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It's Essential: The Ylang-Ylang Trade on Nosy Be

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It's Essential: The Ylang-Ylang Trade on Nosy Be



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Madagascar: Biodiversity and Natural Resource Management

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Misaotra betsaka antsika jiaby!!

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Introduction

The island of Nosy Be, situated eight kilometers off the northwestern coast of Madagascar, is the nation's most developed tourist destination. A large portion of Nosy Be's economic activity is derived from visitors who flock to the island to enjoy its beaches, all-inclusive resorts and famed marine biodiversity. In the cargo holds of the planes that most foreign tourists take to return home lies the coveted oil of Nosy Be – the *Cananga odorata genuina*, commonly known as Ylang-Ylang. Used in fragrancY products ranging from perfumes to cosmetics and soaps, the sweet, floral notes of the flower have distinguished Nosy Be as “l'île aux parfums” or The Perfume Island.

Ylang-Ylang essential oil is said to be used as a significant ingredient in Chanel's famed N°5 perfume, a fragrance that has international recognition (The National, 2015). Coco Chanel, the founder of the fragrance giant famously said she commissioned N°5 to create “a woman's perfume, with a woman's scent” (Young, 2014). The essential oil is likewise a scent employed by notable perfume producers such as Guerlain, Tom Ford and Dior.

The Ylang-Ylang tree is native to the Pacific islands of south east Asia, and it is believed to have originated in the Philippines (Manner & Elevitch, 2006). At the end of the 18th century, French traders brought the tree's seeds back to the colonial territories of Reunion and Mauritius (de Bontin, 2006). By the end of the 19th century, the French had established large plantations on their colonized lands. The tree was introduced to Nosy Be and other parts of Northern Madagascar in the 1920's by French missionaries (Ministère du Tourisme, 2018), who later introduced the species to the neighboring islands of Comoros and Mayotte. The French employed a plantation system of agriculture wherein they laid claim to the fertile agricultural lands for large plantations of the Ylang-Ylang tree and established distilleries for the oil on-site (Bikiny, J.-C., personal communication, April 15, 2019).

The Comoros and Madagascar, Nosy Be in particular, are the two largest producers of the essential oil in the world. The Comoros has the largest share of the market with an estimated 60% of production (Ramsay, 2018) while Madagascar contributes close to 25% of the world's supply of Ylang-Ylang essential oil (Detours Madagascar, 2019). The production of the essential oil has been ramping up in recent years as demand in the fragrance market has shifted away from synthetic compounds to the natural flavors and fragrances chemists try to mimic (Pechman, 2016). With an uptick in demand, the price for the flower and especially the price of the finished oil have both increased dramatically. Nearly everybody that I spoke with on the subject of Ylang-Ylang said that there has been a noticeable increase in production and price of the oil.

According to 2006 report on the industry in the Indian Ocean, Madagascar exported 10-15 metric tons of essential oil (Doyen, 2006). Twelve years later, according to data obtained at Customs in Hell-ville, Nosy Be exported close to 35 metric tons. The higher price for flowers and for the oil had led to more farmers growing the tree as a cash crop to supplement their income. According to franceinfo, a French TV program, an estimated 30,000 people (around half of the population) directly benefit from the production of the oil on Nosy Be (Franceinfo, 2018).

Despite an increase in the price of the flower, and the benefits that accrue from the commerce of the oil, the industry faces many challenges that threaten the future viability of Ylang-Ylang cultivation. The traditional distilleries of the flower require significant amounts of firewood, posing a threat to Nosy Be's already susceptible terrestrial environment. Moreover the excessive cutting of the forest has led to a decline in usable firewood for distillers, which will result in a lower yield of the essential oil. Finally, the system of commerce is imbalanced. Foreign buyers make the biggest returns off of Nosy Be's

incredibly rich natural resource, and the remaining, more limited profits are unevenly divided among the different stakeholders on the island.

This paper attempts to describe the production and sale of Ylang-Ylang from cultivation of the tree to the export of the flower, and examines the roles and power that each stakeholder has in the value chain. From there, the paper will look at issues associated with the trade; namely of the threat to the terrestrial ecosystem and the profit imbalance in the industry. Finally, the paper turns to potential strategies to resolve the previously stated issues associated with the production and sale of Ylang-Ylang. As a whole I hope that the paper can be seen as a rough survey of the system of Ylang production on Nosy Be and its associated issues, which might help inform new strategies for improving the industry and the economic fortunes of those that rely on it.

Methods:

The initial phase of the research project took place toward the end of March 2019 as I prepared for field work on Nosy Be. This consisted of a brief review of relevant literature in SIT's library, as well as any material that I could find online. I arrived on the island on the 1st of April, and began work on my project on the following day. I was graciously housed by Gisèle Bakary, a technician at the National Center for Oceanographic Research (CNRO) in Hell-ville, which afforded me an opportunity to immerse myself in the daily life of the island and matters concerning the industry of Ylang-Ylang.

