



The Coconut Value Chain in Nicaragua

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1. Introduction

The coconut palm (*Cocos nucifera* L.) is an important agricultural crop in many countries throughout the world providing food, drink, and raw materials for industry. It has also been historically utilized on the Atlantic coast of Nicaragua. The global demand for coconut is growing at a remarkable rate due to the popularity of coconut water, oil, and natural food and cosmetic products, supply however, has not kept pace. With supply stagnating in many leading producing countries, Nicaragua is positioned to capture market share through the strengthening of the national coconut value chain aimed at the export of dry coconuts, coconut oil and coconut water. It is however necessary, given the importance of coconut to smallholder agriculture in the Atlantic coastal regions of Nicaragua, to consider the maintained inclusion of poor and marginalized communities in the coconut value chain. This study was conducted for the Association and Producers and Exporters of Nicaragua and maps the coconut value chain in Nicaragua primarily focused on the main coconut producing region in the country, The South Caribbean Coast Autonomous Region (RACCS),

2. Approach and Methods

2.1 Objectives

The objective of this study is to map the coconut value chain in Nicaragua and provide a preliminary analysis of potential points of intervention for the inclusive development of the value chain and increased participation in global markets. The development and initial analysis of the coconut value chain map requires a review of factors that affect the coconut sector such as national and global supply and demand of coconut and value added products, past and current programs and supports in the sector and the mapping of principal actors, activities, links and policies that affect the value chain. The development of an initial value chain map and map matrix provides a basis for undertaking a full value chain analysis by providing the information needed to determine specific actors, geographical scope, important information and significant information gaps.

2.2 Methods

This study maps and analyses the activities, challenges and relationships between coconut value chain actors in Nicaragua through key informant interviews and producer surveys. Secondary information and trade data gathered from Trademap and CETREX was used to round out the picture by presenting current and potential global markets for coconut and value added products. Interviews were conducted with 10 coconut producers, three exporters, two non-government organizations with coconut programs, two coconut oil producers and one intermediary.

During fieldwork and analysis several limitations were present. A lack of willingness or inability of value chain actors to share their costs of operation as well as restricted geographical coverage during fieldwork resulted in limited quantitative data. Recommendations for inclusive development and future research can however be concluded from the relatively uniform results of the key informant interviews.

3. Market and Economic Context

3.1 Economic Context

Nicaragua has maintained above average economic growth for countries in Latin America and the Caribbean, as well as a steady expansion of exports, making it a favorable country for foreign direct investment and trade.

Despite major economic gains, poverty levels in Nicaragua remain high (24.9% live under the national poverty line as reported by the World Bank, 2016) and ongoing disputes over land ownership, price fluctuations of vital export commodities and natural disasters continue to hinder the agricultural sector, particularly affecting smallholder farmers. Of the approximate six million people in Nicaragua, 40.6% live in rural areas where the dominant economic activity is agriculture (FAOSTAT, 2017). Textiles and agriculture combined account for nearly 50% of all country exports and an estimated 31% of the labor force (2011 estimate, CIA) is employed in agriculture.

The Autonomous regions of the Caribbean Coast suffer a disproportionate level of poverty compared to the rest of the country. The last national census in 2005 showed rates of extreme poverty to be as high as 70.9% in The North Caribbean Coast Autonomous Region (RACCN) and 63.1% in The South Caribbean Coast Autonomous Region (RACCS) compared to a national average of 35.7% at the time.

3.2 Global Trend

The reputation of the coconut and its derivatives as healthy natural products has resulted in a new and growing demand for the fruit across several markets. The popularity of coconut water, milk, sugar and virgin coconut oil as well as coconut oil for cosmetic uses and coconut fibre for textiles, rope and bedding have resulted in increases in prices, with coconut oil alone more than doubling since 2013 according to the OECD (2016). Market predictions are bright for the coconut with a predicted demand growth of nearly 27% for coconut water, 15% for coconut milk, and nearly 10% for coconut oil by the year 2020 (Technavio, 2016). ITC predicts coconut water market to grow to 4 billion dollars by 2019.

Coconuts are commonly cultivated in the tropics, however commercial production is predominantly concentrated in Southeast Asia. Primary production is principally held in the hands of smallholder farmers in rural areas (80-90%) and contributes significantly to the agri-food sectors in the main producing countries (Philippines, Indonesia, India and Brazil) and incomes of smallholders across the tropics.

