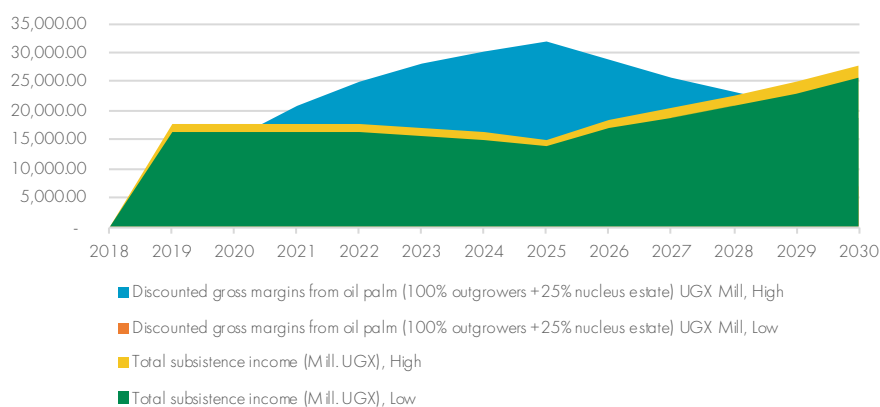


Figure 9: Gross margins oil palm versus total subsistence income in Buvuma district (2018-2030)

Discounted net margins for oil palm production

In aggregate terms, net gross margins for oil palm enterprises on their own will decline in the long-term based on current fresh fruit bunch prices. By 2030, the net economic contribution of oil palm to the economy may either be negative, or about UGX 7.8 billion/year (Figure 10). This economic return is based on contributions of oil palm amongst outgrowers, and 25% of the economic returns from the nucleus estate.

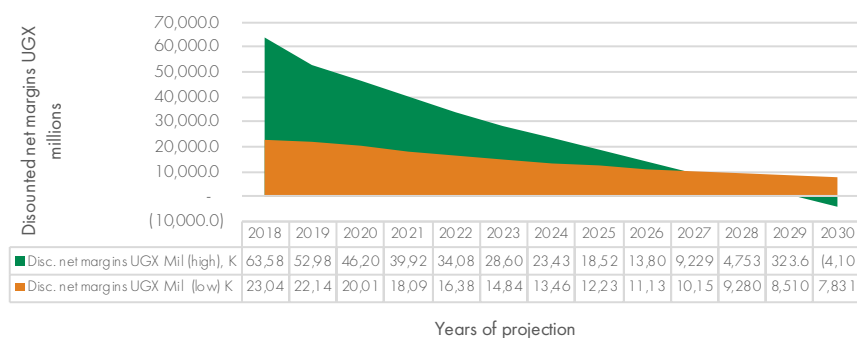


Figure 10: Projections of discounted net gross margins with oil palm production in Kalangala (2018-2030)

The range in current income from crops and oil palm will be significant to overall discounted net margins from oil palm in 2018-2030. Between 2018 and 2024, net margins associated with oil palm production will generally increase, while after 2024, gross margins start to decline as the impact of losses to ecosystem services and food security begin to catch up with gains from oil palm income. At the peak (2023-2024), oil palm net margins will be at a maximum of UGX 23.8 billion/year. In the low range of incomes, economic gains from oil palm will dip into aggregate economic losses in 2026. However, in the high range of prices by 2030, net economic gains from oil palm will still be strongly positive, at about UGX 10 billion/year, but declining.

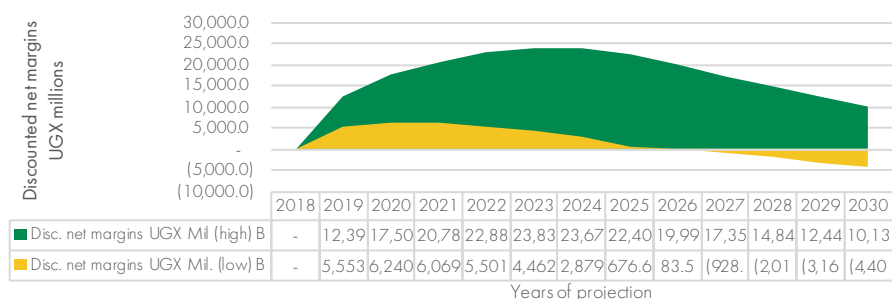


Figure 11: Projections of discounted net gross margins with oil palm production in Buvuma (2018-2030)

Discussion

The higher projected average household expenditure on food in Buvuma was associated with the higher population density and average household size in the former as compared to Kalangala. It is likely that the hidden cost of food insecurity will emerge more strongly in Buvuma as oil palm replaces subsistence agricultural land. Therefore, effective action is required to ensure that livelihoods options are maintained in the local communities, thus the scope of interventions must be wider than oil palm alone.

Community interviews showed that 70% of the people in Buvuma are recently settled while in Kalangala the number of long-term settled and indigenous people exceed recent settlers. New settlers in Buvuma were largely attracted by fishing prospects, while those in Kalangala were attracted by the new economic opportunities from trade, timber and charcoal production, and the likelihood of employment in hotels, farms and fishing when the timber and charcoal trade reduced. Production of new crops such as rice, millet, maize is also attractive to newly settled people.

Generally, both Buvuma and Kalangala showed strong commitment to primary education, but levels of secondary and tertiary education were considerably less in Buvuma, with only 3% of household heads having attained tertiary education compared to the 21% in Kalangala. Low levels of education mean that many opportunities for skilled labour directly or indirectly linked to oil palm are likely to be taken by people from outside the district. The dearth of well-trained people in Buvuma is at an acute level, and should be a priority for development programmes.