I utilized the methodology of semi-structured interviews for each of the 13 of individual interviews completed. The majority of these were conducted in French, however when the interviewee spoke only Malagasy, the services of a translator were required. For three of the interviews, Nicolas Jaosedy, a researcher at CNRO, translated my questions

posed in French into Malagasy and participant responses from Malagasy to French. Participant responses were written down in my notebook in a mixture of French and English, and on three occasions I recorded responses using a voice recorder app on my phone. From April 2nd to April 16th, I conducted interviews of four main groups of individuals: government officials, distillers, small cultivators and exporters of the essential oil. While I conducted the majority of my interviews in the main city of Hell-ville, I traveled on several occasions to Ylang-Ylang cultures and distilleries in the surrounding villages of Nosy Be.

In addition to simply talking to interview participants, I was also able to witness the process of Ylang-Ylang essential oil production, including cultivation, distillation and exportation. This was achieved by visiting both large plantations and small flower cultures, as well as seeing a sliver of the 24-hour distillation process at both informal and formalized distilleries. Additionally, I visited a Ylang-Ylang nursery, as well as the company's quality control site where the different densities of the oil are measured.

I returned to Antalaha on April 18th and spent the remaining days of the ISP period conducting necessary research, consulting with my academic advisor, and completing the final paper.

Ethical Considerations and Problematic:

Since the study relied heavily on interviews of the local population on Nosy Be, I had to ensure that my interactions with each interview subject were carried out in an ethical manner. Only adult subjects that were 18 years of age or older were selected to be interviewed. Prior to the start of each interview, I stressed that the participants' involvement was voluntary, uncompensated and promised to keep their information anonymous upon request. I also told each participant that they could end the interview at any time, and for whatever reason. When the interview was conducted in French, I obtained verbal consent in French. When the services of a translator were required, my translator obtained consent

verbally from the participant. Prior to conducting the interview, I stressed the need to obtain consent with my translator when he was needed for interviews in Malagasy.

Results

Part I: History and Market Forces

From the time it was introduced to Nosy Be in 1920, the Ylang-Ylang tree has been farmed by small-holder farmers and by large companies with colonial roots. The French, claiming dominion over the isle, cleared large plots of land for their tree plantations and established distilleries to process the flower into oil. Some small-holder Malagasy farmers became pickers of the flower, or distillers in the French-owned distilleries, but a large portion were displaced from their farm lands (Bikiny, J.-C., personal communication, April 15, 2019). Many rural Malagasy farmed the Ylang-Ylang tree and sold their yields to the handful of large colonial distilleries who controlled the market from the production stage until its export (Bikiny, J.-C., personal communication, April 15, 2019). Even after Madagascar gained independence from France in 1960, the legacy of the plantation economy is still present in Nosy Be today. Many of the original French plantations are still intact on the island (de Bontin, 2006). One company, the Société des Produits à Parfum de Madagascar (SPPM) provides a clear picture of the colonial legacy of the industry and its impact on current commerce. The enterprise was founded by French missionaries who created distilleries on the island, as well as on Madagascar's mainland and in the country of Mayotte (SPPM, n.d.). SPPM is now the leading producer of the essential oil in the world (SPPM, n.d.) accounting for half of Nosy Be's exports (Franceinfo, 2018). Estimates vary about the company's reach but some interviewers estimated that they own a third of the island's cultivatable land.

According to Jean-Claude Bikiny, the President of the Platform for the Environment & Development of Nosy Be, local Malagasy people continued to be displaced through the 70's and 80's. This time, however, locals were forced out because of the development of tourism on the coasts of Nosy Be. The coastal Malagasy were driven out “because the beaches were given to investors or developers. The Malagasy people were forced to go to the mountains and to cut down the forest to survive. After that, they started to plant Ylang-Ylang” (Bikiny, J.-C., personal communication, April 15, 2019).

Whether it was the French colonizers during the colonial period, or tourism developers in the latter half of the 20th century, Malagasy farmers on Nosy Be have been displaced to serve the economic needs of others. For most of the industry's history on Nosy Be, Malagasy farmers have been relegated to being pickers on the plantations or small-holder farmers forced to sell their flower yields for far below market value (Bikiny, J.-C., personal communication, April 15, 2019). Small scale farmers have long been shut out of making the more profitable value added product of Ylang-Ylang essential oil, and instead have had to simply provide the raw materials for the oil. With a new generation of Malagasy entrepreneurs and craftsmen, however, that is starting to change. One distiller told me that his grandparents sold the flower to the large colonial companies on the island, but he wanted to do it differently. According to Albertosie Tiandraza, “I decided that I won't stop at only growing Ylang-Ylang, but that I would build a distillery.” Tiandraza built his distillery by himself four years ago at a cost of six to seven million Ariary (or €1,500-€1,750). He has heard of other distillers paying upwards of 40 million Ariary in order to produce the more lucrative essential oil (A. Tiandraza, personal communication, April 9, 2019).