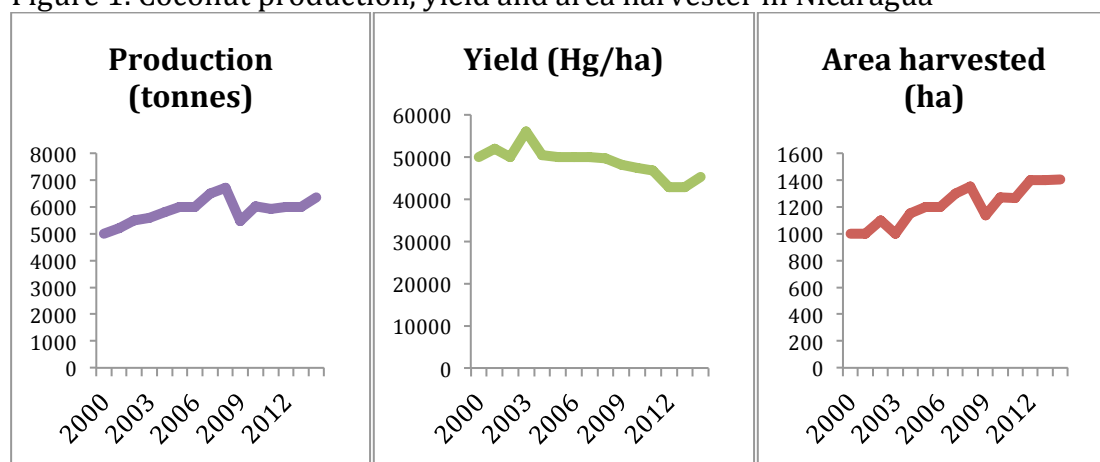
According to the FAO, one Mha of new plantations have been planted with coconut palms over the last decade. Despite this, global production has remained stagnant as a result of declining productivity; a result of aging palms, low access to inputs, underdeveloped institutional capacity, a variety of pests and diseases and frequent and severe weather events. At the same time there is a growing global demand for coconuts and coconut derivatives such as coconut water, coconut sugar and virgin coconut oil. It is estimated that global demand growth will be approximately 10% per annum, outstripping production growth, which stands at 2% by the same estimates.

Many governments in coconut producing nations are making efforts to improve production and capture a portion of the growing demand. In the Philippines and India replanting and rehabilitation programs are expected to increase productivity over the next 10 years. It is said that 70% of this will come from improved yields. Mexico has also announced several incentives to boost coconut palm farming in key states and new genetics are being introduced to the Caribbean to confront Lethal Yellowing disease, which has significantly reduced production in the past.

3.3 Domestic Trends

Coconuts are cultivated throughout Nicaragua with the main areas of production found along the Caribbean coast, primarily in the South Caribbean Coast Autonomous Region (RACCS). As can be seen in Figure 1, both production and area harvested have had consistent growth with the exception of a drop in 2009. Yields however have not followed the same trend and consistently fell between the years of 2003 and 2013.

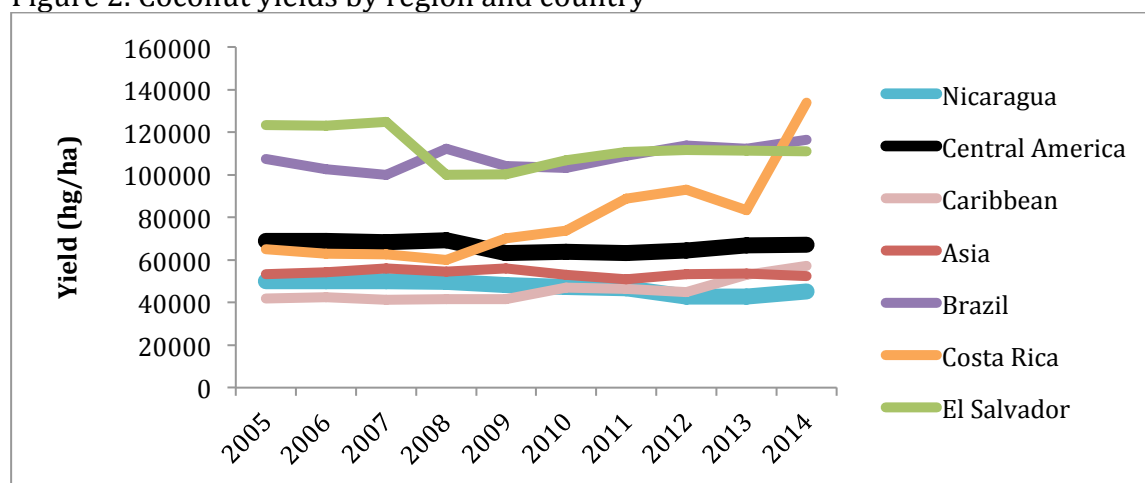
Figure 1. Coconut production, yield and area harvester in Nicaragua