Economic activities in Kalangala and Buvuma are dominated by agricultural value chains. In Kalangala, oil palm has created direct opportunities for nearly 60% in local communities as outgrowers, employees and casual labourers. Commercial and subsistence agriculture, employment by local government, community-based organisations, NGOs and business activities are also important sources of livelihoods in Kalangala. In Buvuma, the subsistence economy of mixed farming of food crops such as cassava, banana, beans, maize, rice and sweet potato among others is still the dominant source of livelihoods. Fishing has transitioned into commercial fisheries where local people are mainly employed as porters for wealthier boat owners. Women are most engaged in processing silver fish and farming, and the enterprise mix in Buvuma is clearly inferior to that for Kalangala district.

Gross margin analysis for crop enterprises showed that cassava, beans, sweet potato, rice and coffee were the leading enterprises in Buvuma. In Kalangala, oil palm was the leading enterprise, with passion fruit, tomato and coffee being high value alternatives to oil palm. Food and nutritional security based on dietary diversity and food security score showed that Kalangala was significantly more food secure than Buvuma. The preference of food types showed higher affluence associated with more disposable income. Dietary distribution in Kalangala indicated a higher consumption of meat and milk, which score higher as compared to carbohydrates and pulses. The presence of fish in Buvuma was outweighed by low household incomes to buy other food types.

In Kalangala, oil palm creates an opportunity for revenue that can be used to transform agricultural production. Unless prices from oil palm production increase, discounted gross margins showed that the current prices of oil palm will be overtaken by the future investment required to ensure food security, at least by 2027. In aggregate terms, net gross margins for oil palm on its own will decline in the long-term in Kalangala, based on the current prices for fresh fruit bunches, and the economic impact on ecosystem services and food security. By 2030, net economic contribution of oil palm to the economy in Kalangala may either be negative, or UGX 7.8 billion/year., based on the contributions of oil palm from outgrowers and 25% of the economic returns from the nucleus estate.

Between 2018 and 2024, net margins associated with oil palm production in Buvuma district will generally increase. After 2024, gross margins start to decline as impacts of loss to ecosystem services and food security begin to catch up with gains from oil palm incomes. Between 2023 and 2024, oil palm net margins will be at a maximum of UGX23.8 billion/year. In the low range of incomes, economic gains from oil palm will dip into aggregate economic losses in 2026. However, in the high range of prices by 2030, net economic gains from oil palm will still be strongly positive at UGX10 billion/year, but declining.

Projections for oil palm show that it will generally have positive economic returns. However, the projected decline in returns will become a major consideration in the long term, as the impact of lost ecosystem services and the growing demands for food security as land for food production in Buvuma becomes limiting. Therefore, oil palm production and maintenance of ecosystem services and food security need to be considered together, or the long-term gains of oil palm will be negated.

Conclusions

Migration in and out of the islands disrupts the establishment of social programmes and also leads to communities with low social development in education and healthcare, among others. The low education attained in both districts but particularly in Buvuma, limits the possibility of exploiting value chain upgrading opportunities that may become available in the district. There is potential for tourism and alternative agricultural value chains in dairy, poultry and fish processing, but these enterprises are poorly developed, though there are signs of some innovation in these sectors. Moreover, many of the innovators are either based on the mainland or prefer to make investments on the mainland even though they exploit resources from the islands.

The population density in Buvuma leads to higher average household expenditure on food security compared to Kalangala. Therefore, from the outset, the risk of food insecurity following the introduction of oil palm is higher in Buvuma, and effective action is required to ensure that livelihood options are wide enough to boost agricultural production to safeguard food security of the settled community in Buvuma. The assessment of direct and indirect impacts was based on the economic contribution of natural resources, and impacts on ecosystem services, food security and household incomes. Kalangala and Buvuma still maintain primary economies of production and sale of raw produce with limited processing and development of other sectors. Therefore, economic returns to the communities will still be largely associated with direct incomes, ecosystem services and food security benefits, and their own income will remain the basis for healthcare, education, nutrition and other social services they can access.

Projections of food insecurity emerged as both an indirect and hidden cost more strongly for Buvuma than for Kalangala. Nonetheless, for both districts, food insecurity will increase as economic gains of oil palm are outweighed by the need to enhance living standards. The loss in ecosystem services is a more limiting factor for Kalangala due to the larger size of well stocked tropical high forest and maintenance of ecosystem services will be critical to agroecosystem sustainability and diversification of livelihoods.

Recommendations

Oil palm has been produced in Kalangala for over 12 years, with many lessons learned. But to ensure mistakes are not repeated where planting is yet to begin, actions are needed by the government, donors and BIDCO/OPUL.

1. The National Oil Palm Programme (NOPP) should include alternative livelihood options and means to increase food security, including the promotion of other crops such as banana and coffee, and agroforestry through intercropping food crops.
2. Government regulators should reinforce social, economic and environmental safeguards to minimize negative impacts associated with oil palm development.
3. The government and donors should support integration of the value of ecosystem services into district accounting systems, and in developing and managing projects.
4. The government, in close collaboration with communities and other partners, should develop integrated land use plans that incorporate their considerations and concerns.
5. The government should consider breaking the monopsony (the condition of having only a single buyer) to give farmers choice and allow them to obtain more competitive prices.

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