The island has relied heavily on tourism since the development of the sector in the 1970's. A significant source of economic revenue is generated serving tourists in the form of hotels, restaurants, transportation, guides and eco-tourist destinations. According to the

Regional Office of Tourism: Nosy Be, there were upwards of 72,000 foreign visitors to the island in 2017 (ma-TV, n.d.). Nosy Be is one of Madagascar's most developed tourist attractions, with "western" incarnations like super markets, European-style cafés, and discotheques. Much of the job opportunities associated with the tourism industry, however, are concentrated in the urban or semi-urban areas of the island: namely Hell-ville, Ambatoloaka and Ambondrona. The rise of all-inclusive resorts has excluded the surrounding community from conducting economic activity with foreign guests unlike the way traditional hotels are structured (Bikiny, J.-C., personal communication, April 15, 2019).

Other than tourism, Nosy Be had two heavy industries that were huge economic drivers for the island until the mid 2000's. The Malagasy company SIRAMA, the nation's leading sugar producer employed 3,000 people at its height before it closed, while the "Pecherie de Nosy Be" an industrial fish processing plant employed another couple thousand (Bikiny, J.-C., personal communication, April 15, 2019). Together these two companies directly employed a significant portion of the population, and their business had many indirect economic benefits for the island. Bikiny told me that the two industries benefitted around 60% of the population (Bikiny, J.-C., personal communication, April 15, 2019). In the last decade or so, Nosy Be has seen a collapse in their large industries, resulting in large-scale job loss. The Pecherie closed in 2005 to move to the city of Ambanja on Madagascar's mainland, and SIRAMA filed for bankruptcy in 2006 and has since been operating on a smaller scale. Although SIRAMA has made many promises of returning to full scale production, as of writing this, the corporation continues to operate far below what they are capable of producing (Ihariliva, 2018). Ten years after they ceased production, the economic impact of their departure has been lasting according to Lanto Benjafy, the Executive Director of the Chamber of Commerce.

With the hotels and resorts occupying the urban and coastal areas of the island for touristic endeavors, and the closing of the two largest industrial plants, many Malagasy workers flocked to the production of Ylang-Ylang. Bikiny explained that those who were educated went to look for jobs in the tourism sector, “but the others were obligated to work in Ylang-Ylang.” An influx of new cultivators joined the existing workforce of small farmers whose families had themselves been displaced, first by colonial forces and later by increased coastal development for tourism in the 1970’s (Bikiny, J.-C., personal communication, April 15, 2019). Up until the closure of the industrial plants, some of these families had been producing the flower for multiple generations.

Part II: Stakeholders

In this section, I focus on the different players that are directly involved in the production of Ylang-Ylang ranging from the flower to the finished product. These actors for this study are limited to: cultivators, collectors, distillers, exporters and officials. Although Ylang Ylang has a far greater impact on the island than solely on this limited list of actors, I have decided to narrow the scope of interviewees to ensure that I can properly explain and synthesize each group’s role and relationship to the other. It is also important to note that many of these groups are not strictly limited to one single role. Unlike some industries in Madagascar, namely the Vanilla industry in the SAVA region whose structure is more rigid, those that work in Ylang-Ylang are often both cultivators and distillers; and exporters are sometimes collectors. During my time on Nosy Be I met every combination of role described above.

Small Cultivators

At the base of the supply-chain for Ylang-Ylang oil are the hundreds of small farmers of the flower, and a handful of distillation-export companies that have large plantations. As such, a large portion of Nosy Be’s land, especially outside of the dense urban core of Hell-

ville is dedicated to the cultivation of the Ylang-Ylang plant. The actors who make up this rung of the production ladder are small-holder farmers and pickers.

First I will describe the agricultural and commercial practices of farmers who cultivate the Ylang-Ylang tree. According to the Minister of Agriculture, Hensley Pelerin, the process begins by clearing out any vegetation on the desired plot of land. Some growers fertilize the soil using zebu excrement and cover it with straw and grass clipping as a light ground cover (Jean-Claude, personal communication, April 4, 2019). Next, juvenile trees are transplanted from a nursery into holes and spaced between 3-6 meters apart. After about 2-3 years of growth the tree is topped at around 3 meters by trimming the “gourmandage,” or trunk. This prohibits the tree from growing to its full height of 10-20 meters, and allows for maximum sunlight to reach its branches which increases the amount of flower production (Manner & Elevitch, 2006). The lopped trees may look slightly bizarre due to their shape, but they are trimmed in order to maximize flowering and facilitate the picking of the flower as well (Figure 1). After three years in the soil, the tree will start to produce flowers. Ylang-Ylang is particularly adapted to Nosy Be’s “volcanic soils” and the island’s hot and rainy climate (H. Pelerin, personal communication, April 2, 2019).



Figure 1: A large Ylang-Ylang plantation outside of Hell-ville, Nosy Be

An area of 2.5 acres (around one hectare) will produce around 400 square feet of the Ylang-Ylang tree, according to Mr. Pelerin, and each tree produces on average between 10 to 20 kilograms of flowers per year (Manner & Elevitch, 2006). From participant interviews, most growers had small plots of land, on average about 2-10 hectares large, on which they split their cultures between Ylang-Ylang and other crops. Most of these crops were fruit crops that were not expressly grown to be sold at a market, but rather to be consumed by the growers and their families. Ylang-Ylang is clearly a cash crop that is grown purely for generating revenue and not for consumption. As the price for the flower has increased dramatically over the last decade, however, most of the small farmers I spoke with have opted to dedicated more of their land to grow Ylang-Ylang.