Source: FAOSTAT

Nicaragua is a comparatively small actor in the production of coconut, representing a less than 0.05% share of total global production (the 64th biggest coconut producer). There does however exist opportunity for value addition and export of coconut and coconut products in the face of growing demand and stagnant production growth in main coconut producing nations. As seen in Figure 2 Nicaragua presently lags behind the average yields of both Central America and the Caribbean with the gap between Nicaragua and El Salvador, Brazil and Costa Rica representing the unrealized potential for yield gains.

Figure 2. Coconut yields by region and country



Source: FAOSTAT

The domestic consumption of coconuts in Nicaragua has stayed relatively level with only a 3.5% change between 2010 and 2014. Coconut is primarily consumed in the Atlantic regions of Nicaragua with slight seasonal increases recorded in the months of December and January. Coconuts are mainly sold in domestic markets as husked coconuts (coco seco) or shredded coconut with demand for value added products limited to cookies and sweets and coconut oil primarily targeted at tourists and niche markets.

Table 1 presents Nicaragua's exports in 2016 as reported by CETREX, with Italy the United States and Honduras being the top importing countries (by mass) for Nicaraguan coconuts. Exports were made to two additional countries in 2017: Colombia and Ecuador. By November 2017 exports had already totalled \$US 530,948.00, 46% higher than in 2016. This comes after 3 years of export growth stagnation in the coconut sector according to COMTRADE historical data and is primarily due to an increase in the average price received from \$US 0.37/Kg to \$US 0.71/Kg in 2017. The total volume of exports by November 2017 was 22% lower than in 2016.

Table 1. Nicaragua Coconut Exports 2016

Country	Kg	Value (\$US)	Percentage of Exports
Total	977,787.33	362,656.91	100%
El Salvador	17,871.00	7,418.16	2%
United States	201,225.33	82,786.75	21%
Honduras	143,800.00	12,862.00	15%
Italy	558,186.00	238,310.00	57%
Puerto Rico	38,480.00	14,800.00	4%
Dominican Republic	18,225.00	6,480.00	2%