The flowers of the Ylang-Ylang plant are best harvested in the early morning, from around 6 to 9 am, before the sun dries out the flower and the oil contained within its leaves (Manner & Elevitch, 2006). The industry is surprisingly patriarchal and gender roles play a huge role in deciding who does what on a given operation. The task of picking the flowers is done almost entirely by women, particularly those that work for the large essential oil producing companies, because it is a job that is viewed as appropriate for them while the job of distillation is done nearly exclusively by men (Fabrice, personal communication, April 5, 2019).

After picking the flowers, time is quite literally of the essence as they must be transported quickly to a distillery so that the maximum amount oil is retained for the production of the essential oil. For small-holder farmers that do not have their own artisanal distillery, they either sell the flower directly to the owners of informal and formal distilleries, or to collectors who eventually transport the flower to distillers. These farmers usually have very small cultures of Ylang-Ylang and are generally poorer than the other players in the scale of production.

Prices, however, are rising for this group of cultivators whose livelihood is increasingly dependent on the Ylang-Ylang tree to support their household. The clearest quote that I received about the evolution of the price for the flower was that it increased fivefold in the period of 2008-2018 from 1,000 Ariary to 5,000Ar per kilogram (Jaomanonga, personal communication, April 11, 2019). In U.S. currency this amounts to a change from 30 cents to \$1.50 with today's exchange rate. Most estimates hovered between the 500Ar-1,000Ar/kilo mark up until around 2011 where it has since seen a gradual price increase. It seems that 5,000Ar/kg is a median price for the flower in today's market, a marked increase in the days where the flowers were bought by a handful of large companies for mere cents per kilogram.

The second sub-group that is a part of the label of "small cultivator" is the picker who works in the fields of the large Ylang-Ylang companies. This role is filled entirely by women who work from the hours of 6-9 am picking the flower when it is still fresh and full of oil. These women work for the handful of large corporations that play the role of cultivator, collector, distiller and exporter. Like companies in any other industry, each employer has different relationships and labor standards with their employees. The pickers at the Bevoay Agricultural Company (SAB) sign a contract that affords them a monthly wage and they receive "benefits" (Fabrice, personal communication, April 5, 2019), while at the Hassanaly & Sons Company, pickers and distillers are payed on commission (Jean-Claude, personal communication, April 4, 2019). According to the foreman at the SAB plant, workers make "decent" wages and he generally thinks that the presence of SAB is overall a benefit to the community (Fabrice, personal communication, April 5, 2019). Pickers at SAB and Hassanaly work only in the morning, and many have other employment that supplements their income.

Informal Distillers

The next group of stakeholders are the informal distillers, who often happen to be growers and collectors of the flower. I have assigned this label in order to better encapsulate a group that participates in multiple different processes of Ylang-Ylang production and commerce. Although informal and formal distilleries look nearly identical in form, informal distillers do not possess the paperwork that legally authorizes the production and commerce of Ylang-Ylang. In order to reach the status of “formal,” a distiller must pay yearly taxes on each still they own, as well as a host of initial fees to register with the Fiscal Office of Nosy Be.

According to the most recent survey of the industry by the Civil Society for the Environment Mandresy Nosy Be, informal distillers own on average 1-2 “alambics” or stills (Voca, 2018). Some informal operations have up to five stills, which is comparable in number to the large companies on the island. Most of the informal operations have their own land where they grow the Ylang-Ylang tree, making it easy to cultivate transport and begin the 24 hour distillation process of the flower. An informal distiller often plays the role of collector as well. Since most informal distillers have small plots of land ranging from 2-10 hectares, flowers from neighboring cultivators are needed to supplement their own supply. Distillers cultivate relationships and business partnerships with those in their community who don’t have the funds to build or buy their own distillation equipment. The families of two of the distillers I talked to had been cultivating and selling the Ylang-Ylang flower for generations, but it wasn’t until their own generation that they began distilling the flower for its oil.

A typical informal distillery consists of two large “pots” constructed out of either galvanized sheet metal or copper whose bottom half is insulated with a layer of concrete or homemade brick (de Bontin, 2006). One pot sits atop a furnace where the firewood that is used to heat the distillery is placed, while the other has a snaked tubing system that pumps

cold water into the pot from a water source on-site (Figure 2). As it was explained to me, the flowers (between 80-200 kilos at a time) are placed in boiling water. Next the water and essential oil vapor rises through a tube connecting the first pot with the second. The tube passes through the water in this pot which is a mix of cold and hot water, causing the water and oil vapor to change states into a liquid solution. Finally, the mix of oil and water drains into a bottle partly filled with water. The oil rises due to its density and is drained into a storage vessel. The entire distillation process takes a full day, however “fractions of the oil are collected over the course of the distillation to obtain the different grades” of extract, and 1st, 2nd and 3rd qualities (de Bontin, 2006).