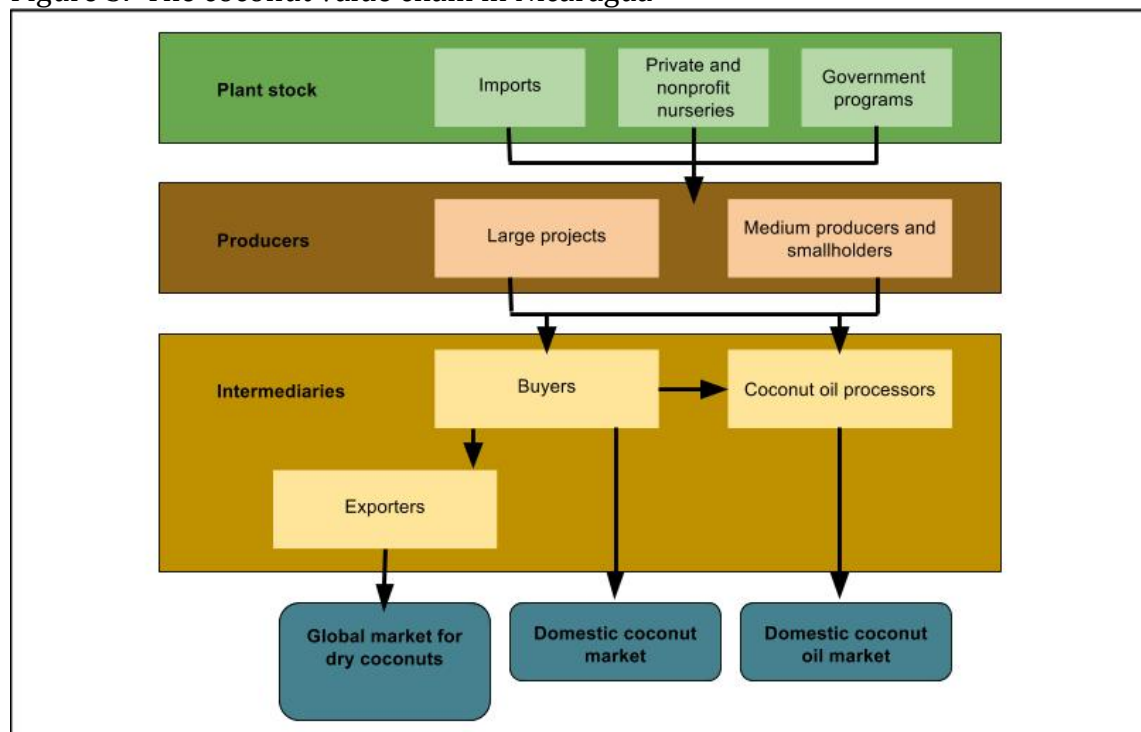
Source: CETREX

4. The Coconut Value Chain in Nicaragua

4.1 Value chain map and characterization of stages

The highest coconut-producing region in Nicaragua is RACCS depicted in Figure 3. The main value chain actors for coconut are presented in Figure 4. Product flows from producers to either global markets for husked coconut or domestic markets where husked coconuts are either sold whole, as shredded coconut or used in the production of coconut oil sold in niche national markets. Typically coconuts for export are collected at main points along the Atlantic Coast (Laguna de Perlas, Kukrahill, Monkey Point, Punta Gorda and Greytown) by independent buyers or contracted buyers and then transported by boat or truck to processing centers in Nueva Guinea and Rama. From here the coconuts are packed in containers, most commonly in bags of 40, and shipped to recipient trade partners.

Figure 3. The coconut value chain in Nicaragua



Inputs Quality planting material is critical in the cultivation of coconuts. Coconuts cultivars are typically classified into tall and dwarf varieties. Tall varieties are faster growing, lower maintenance, and have a longer productive life. Dwarf varieties become economically productive sooner and are easier to harvest. R&D activities have produced several hybrid varieties that cross tall and dwarf, mainly targeted at disease resistance and increased yields.

There are three main avenues by which producers can procure seeds and nursery stock for planting additional land or new plantations: through importation of seed, private and nonprofit nurseries or through government programs. The number of nurseries providing seed with improved genetics is limited in Nicaragua. FADCANIC runs a sustainable Agroforestry Centre located in Wawashang, RACCS, that provides several different varieties of coconut palm: dwarfs, hybrids and tall, including Malayan Dwarf, which is favored by producers and Brazilian Green Dwarf, which is currently being planted aimed at future coconut water production. The Center also has an established stand of Panama Tall, which is used for the production of pollen. There is one known private nursery on the Atlantic coast that is able to provide large orders of improved nursery stock. This plantation imports pollen from the Ivory Coast to ensure the purity of the genetics. Some larger producers also reported importing seeds from Brazil. A plantation run by INTA near Kukrahill has provided hybrid coconut seed in the past.



A coconut nursery in Wawashang

There have been several programs through government ministries as well as through FADCANIC that have provided seed and nursery stock to smallholder farmers to establish mixed gardens and small commercial plantations. Between 2005 and 2008 FADCANIC delivered around 63,000 plants of various varieties to 669 families in Laguna de Perlas, Bluefields, Kukrahill, Rio Escondido and Bluefields. MEFCAA (Ministerio de economía familiar comunitaria cooperativa y asociativa) aimed to establish 300 manzanas (214. 28 ha) of coconut in eight different RACCS communities to benefit 280 families (97% female led households) by 2015. The objective of the government project was to increase the technical abilities of coconut farmers and the commercialization of coconut oil (MEFCCA, 2017). A modern coconut oil processing facility with a capacity of eight gallons of pure coconut oil (or “virgin” coconut oil) per day was installed in Laguna de Perlas in association with the Association of Black Farmers. It is uncertain if the facility is still producing.

Production Production of coconut is labor intensive with a year-round harvest. The majority of coconut producers in Nicaragua are smallholder farmers with land parcels ranging between two and four manzanas (1.4 to 2.8 hectares). The producers interviewed in this study ranged between 1.4 and 10.5 hectares with a mean of 3.8 hectares. All the producers in this study with 2.8 hectares or less of coconut were at one point recipients of government or non-profit agricultural programs. Smallholder producers commonly travel by boat or horse to collection stations run by coconut buyers.