Figure 2: The heating pot of an informal still

There are currently 123 different known distillers operating a total of 240 stills on the island of Nosy Be, according to a 2018 survey (Voca, 2018). The vast majority of the operations on the island are classified as informal. In fact, the survey only identified eight of the 123 as formal operations on the island (Voca, 2018). Some informal distillers who have multiple stills, however, chose to declare a single still while keeping the rest undeclared in order to pay less in taxes and other fees. Therefore, while the number of fully legitimate

businesses are sparse, the number of individually registered stills is probably higher. One distiller declared only one out of his four stills in order to reduce costs while simultaneously outwardly showing the state that he has a legitimate business (E., Dزامандзар, personal communication, April 3, 2019). In general, only handful of operations are fully registered with the state.

The final product is bottled according to varying densities that determine the different qualities of the Ylang-Ylang essential oil. Prices vary depending on the contact, and who the oil is sold to. One distiller told me that he sells his oil to a collector from Hell-ville for 500,000Ar per kilogram for the 1st grade of oil, and 300,000Ar/kilo for the 3rd grade (E., Dزاماندзар, personal communication, April 3, 2019). The other informal distiller I talked was able to sell a kilo of 1st degree oil for a maximum price of 560,000Ar and on average sells a kilo of 3rd degree for 330,000Ar (A. Tiandraza, personal communication, April 9, 2019). Most informal distillers lack the contacts that would allow them to export the essential oil outside of Nosy Be (L. Benjafy, personal communication, April 16, 2019). Most years, the number of exporters that can directly export their products abroad number between 8-12 (Voca, 2018). Furthermore, given their informal status, they are barred by the state from exporting their products due to industry regulations, sanitation standards and because they don't pay taxes to the state (Bikiny, J.-C., personal communication, April 15, 2019). Despite most informal distillers telling me they would like to send their products directly abroad, they are resigned to selling their oil to a collector-exporter or to the large enterprises. The middlemen are able to set a price for the oil that is far below the market valuation for Ylang-Ylang essential oil. As one exporter put it "It doesn't suit my business, but I don't have contacts [abroad] which is why I sell what I have here [to a collector]" (A. Tiandraza, personal communication, April 9, 2019).

To formalize a distillery requires a good amount of time, money and know-how of the bureaucracy of Madagascar's business and regulatory sectors. An initial fee of 320,000 Ariary must be paid to register the distillery with the state, and a tax of 400,000Ar per year is applied (E. Dzamandzar, personal communication, April 3, 2019). Registering one's distillery with the state and paying taxes ensures the legitimacy of one's business in the eyes of the state. Tiandraza, believes that the cost "isn't expensive, we just aren't used to doing that...going into the office and all that." Some distillers, in fact, are able to pay off the initial fees and taxes with a single order from a collector. Formalizing one's distillery also opens up the possibility of exporting one's own essential oil, instead of having to sell to a collector or large company. This means an increase in profits because the middle-man collector is cut out of the process.

In any event, there is little to no enforcement of the informal distilleries by Nosy Be's police forces, or by any other mechanism of government. Most distillers rarely interact with the government or the police at their place of work or their residence (Marie, personal communication, April 9, 2019). Nevertheless, I heard the label of "clandestine" being attached to the informal distillers by government officials and from a senior employee at SAB, giving the impression that their work was illegal and necessitated a degree of secrecy. This was not the situation that I saw on the ground at the distilleries. The "clandestine" distillers don't view themselves as criminals nor do they feel the need to keep their operations secret. Tiandraza, however told me "I've taken notice that especially with the new president...in order to continue my work I need to get my papers and permits in order."

Large Ylang-Ylang companies

The third and final stakeholder affiliated with the production of Ylang-Ylang essential oil are the big enterprises that are directly involved in every step of the process. From the cultivation of the flower all the way to the export of the Ylang-Ylang essential oil, a handful

of companies dictate much of the production and sale of the flower. Thus, they play the roles of cultivator, collector, distiller and exporter. According to Voca's survey of the industry, there are seven companies on the island of Nosy Be, and all but one are assigned the status of formal operations (Voca, 2018). A portion of the companies operating today are remnants of the old colonial era, and their business leaders are often the descendants of French-Malagasy metis.

The major companies have their own Ylang-Ylang plantations that provides the main source of flowers for the distillation. Many of them also have their own land where they harvest trees for firewood use, and they source water for the distillery from their own sources on site. When the flower arrives from the fields to the distillery, each batch is weighed prior to the start of the distillation process. According to the foreman at the SAB distillery, the company sources its wood and water from its own land (Fabrice, personal communication, April 5, 2019). Occasionally they are forced to buy wood or flowers from local sellers because of their limited supply. SAB distills six out of seven days of the week, and for 24 hours at a time. The distillery that I visited at SAB was similar to the artisanal stills that I saw at the distilleries of the informal distillers (Figure 3). By looking at different media, it is clear that SPPM has much more modernized distillation equipment (Franceinfo, 2018). To keep up with the demand from abroad, it is common for the main companies to buy the raw materials needed for the distillation and the finished oil from informal distillers or collectors.

Companies that have artisanal or tradition stills can achieve an oil yield of 1-2% of the weight of the flowers. More modern distilleries like the ones that SPPM employ can obtain a yield of 2-5% of the mass of the flower. For one of SAB's traditional stills that has a capacity of 128 kilos, between 2-4 liters of oil are extracted (L. Anjary, personal communication April 10, 2019). The large companies are able to make all four kinds of essential oil: extract, 1st degree, 2nd and 3rd qualities. These distinctions are classified based

on “specific gravity at a temperature of 27°C (the average local temperature), into the four grades” (de Bontin, 2006).

Before the order can be sent abroad, the export company must send samples of their product into a laboratory for testing (L. Benjary, personal communication, April 16, 2019). This is required by importers to ensure that they receive the correct grade of oil and that there are no impurities. Since there isn't a lab on Nosy Be, exporters ship the samples by air to a laboratory in Antananarivo. That information is then relayed to the importers who analyze the results of the chromatography done on the oil. The Chief Financial Officer of SAB, Lucienne Anjary, told me that the samples they must send to Tana are a large inconvenience because the company must pay many different fees and fares to ensure that their oil is up to standard. She went so far as to say that the laboratory process was one of the biggest problem's facing SAB's work.



Figure 3: SAB's distillery in Ambatozavavy

The extract, which is the hardest to achieve in the distillation process (A. Tiandraza, personal communication, April 2019) sells for the highest price, and the price falls for each different category thereafter. I was able to verbally obtain some statistics from on the prices

of their most recent exports and the fees that they are charged. According to Anjary, SAB was paid 215 Euros per kilo for Ylang-Ylang extract, and 185 Euros/kilo for the 1st degree. On every export order, the company is charged 4,500Ar/kilo (1.12 Euros), as well as a “forestry tax” of 1.5% that is applied to the total value of the order. On top of that, the company pays the bank a fee and covers the cost for the storage units and packaging that hold the oil.

The 8-12 exporters of Ylang-Ylang essential oil are largely made up of the main enterprises on the island. Though there are a few collectors who export some essential oil abroad, most of it is done by the large companies. Exporters sell their oil for a wide range of prices. There isn't an “international price” for the commodity of Ylang-Ylang oil that is established by the global market. It is instead whatever price the exporter can negotiate with the buyer abroad (L. Anjary, personal communication, April 10, 2019). Since there is no defined price at which to buy the essential oil, foreign buyers have an advantage over an exporter on Nosy Be because the buyer can set the price. There is also little communication and cooperation among exporters, according to Anjary. Every exporter works with individual clients from abroad to set an agreed price per kilo of Ylang-Ylang essential oil. Exporters are reticent to share who their buyers are and the price at which they priced the kilo, out of fear of being undersold by competing exporters (L. Anjary, personal communication, April 10, 2019).

Seven companies control much of the industry of Ylang-Ylang, with a strong hold on production, collection, distillation, and exportation. They have no control, however, over the foreign buyers who have the upper hand in determining the price that they are willing to pay.

Part III: Deforestation

The rise in production of the Ylang-Ylang tree due to the increase in the export price of its oil has led to a high rate of deforestation on the island of Nosy Be and an accentuation of the power imbalances in the industry. As landowners begin to plant Ylang-Ylang on their plots and more Malagasy entrepreneurs and businessmen and women enter the distillation and exportation market, the issues associated with the industry have become more apparent.

Nosy Be is most noted by tourists for its beaches and marine life, but the island hosts a decent amount of terrestrial life given its size. The island boasts the Lokobe Natural Reserve, and the western coast of the island in particular has more intact forests than the rest of the island. The numerous sacred lakes on the island as well as the hillsides not yet claimed by Ylang-Ylang are ringed by primary forest cover (Figure 4). The production of Ylang-Ylang is quickly becoming a threat to the terrestrial ecosystem of the island.



Figure 4: An aerial view of the island. Credit to NASA WorldWin

When it is planted, the tree prefers direct sunlight, meaning that existing trees and vegetation must be removed (H. Pelerin, personal communication, April 2, 2019). Furthermore, during the distillation phase, large amounts of firewood are needed to fuel the 24-hour distillation of the flower. These agricultural practices have a big effect on the amount of forest cover on Nosy Be. A typical artisanal still that has a capacity of 50 kilograms of flowers generally requires 6m^3 of firewood for each distillation (Voca, 2018). During a given

week, a distiller might extract oil 2-4 times a week, depending on the season of production of the flower (Voca, 2018). The large Ylang-Ylang companies have much larger distilleries with multiple stills of high capacity, meaning that they require far more wood than the small oil producers. With at least 240 stills on the island according to the Voca survey, the forests of Nosy Be “find themselves in a catastrophic situation and are likely to disappear.” As one distiller put it, “We no longer have the natural forest, it’s the Ylang-Ylang that is everywhere now” (A. Tiandraza, personal communication, April 9, 2019). Even fruiting trees that would otherwise be left to produce are being used as firewood in the distilleries on the island (Bikiny, J.C.-, personal communication, April 15, 2019).