There are two major managed coconut plantation schemes currently in initial stages in Nicaragua, one near Kukrahill and one located in the department of Rivas on the Pacific coast. Managed coconut plantations offer investors the opportunity to purchase or invest in a managed plot or plots of land to be planted with coconut palms. The Returns based on production are awarded annually. The plantation near Kukrahill is managed by XAGRO S.A., one of Nicaragua’s main coconut exporters, and it is uncertain as to whether planting has commenced. The second is managed by Maderas Futuro (Precious Timber), an agricultural company that specializes in the growth of hardwood timber under managed plantation conditions. Maderas Futuro planted their first palms in 2014 and it was reported that they currently have around 500 acres planted with potential for 500 more. This is a considerably large project with intentions aimed at fresh fruit export and the coconut water market.

There are also plans for several large plantations to be planted in the near future. These plantations are specifically targeted at the production of coconut water. Currently The Coca-Cola Company is working to establish a plantation that may range in the scope of two million palms. New challenges are presented when producing coconut for the production of water. Access to regulated electricity for refrigeration in remote areas of Nicaragua can be difficult. This is compounded by complications with land tenure in RACCS in the face of large initial investments.

Intermediaries Coconut buyers work through contract or are employed by the two main coconut exporters, XAGRO S.A. and Nicarao. There are also independent buyers who make limited exports on an inconsistent basis or purchase coconuts for coconut oil processors. The price offered for husked fruit is dependent on three quality levels based on the size of the coconut. Currently the same price is offered on a per-unit basis regardless of the variety of coconut (For example, Malayan dwarf vs. Brazilian Green dwarf) or the quantity provided. Prices and specifications for coconuts are set by the



exporters and oil producers and communicated down through the buyers, to the coconut producers. In the current market there is a high degree of competition in the purchase of coconuts. High global demand and consistent production needs in the coconut oil industry translate into periods of increased farm gate prices. At the time of this study the farm-gate price for a first grade coconut ranged from 6.5 to 7 cordobas but producers and buyers reported prices in the last two years to have ranged between 5 and 10 cordobas on the Atlantic Coast.

FUNCOS (Fundación Nicaragüense Cosecha Sostenible) is a non-profit organization currently working in the commercialization of coconut and acts as a coconut buyer in communities in Laguna de Perlas, Kukrahill and Bluefields for approximately 165 producers. The organization also provides technical assistance and works to strengthen the capacity of producers in these regions.

Processors and Exporters As mentioned, there are two main coconut exporters in Nicaragua, XAGRO S.A. and Nicarao. The Coconuts are received at processing facilities where they are washed, sanitized and either packaged or processed further. Currently exports of coconut are limited to predominantly husked coconut and in a lesser amount, frozen coconut meat and fresh shredded coconut. Exports mainly go to Europe, the United States and other Central American countries. Some specialty value

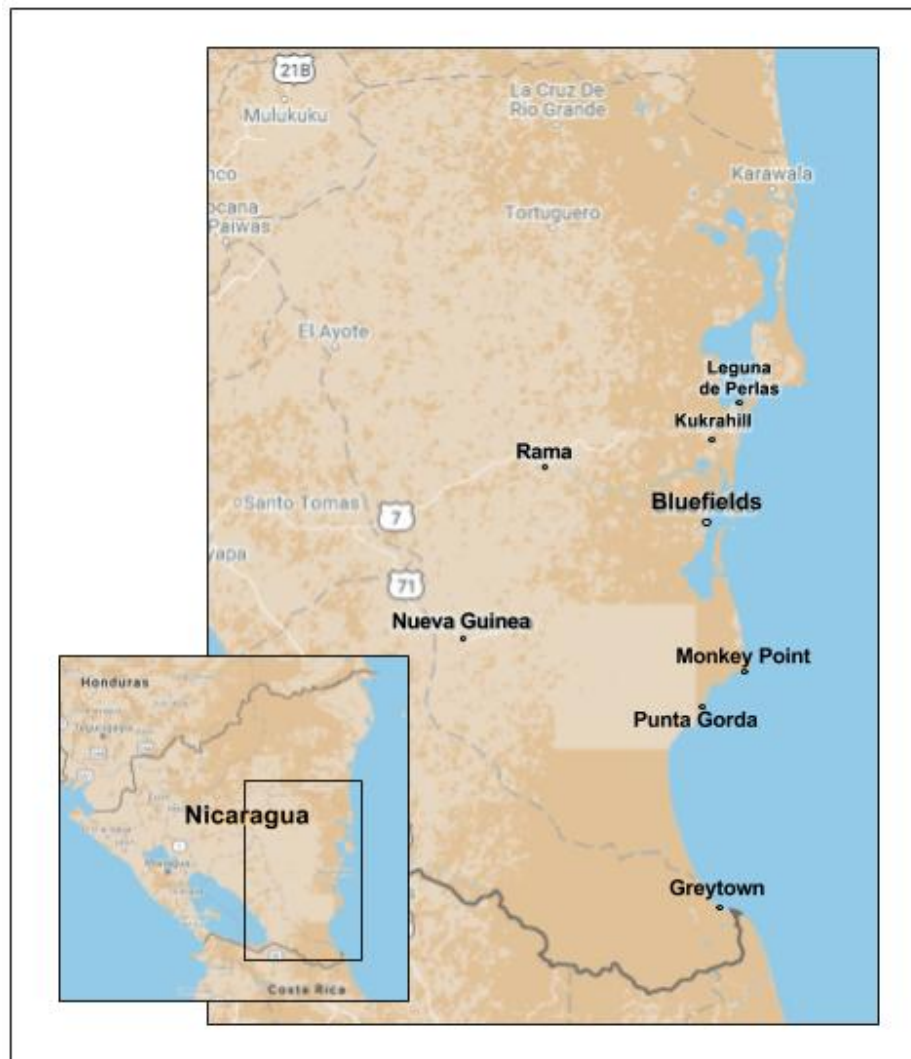


Dry coconuts for export at the Nicarao processing facility in Rama

added products such as dry coconuts with pre-cut grooves and a pull tab for easy consumption as well as an alcohol beverage aged, stored and served in a coconut are made for European and USA markets respectively.

There have been a limited amount of one-off coconut oil exports in the past but no firm is currently exporting. Coconut oil for cosmetic use as well as consumption is produced for the national market and sold in markets and specialty stores in the Pacific regions as well as select grocery stores in Bluefields. This study found only four firms producing coconut oil for consumption in Nicaragua.

Figure 4. Map of Nicaragua



4.2 Value chain analysis matrix

There is a strong market potential for coconuts in Nicaragua primarily dependent on global demand. The main bottleneck along the value chain is at the point of production with supply lagging behind the demand of exporters and oil producers. The infrastructure for exporting dry husked coconuts already exists with coconut exporters increasingly participating in value addition and secondary processing. However, increases in exports are currently limited by a consistent supply. Potential exists for the production and export of food grade coconut oil though this will require increased quantities in order to compete with prices in North American and European markets as well as consistent quality standards and certification.

Interviews with value chain actors resulted in a relatively consistent report of poor transportation infrastructure being an important factor in the production bottleneck. Poor transportation infrastructure increases marketing transaction costs and many producers must travel long distances by horse or water

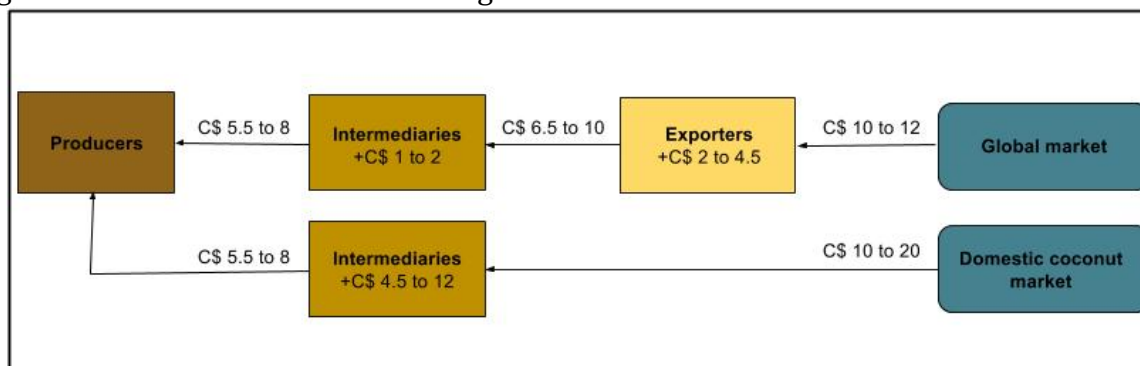
to sell their coconuts at collection points. Intermediaries must then transport the coconuts, either by truck or water, to processing facilities.