The clearing of the forests will lead to flora and fauna species loss, and as many interviewees mentioned, a decline in the amount of potable water. With fewer trees resulting from the clearing of the forest for firewood, transpiration of the forest will decline, leading to less rain. Jaomanonga, a small-farmer of Ylang has seen both a decline in forest cover and precipitation levels since he started growing the tree ten years ago (Jaomanonga, personal communication, April 11, 2019). This will lead to a decrease in productivity of the Ylang-Ylang tree because of its need for rain. In a negative feedback loop cycle, wherein one factor causes other factors to worsen, the deforestation of Nosy Be’s forests for the distillation of the flower will in turn lower the productivity of the tree.

Another issue stemming from deforestation is that of erosion. Clearing large swaths of land for firewood will leave the soil susceptible to large rain events. Trees and other herbaceous plants help retain moisture in their roots, and aid in stabilizing soils. The forested hillsides, which drain into the island’s volcanic lakes, are particularly important to the durability of soils on the slopes. If more trees are cut, more soil is washed away during large rain events, which results in the sedimentation of the island’s lakes and streams. The lakes are used as a water source for the main urban areas of the island—namely its main city of Hell-

ville. Jean-Claude Bikiny worries that the demand for firewood “will have an impact on the provisioning of water on Nosy Be.” The cutting of trees threatens the supply of water used by the entire population of Nosy Be, as well as the amount of water available for the distillation process. Erosion and a reduction of rain pose large threats to the terrestrial ecosystem, and the stock of water for the island. Both of these environmental challenges likewise threatens the viability of the industry on Nosy Be.

The Comoros, Nosy Be’s biggest competitor on the global market, has seen forest cover decline due to the rising demand for firewood and decades of intensive farming of the Ylang-Ylang tree (Doyen, 2006). Unlike Nosy Be’s deforestation problem that is just now starting to become more evident, the loss of forest cover has been a threat to The Comoros’ industry for more than a decade. Deforestation due to the demand for firewood and the urbanization of the island has led to a decrease in production of essential oil on the island-archipelago. A 2006 profile of the industry claims that importers have taken notice of Comoros’ supply decline and a reduction in quality of their oil exported abroad (Doyen, 2006). The report claims that there is now a “growing interest from importers for Malagasy production... due to the decline in Comorian production” (Doyen, 2006). SAB has seen more of a demand for their essential oil grades because of The Comoros’ dip in supply (L. Anjary, personal communication, April 10, 2019).

From an outsider’s perspective, it appears that Nosy Be may be now entering into the same downward trend that threatens the production of essential oil on The Comoros. In response to demand from abroad, Comorian cultivators and distillers of the Ylang-Ylang tree have had to harvest large portions of their forests for firewood. Half of the rivers on the island that supply water for the distilleries and of course provide other ecological and economic benefits have dried up (de Bontin, 2006). It seems likely that the island-nation did not have a plan for the management of forest resources to ensure that oil producers had a

continued supply of firewood, given the island's current situation. There are fears by some that Nosy Be's Ylang-Ylang industry may face the same challenges that The Comoros is now facing if the cutting of the forest continues at its current pace (L. Benjafy, personal communication, April 16, 2019).

Efforts are being made, however, by producers of the essential oil to ensure that they have a steady supply of firewood for the future. These projects were being undertaken by informal and formal distillers alike, independent of a government or other governing body encouraging them to do so (A. Tiandraza, personal communication, April 9, 2019). Tiandraza has begun replanting young trees in the places where he has felled trees on his property. Two other distillers told me that they have recently begun to employ a more sustainable forestry management system that consists of alternating between cutting a section of their land while allowing other portions of the land to regrow. One distiller said that she and her husband do this form of rotational cultivation because it helps their business, saying "It's our livelihood so we know we must conserve the trees" (Marie, personal communication, April 9, 2019). She says that the other informal distillers in their area are now doing the same thing because they know the importance of firewood for their businesses (Marie, personal communication, April 9, 2019).

The employees at the large producer-export companies said that they do their own part in reforesting the land that they use for firewood. These stakeholders told me that workers cut only the branches of certain trees, and rarely do they ever cut entire trees down (Fabrice, April 5, 2019 and Jean-Claude, April 4, 2019). They also replant trees that have died on their properties. Other than direct reforestation projects, the large exporters must pay a "forestry tax" of 1.5% applied to the value of the order which supposedly funds the state's reforestation projects. The principal project is a week-long replanting of young saplings in areas where there has been intensive cultivation of trees for firewood and charcoal. Many

people that I spoke with believed the government program to be ineffective. The initiative starts between February and March during the tail end of the wet season, which doesn't encourage the trees to grow as quickly as when saplings are planted during other times of the year (A. Salehi, personal communication, April 3, 2019). Bikiny viewed the reforestation program contemptuously, saying that it was purely a "formality of the state" (Bikiny, J.C.-, personal communication, April 16, 2019).