Coconut yields in Nicaragua lag behind Central American and Caribbean averages as seen in Figure 2. The dissemination of improved varieties of coconut palm was outside the scope of this study but information in this regard may shed additional light on the low comparative yields. Producers who were previous recipients of programs that provided coconut palms quoted limited access to financing and the affordability of inputs to control disease and pests as a challenge to the increased production of coconuts. Larger producers and potential producers cited uncertainty in land tenure and access to leased land in the autonomous regions as a major hindrance to production growth.

The coconut value chain has very few specific rules or regulations and governance runs from exporter to producer with the exporter acting as the lead firm, setting quality standards and communicating them through the intermediary to the producer. Producers learn how to meet requirements at their first point of sale. There exist persistent network relations in linkages between exporters and intermediaries. A persistent network relation is defined as a preference for a consistent transaction between firms with or without a contract and may indicate a high level of trust or interdependence. Though this exists between intermediaries and producers as well, producers will commonly sell to different intermediaries depending on the spot price being offered. There also exists a degree of vertical integration in cases where the exporting firm employs intermediaries or where oil producers are also producers of coconuts.

The share of value addition as seen in Figure 5 can also be used as an indicator of governance structure along a value chain. This study was unable to calculate the costs seen by producers in the cultivation of coconut and thus profit margins are unavailable. However, price information is useful to confirm the exporters as the lead-governing firms in the value chain. It is also worth noting that in the domestic market for coconuts, the intermediaries become the lead firms, creating the largest share of value addition.

Figure 5. Share of value addition along the coconut value chain 2016-2017



Note: Prices recorded on a per-unit basis. Price information collected through interviews with producers, intermediaries and exporters and cross-referenced with trade data from CETREX and USDA using a unit to pound conversion of 1.8.

Efforts have been made through non-profit and government programming (MEFCCA) to increase the capacity for value addition for smallholder farmers. Coconut oil production for national markets holds potential for small and medium sized producers and collectives, however, meeting quality standards and economically viable quantities are likely to be limiting factors for export. A coconut oil processing plant needs a constant flow of coconuts to stay in production (Around 10,000 coconuts a day according to one oil producer). This has also been a challenge for existing operations.

In the last two years both of the main exporting firms have been experimenting with, and exporting in a limited quantity, value added coconut products. This signals a shift towards the exportation of processed goods as opposed to predominantly fresh fruit. The value chain is also currently adapting for the production and collection of coconut water. This has been led by private innovation as well as government programs with the introduction of new varieties of palm to smallholders (Brazilian Green) and the planting and planning of several larger plantations. Access to electricity for refrigeration will be one of the main challenges for remote plantations along the Caribbean coast.

Table 2. Value chain analysis matrix

	Plant stock	Production	Collection	Exportation	Oil Production
Inputs	Pollen	Plant stock, fertilizer, pesticides	Husked coconuts	Husked coconuts	Husked coconuts
Activities	Production of coconut seed and nursery stock	Coconut production	Collection of husked coconuts and selling to exporters, oil producers, domestic market	Processing packaging and shipping	Oil processing
Outputs	Seeds and nursery stock	Husked coconuts	Husked coconuts	dry coconuts, frozen coconut meat, limited value added products	Coconut oil
Actors	Government ministries, private plantations, non-profit organizations	Smallholder farmers, plantation owners	Contracted or individual buyers	Agricultural exporters	Collectives and private businesses
Location and participation of the poor	Laborers	Smallholder farmers, landless farmers and laborers	Limited	Processing facility laborers	Cooperatives and laborers
Challenges	Importation of pollen costly, maintaining purity of genetics	Pest and disease control, access to financing, road access. Land tenure in Autonomous regions	High cost of transportation	Limited supply, high prices	Limited supply, cost of inputs and production, competitive pricing in global markets, weak national markets

Possible solutions	Support for research and development of coconut genetics	Micro-financing programs for the purchase of inputs combined with technical assistance. Availability of improved varieties	Better road access, increased yields to bring down marginal cost of collection	Establishment of large plantations, organization of producers on communal lands and support for building cooperative capacity, improved yields for smallholder farmers, better access to reduce costs of transportation	Establishment of large plantations, organization of producers on communal lands in support for building cooperative capacity, improved yields for smallholder farmers, better access to reduce costs of transportation, promotion of coconut oil in national markets
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4.3 Recommendations

Following a review of the stated challenges within the coconut value chain, there are several areas in which intervention has potential to ease the bottleneck and allow for a rise in production to meet volume requirements, increased value addition and higher exports. These recommendations are the result of the value chain mapping process and serve to suggest areas for further consideration.

In the past, coconut seed and seedlings have been provided to small producers through government and non-profit development programs, it was however expressed by the participants in this study, a need for inputs to combat pests and disease in their young palms. The establishment of asset-based micro-finance or micro-credit programs, or assistance in the procurement of additional inputs in the years immediately following a seedling offer may increase the success of coconut palm establishment and thus, the productivity and return on development programs. Micro-finance and micro-credit based interventions in combination with technical assistance may serve small farmers who are responding to the present market demand for coconuts from exporters and oil and water producers by increasing access to the appropriate inputs for coconut production as well as additional seedlings for those wanting to expand. This is however dependent on the availability of inputs and improved seed varieties.

Access and availability of improved varieties of coconut palm outside of development programs and proximity to the FADCANIC Agroforestry Centre is uncertain. This access and availability will likely be integral to small farmers' abilities to maintain economically viable coconut production in competition with existing and establishing larger plantations. Support for research and development of improved varieties as well as their dissemination is an area in need of further investigation. Nicaragua's participation in the International Coconut Genetic Resource Network (whose membership includes Costa Rica, Cuba, Brazil and Mexico) may also be considered.

The existing structure of intermediary buyers collecting and amalgamating the products of many medium and small producers serves to address the geographical obstacles of coconut production in the

Atlantic coastal regions. Continued upgrading of road infrastructure will further reduce costs of transporting coconuts to processing facilities. The coconut collection network could be utilized in the offer of inputs and financing to low-access areas. The One Acre Fund (www.oneacrefund.org), a social enterprise working in the empowerment of small-holder farmers in East Africa, provides an example of a core program model that offers financing, inputs, marketing and technical assistance combined in an economically viable model that reaches geographically diffuse and remote small-holder producers.

In the past and according to key interviews in this study, the land tenure systems in the autonomous Atlantic regions (RACCS and RACCN) have been an obstacle to the establishment of large coconut plantations. In place of large company-owned plantations, coconut production has largely remained in the hands of small and medium producers. With several large projects in the works, including investor-based projects and the involvement of multinational corporations, economies of scale are likely to remove many obstacles related to infrastructure and supply. It is however recommended that further consideration be paid to how this might effect low-income and small-holder farmers who have been recipients of non-profit and government programs to strengthen their livelihoods through the introduction of coconut cultivation. Displacement and smallholder's inability to compete with lower farm-gate prices are potential consequences. Support for building cooperative capacity and vertical linkages between producers and buyers may help prevent small farmers from being left out of the gains from growth in the industry and the development of higher-value coconut products.

5. Conclusion

Coconut has seen increasing global demand in the face of stagnant supply. This has created opportunities of many developing countries to capture market share through private investment in coconut production as well as policy and programs that incentivize and support the production of coconut.

Given the global demand for coconut and, with several large plantations in the planning and establishment phase, Nicaragua's ability to increase exports of fresh fruit and value added coconut products is promising if not inevitable. However, with the advantages of the economies of scale and the existing challenges for small producers in the value chain, the inclusion of the often low-income small producers in the value chain will be threatened.

The value chain map and analysis matrix provides an overview of the coconut value chain in Nicaragua with a focus on RACCS as well as possible interventions for the inclusive strengthening of the value chain. The development of an initial value chain map and map matrix provide a basis for undertaking a full value chain analysis by delivering the information needed to determine specific actors, geographical scope, important information and significant information gaps. It was found that coconut production is not keeping pace with demand from export and oil producing firms. This has created a bottleneck in the coconut value chain at the point of production and has presented challenges for the development of value added products for export. Small producers often lacked access to inputs after the initial procurement of coconut seed and poor transportation infrastructure increased marketing transaction costs. Difficulty in securing land in RACCS has slowed the establishment of large plantations, however, currently there are several in the works. Various potential solutions to challenges faced in the coconut value chain were provided. It is recommended that a full analysis be conducted with the participation of value chain actors in decisions regarding interventions.

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