Discussion

Profit & Power Imbalance

The commerce of Ylang-Ylang is a set up in a way that primarily benefits importers outside of Madagascar, while the rest of the remaining profits are unequally distributed among the other stakeholders on Nosy Be. The well-known perfumers of the world buy the Ylang-Ylang essential oil and process it into expensive perfumes. A 15-milliliter bottle of Chanel N°5 Eau de Parfum sells for \$210, while other exclusive perfumes made by high-end producers sell for even more than that. A bottle of N°5 is sold every 30 seconds (Young, 2014). The importers, primarily from France, are able to buy Nosy Be's finished product, and make an even more valuable product through processing and marketing their perfumes and cosmetics. The balance of power in the trade of the Ylang-Ylang is hugely skewed in their favor.

It became clear during my time on the island just how valuable it is to have the contact of an importer abroad. Informal distillers would ask me for my help in procuring buyers in the U.S. who would want to buy their artisanal oil. This demonstrates the power imbalances present in the trade because Malagasy producers rely heavily on buyers from abroad to sustain their business. Importers have the market power to set the price for the oil since they know that producers and exporters rely entirely on them to sustain their businesses.

As such, importers establish a price that is far below what can be called a fair price for the producer-exporters on the island.

On the island of Nosy Be there are also tensions and imbalances between the different groups of stakeholders. Obviously, each stakeholder is hoping to make the most amount of profit from whoever they choose to sell their product to. For the small-cultivators that supply their flower yields to informal and formal distillers, they are resigned to selling a raw material at a low price per kilo. They lack the equipment to transform the flowers into a value-added product that can be sold for much more than just their flower yield. They are at the bottom of the supply chain and thus have the least amount of power in the trade system. The Executive Director of the Chamber of Commerce told me that a cultivator can make a living from selling the flower, but he knows that the price that they sell at is not the genuine price.

Informal distillers are also at a disadvantage in the trade. The distillers are barred from exporting the oil directly because they don't pay taxes on their stills and they lack the required paperwork required for exporters. They are resigned to selling their product to collectors and the main exporters who, again, pay below the market value for their product. The informal distillers believe that the system of commerce of the Ylang-Ylang is stacked against them. One distiller told me that profits in the Ylang-Ylang industry were doubled at every step of the production (E. Dزامандзар, personal communication, April 3, 2019). Another told me that she doesn't make nearly as much of a return as she should because of the structure of the system of commerce and because of her informal status (Marie, personal communication, April 9, 2019).

Finally, exporters are also at a disadvantage in the trade. There isn't an international price for Ylang-Ylang essential oil, the price is first established by the importer and then negotiations between the two groups. If the importer thinks that the price per kilo is too high

for their liking, they are able to find another exporter who will sell their oil for less. Exporters are constantly underselling each other to make money and strengthen connections with buyers from overseas (L. Anjary, personal communication, April 10, 2019). There is also little to no communication among exporters regarding the price at which they sell their oil or the contacts that they ship order to. According to SAB's CFO, this may be because of a lasting "colonial mentality" among the exporters who have connections with importers from abroad and are unwilling to cooperate with local Malagasy, whether they be entrepreneurs or small-farmers. She and I share the hope that with the liberalization of the market--that sees Malagasy people having dominant roles in all the stages of production—and with concrete policy changes, the current power imbalances will be resolved.

The other pressing concern for producers and exporters is the looming threat of deforestation stemming from the cultivation of the forest for firewood. If more sustainable forestry practices aren't adopted the future of the island's terrestrial ecosystem and water supply will be put in jeopardy which will have cascading effects on the Ylang-Ylang industry. If the issue of deforestation isn't addressed soon, Nosy Be will face the same fate of The Comoros' Ylang-Ylang industry that produces less of the oil now than when they used to. With more and more Malagasy farmers entering the trade by becoming cultivators, distillers and collectors, a lifeblood of the economy could crash.

Limitations

This very brief and incomplete survey suffered from multiple limitations that may have contributed to a diminished quality of work. The first is obviously time. The time spent on Nosy Be was limited to just two and a half weeks, which was not enough time to fully have an understanding of all the challenges and possibilities of the Ylang-Ylang trade. The second was time budgeting. I was based out of the city of Hell-ville, which impeded transportation out to the rural areas of the island where the majority of plantations and

distilleries are. I also wasn't able to talk to nearly as many people as I would have liked. I'm sure that at times during this paper and research process that I have made generalizations about the entire industry from the very few people I was able to interview. I wished that I had had more time to speak with the many stakeholders and understand their views. A big regret and misfortune was that I wasn't able to talk with anybody at the island's largest producer, SPPM. I was not allowed to conduct my study of the different people involved in the trade at their plantation, nor their distillery.

Conclusion

The Ylang-Ylang trade on Nosy Be is vital to the economy of the small island that relies heavily on foreign visitors for economic development. The tree was introduced by French colonials, and their legacy of plantation agriculture and their method of exportation continues to have lasting effects on the industry. In the last two decades, however, the Malagasy residents on the island have become more involved in the trade and have begun to reap more of the benefits that come from the orders of the essential oil from abroad. Unfortunately, especially for those at the bottom of the supply chain, the balance of profits and power remains concentrated at the top, while the rest of the profits are fought over by the exporters. The threat of deforestation also poses a huge risk to the industry. If more sustainable forestry practices are not implemented, then the industry will be adversely affected.

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